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Using environmental report cards to encourage constructive
stakeholder relationships in natural resource management:
developing a participatory report carding process

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Abstract

Environmental report cards are an increasingly widespread tool for reporting ecosystem health. In a report card, overall ecosystem health is typically presented as a grade from A to F, similar to school report cards. This overall grade is a product of assessing indicators of ecosystem health, such as water quality and biodiversity. In turn, the health of each indicator might be assessed using sub-indicators (e.g., water quality health might be indicated by salinity, turbidity, nutrient levels, and dissolved oxygen levels). Assessing an indicator requires setting thresholds defining what levels of salinity constitutes an A grade, a B grade, a C grade, and so on.

When published periodically (often annually), environmental report cards are apt tools for supporting adaptive management. Adaptive management is an iterative management approach whereby policies are implemented, their effects monitored and evaluated, and adjusted accordingly (Walters, 2002; Holling, 1978). By periodically synthesising monitoring data, report cards can help environmental managers to see changes in the environment they manage (including the effect of their management), and to adapt accordingly (see Harwell et al., 1999).

However, current research on report cards tends to focus on the report card *product* (the document constituting the report card) or the methodology of converting raw data into grades (see Connolly et al., 2013). The process of creating a report card has not been examined in depth, at least not insofar as such processes relate to social interactions among stakeholders. And yet it is well established that such social dimensions are critical to environmental and natural resource management (NRM). In particular, it is widely recognised that collaborative approaches can lead to better community engagement, more empowered decision-making, the inclusion of a more diverse set of perspectives, social learning, improved social capital, and greater acceptance of decisions leading to lowered risk of destructive conflict (Whelan & Oliver, 2005; Wondolleck & Yaffee, 2000; Daniels & Walker, 2001; Keen et al., 2005).

This thesis aims to develop environmental report cards as a tool for the express purpose of encouraging constructive stakeholder relationships. More specifically, it aims to develop a collaborative report card *process* that would encourage constructive stakeholder relationships. This tool is the central output of the thesis. Producing this tool required two linked research components. The first component identified what factors make stakeholder relationships in NRM more constructive or destructive. Conducted in the Australian NRM context, a total of 26 interviews with environmental managers and other stakeholders yielded over 20 factors, which were categorised into four themes. A mental model of these factors was created (the 'landscape' model), as a way of

helping people involved in NRM to make sense of the interplay between the factors. The findings of this study became an analytical framework for the second research component.

The second component critically documented an existing report card process, as practiced by the Integration & Application Network (IAN), within the University of Maryland, USA. IAN's program was chosen firstly because its report cards are utilised globally, and secondly because its collaborative process presented opportunities to examine whether and how it could be used to encourage constructive stakeholder relationships. IAN's process was observed over 8 months' participant-observation in 2013/14. Three US report card programs were examined as primary case studies: Long Island Sound, Arkansas & Red Rivers (within the Mississippi River Basin), and Chesapeake Bay. An additional 15 interviews were conducted with participants, funders and users of the three case studies.

Overall, the two components combined to enable IAN's report card process to be documented and critically examined from a relationship-building perspective. The result is a report card process designed specifically to encourage constructive stakeholder relationships. As report cards become more widespread, it is hoped that this thesis will enable them to play an expanded role – not just in communicating monitoring data, but in navigating the complex social and political relationships that make environmental management so intricate, fascinating, and rewarding.

Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly authored works that I have included in my thesis.

I have clearly stated the contribution of others to my thesis as a whole, including statistical assistance, survey design, data analysis, significant technical procedures, professional editorial advice, and any other original research work used or reported in my thesis. The content of my thesis is the result of work I have carried out since the commencement of my research higher degree candidature and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution. I have clearly stated which parts of my thesis, if any, have been submitted to qualify for another award.

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Publications during candidature

Kung, A. (2014) ‘Understanding and managing environmental conflict for social resilience’. Conference abstract for Resilience 2014 (4–8 May, 2014), Montpellier, France. Available at: <http://resilience2014.sciencesconf.org/25076>.

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Contributions by others to the thesis

The following persons contributed to the conception and design of the project, to confirming analysis and interpretation of research data, and to critically revising drafts. In order of contribution:

- Dr Brian S. McIntosh (International WaterCentre, principal advisor).
- Prof Poh-Ling Tan (Griffith University, School of Law, associate advisor).
- Prof Paul Lant (University of Queensland, School of Chemical Engineering, associate advisor).

In addition, Associate Professor Claudia Baldwin (University of the Sunshine Coast) provided feedback as part of the internal review processes conducted within the University of Queensland.

Statement of parts of the thesis submitted to qualify for the award of another degree

None.

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Keywords

Environmental report cards, natural resource management, stakeholder relationships, tools for collaboration, constructive conflict, destructive conflict, ball and basin model

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ANZSRC code: 050209 Natural Resource Management (10%)

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List of Abbreviations

AGWI	America's Great Watershed Initiative
AWI	America's Watershed Initiative
CB	Chesapeake Bay
CMA	Catchment Management Authority
DERM	Department of Environment, Resources and Mines (Queensland Government)
EPA	Environment Protection Agency
GBR	Great Barrier Reef
GBRF	Great Barrier Reef Foundation
GHHP	Gladstone Healthy Harbour Partnership
HH	Hempstead Harbour
IAN	Integrated and Application Network
IWC	International WaterCentre
LIS	Long Island Sound
LISFC	Long Island Sound Funders' Collaborative
LISS	Long Island Sound Study
MTAC	Mid-Atlantic Assessment Coalition
NH	Norwalk Harbour
NRM	Natural resource management
NSW	New South Wales
SSM	Soft Systems Methodology
TMR	Department of Transport and Main Roads (Queensland Government)
UMCES	University of Maryland Center for Environmental Science
US ACE	United States Army Corps of Engineers

Preface: background & motivation for this thesis

The story of this thesis begins when I was an undergraduate, studying Law and Environmental Engineering at the University of Melbourne. In 2008, Dr Graham Moore took a group of 10 engineering students, including myself, to the remote rural village of Ilahita, Papua New Guinea. At the time, Dr Moore was helping village leaders apply for a European Union grant to improve water and sanitation. In subsequent years, I visited twice more with Dr Moore.

In preparation for that first visit to Ilahita, I had received much advice about the imperative to ‘work with the locals’ and ‘talk to the community’ – and not just provide so-called solutions that failed to take into account local conditions and culture, disempowered the community (or parts thereof), or were otherwise unsustainable. But *how* does one ‘work with the locals’ and ‘talk to the community’? How can a visitor to a community interact with its members in a way that elicited rich data *and* built long-lasting relationships of trust and respect? The frustration of not knowing was the seed from which this thesis grew.

It was not until 2011 that I began considering undertaking a PhD to find out. In May, I flew to Brisbane to speak with Prof Paul Lant, Dr Brian S. McIntosh and Dr Peter Oliver, who were meeting me in their capacities as teachers and researchers at the International WaterCentre (IWC). They were later to become my PhD advisors, with Peter as the lead. Several days after that meeting, Peter called to invite me to visit the Kimberley region, in Western Australia, to explore potential for a thesis set there. He himself was going because, at the time, the IWC’s Master of Integrated Water Management involved no module focusing on water issues in Indigenous Australia. The IWC generously funded my trip, even though I had not, at the time, even decided whether I would undertake a PhD.

My trip to the Kimberley reprised the same sort of questions that arose in Ilahita. How can people work together to manage common land and water issues, when they have such competing interests, differences in cultural backgrounds, divergences in values, and a history of conflict and distrust?

It was on this trip that I, with Peter, began to articulate the ideas contained in this thesis. Originally planned to focus on cross-cultural communication and knowledge sharing in the Kimberley, the focus later shifted towards conflict, which I considered to be the trickiest scenario for such interactions to take place.

I started the PhD in February 2012. I had known since we met that Peter had terminal lung cancer. (He would probably want me to add that he never smoked, and that a third of all lung cancer sufferers are non-smokers.) In April 2012, he published in a newspaper excerpts from his personal

diary, describing his battle and what he still wanted to achieve (Oliver, 2012). Courageous, driven, and dryly witty, his diary included aspirations for me: ‘I have a PhD student who has just started this year. I’d love to see him finish.’

Peter died in November 2012, and Brian took over as principal advisor. In March 2013, Prof Poh-Ling Tan joined the project as an associate advisor. At around that time, we decided that the complexity and remoteness of the Kimberley made it unfeasible as a case study, and the thesis was refined to its present scope.

Nonetheless, the core elements remain. This thesis is fundamentally about helping people work together to tackle complex, ‘wicked’ problems relating to land and water.¹ Solutions are probably slow, usually elusive and never quite complete, but it is often critical that those affected by the problem (i.e. stakeholders) express their perspectives in meaningful ways, and develop trusting and respectful relationships so that they can work together. Ultimately, this thesis is about finding ways to encourage both the expression of perspectives and the development of strong relationships. With this premise, it is my pleasure to present this thesis.



Peter Oliver and I in the Kimberley, Western Australia – with Dr Anne Poelina, Nyikina Traditional Custodian. Photo: Ian Perdrisat, 2011.

¹ On the properties of ‘wicked’ problems, see Rittel and Webber (1973).

To Peter Oliver

in memoriam

Chapter 1. Introduction

By describing the background and motivation of the thesis, the preceding preface set out my personal aims for this research. This chapter sets out the thesis aims from a scholarly perspective. The key message is that I aim to produce research that is *useful* to people involved in natural resource management (NRM). Here, I explore the concept of useful research, and explain how the desire to produce useful research has led to this study's focus on relationships as *dynamic processes*. The chapter goes on to state the research questions, to articulate the significance of the research, and to present an outline of the thesis as a whole.

1.1. Tackling (some of) the challenges of natural resource management

This thesis is driven by a recognition that increasing resource stress makes resource management more difficult: resources must be shared fairly, among human *and* non-human users that are ever more connected, and who exist in the present *and* will exist in the future for generations (see Rittel & Webber, 1973; Ostrom, 1990; Borrini-Freyarabend & Jaireth, 2007; Barnett & Adger, 2007; Gross, 2014). This is a far-reaching challenge which has been approached from diverse perspectives. Some of these perspectives will be explored in the literature review in Chapter 2, but I note here that a major point of convergence is the need to involve and empower a broad stakeholder base in natural resource decision-making (Polasky et al., 2011; Wondolleck & Yaffee, 2000; Daniels & Walker, 2001; Konisky & Beierle, 2001; Dietz & Stern, 2008).

What makes for good stakeholder relationships, and how can such relationships be brought about? This is the overarching question of the study. More specifically, this thesis aims to evaluate environmental report cards as a tool for building constructive relationships among stakeholders in natural resource management.² This statement encapsulates the two components of the research:

1. A study of stakeholder relationships in NRM, focusing on relationships as dynamic processes (the Australian NRM study); and
2. A focus on the role of environmental report cards in influencing such relationships (the IAN report card studies).

Three explanatory notes are due here. Firstly, the term 'dynamic processes' focuses the research on how relationships change *over time* (dynamic), and how each change influences the course of the relationship (process). This perspective is adopted because many scholarly accounts of NRM

² The framing of 'good' relationships as 'constructive' (cf. 'destructive') is justified in Chapter 2.

relationships appear to focus on attributes of effective relationships – yet how those attributes interact over time is not deeply explored. Chapter 2 will examine this concept further.

Second, an environmental report card is a publication that typically reports the ecological health of a region. A river system might be monitored for its water quality, biodiversity and recreational capacities. ‘Indicators’ determine the health of each value. For instance, levels of salinity, turbidity, and nutrient *indicate* water quality. Grades are often assigned to indicators (e.g. turbidity falling within certain levels may be assigned a C+); this grading makes an environmental report card akin to a school report card. The scientific rigour underpinning report cards varies, with some undertaken meticulously, while others may be informal. An example of an informal indicator is the so-called ‘Fowler sneaker index’ – an annual community event in which members of the public wade into the Patuxent River (USA). The depth of water at which one can no longer see one’s white sneakers is taken as an indicator of water clarity (CBP, 2015). The literature review in Chapter 3 describes report cards in more detail, with a specific focus on the report cards studied in this thesis: namely, those produced by the Integration and Application Network (IAN). IAN is a part of the University of Maryland Center for Environmental Sciences, USA, and a prominent producer of report cards globally.

Third, ‘tool’ is defined as a practice that is used to achieve a particular purpose. ‘Practice’ means both the *process* of achieving that purpose (the actions taken), and the *products* that result from the process (any physical artefacts produced). Figure 1-1 presents these meanings. Thus, the word ‘tool’ in the thesis aim (evaluating environmental report cards as a tool for building constructive stakeholder relationships in NRM) means an evaluation of both the report card *products* (the physical document and the components of its design), as well as the report card *process* (the activities that led to the document’s creation), for the purpose of building stakeholder relationships.

Overall, this research aims to be useful to people involved in NRM. With this thesis, I hope to offer three useful things, as follows, while the next section examines the concept of ‘useful research’ and justifies why I aim to produce it in this thesis. The three useful things are:

- A shared understanding of how to foster and manage NRM relationships;
- A shared vocabulary with which people involved in NRM can think and talk about their relationships with other stakeholders; and
- A tool with which those people can improve their relationships with stakeholders, in the context of NRM.

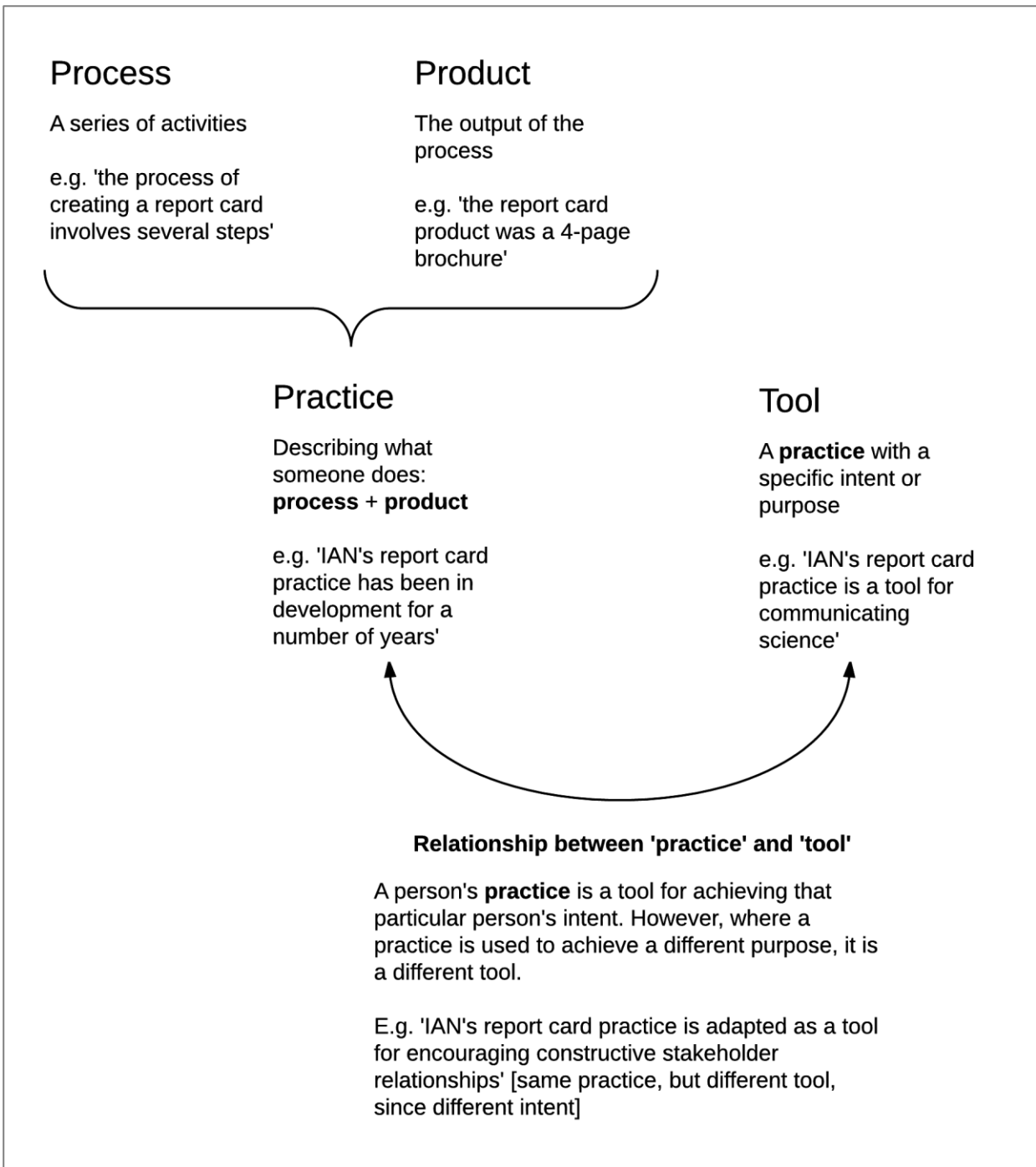


Figure 1–1 Defining process, product, practice, and tool

1.2. Why aim for ‘useful research’? Choosing practical social science

The idea of ‘useful research’ is, ironically, not very useful. One might ask: useful for *what*? In exploring Aristotelian concepts of knowledge, Carr and Kemmis (2004: 32–33) identify a number of purposes to which research might be applied. Knowledge may be advanced for its own sake (*episteme*). Or, knowledge might be applied in order to create something – a craftman’s knowledge (*techne*). Knowledge might also be applied to advance ‘ethical and political life’ – knowing what ought to be done and doing it. The last are encapsulated in the concepts of *phronesis* and *praxis*, and, at a broad level, they form the motivation for this thesis.

Phronesis has no modern-day English counterpart, but refers to ‘a prudent understanding of what should be done in practical situations’ (Carr & Kemmis, 2004: 132). Sometimes, it is translated as ‘practical wisdom’ (see, e.g. Coope, 2012; Suprenant 2012). It is a disposition to act truly and rightly, and to discover what is true and right (Carr & Kemmis, 2004: 34).

Flyvberg (2001) argues that *phronesis* is the goal of social sciences, distinguishing social sciences from natural sciences. According to Flyvberg (2001: 39), natural sciences aim to formulate ideal theories that are: explicit, universal, abstract, discrete (i.e., independent of human cultural context), systematic (i.e., constituting the whole), complete and predictive. Attempting to formulate such theories in the social sciences ‘seems impossible because human skills are context-dependent and cannot be reduced to rules, whereas a theory must be free of context and have rules’ (Flyvberg, 2001: 47). Rather, social sciences should be guided in producing the types of knowledge that encourage *phronesis* and *praxis* (Flyvberg, 2001: 57). Phronetic research seeks answers to three questions (Flyvberg, 2001: 60):

1. Where are we going?
2. Is this desirable?
3. What should be done?

Crucially, phronetic social science acknowledges that nobody has the experience and wisdom to completely answer these questions. Nonetheless,

[w]hat should be expected, however, is attempts from phronetic social scientists to develop their partial answers to the questions; such answers would be input to the ongoing social dialogue about the problems and risks we face and how things may be done differently (Flyvberg, 2001: 61).

If *phronesis* is thinking about what should be done, then its counterpart is *praxis*, which is doing what has been thought about. Carr and Kemmis (2004: 33) define *praxis* as thoughtful doing,

‘guided by a moral disposition to act truly and justly’ (i.e. guided by *phronesis*). Thus, *praxis* can be seen as the practical application of *phronesis*, which in turn sparks a renewed need for *phronesis*. This relationship is illustrated in Figure 1-2.

With this understanding of ‘useful research’, it is apparent that the first two ‘useful things’ articulated in the previous section (a shared understanding and vocabulary of NRM relationships) are an expression of *phronesis*. They aim to contribute to ‘ongoing social dialogue’ (Flyvberg, 2001: 61) about NRM relationships. The third useful thing (a tool to build constructive NRM relationships) is an example of *praxis*-driven research.

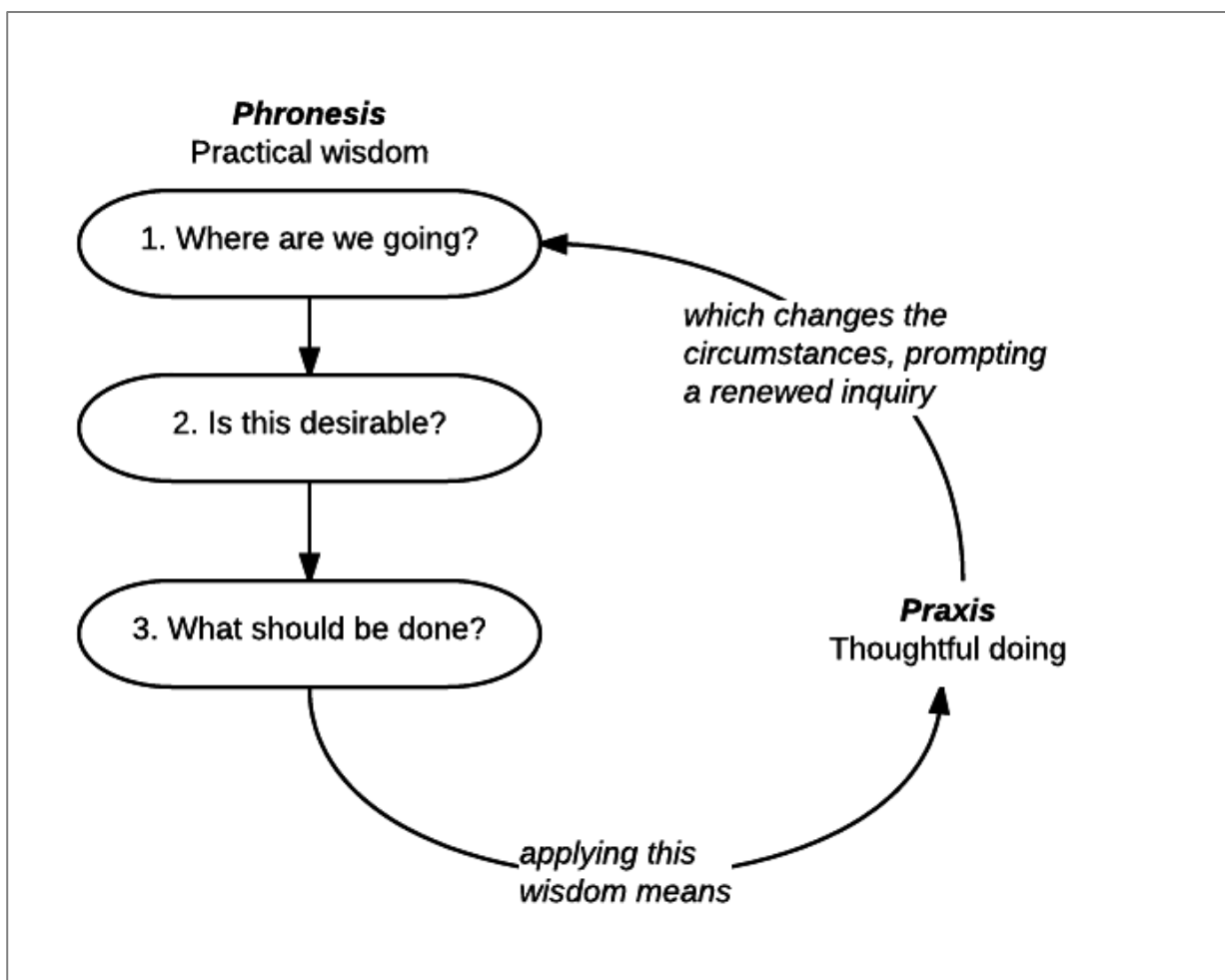


Figure 1–2 Relationship between phronesis and praxis
Adapted from: Flyvberg (2001); Carr & Kemmis (2000).

1.3. Research questions

This section states the research questions and describes the logic of the thesis. As noted, the central question is: what makes for good stakeholder relationships, and how can such relationships be brought about?

This overarching question is divided into three research questions:

1. What factors influence NRM stakeholder relationships to transition from constructive to destructive, and vice versa?
2. What defines IAN's report card practice?
3. Can (and how can) IAN's report card practice be used purposively to foster the constructiveness of NRM stakeholder relationships?

Table 1-1 maps these questions against the goals of phronetic research, and against the research tasks undertaken in this study. Figure 1-3 illustrates how the thesis aim fits together with the two components, the research questions, and the research activities undertaken. Note how the third research question completes the thesis aim, while the first two questions explore its premises.

Table 1–1 Thesis overview: research questions, research goals & activities

Phronetic goal	Research questions	Activities	Chapters*
Where are we going? Is this desirable?	(1) What factors influence NRM stakeholder relationships to transition from constructive to destructive, and vice versa?	Interview senior staff at NRM groups across Australia, plus triangulation against deeper case study (Mount Sylvia case).	Ch 2: Literature Review I Ch 5: Constructive and destructive relationships in Australian NRM
		Develop theoretical model to make sense of how relationships move between constructive and destructive modes.	Ch 6: A three-dimensional landscape model of stakeholder relationships
	(2) What defines IAN's report card practice?	Analysis of IAN's report card <i>product</i> : content analysis of 43 report cards.	Ch 3: Literature Review II Ch 7: Characterising IAN's report card product
		Analysis of IAN's report card <i>process</i> : observation of (and participant interviews relating to) three report card programs (Mississippi Basin, Long Island Sound, and Great Barrier Reef). (Some additional discoveries relating to process arose from the Chesapeake Bay case.)	Ch 8, Ch 9: Characterising IAN's report card process
What should be done?	(3) Can (and how can) IAN's report card practice be used purposively to encourage constructive NRM stakeholder relationships?	Interviews with users of report cards in Chesapeake Bay report card program.	Ch 9: Usefulness of IAN's report cards
		Synthesis report developing report card process for building relationships in NRM.	Ch 10: Synthesis: a report card tool for encouraging constructive stakeholder relationships

* Chapter titles have been abbreviated here for clarity.

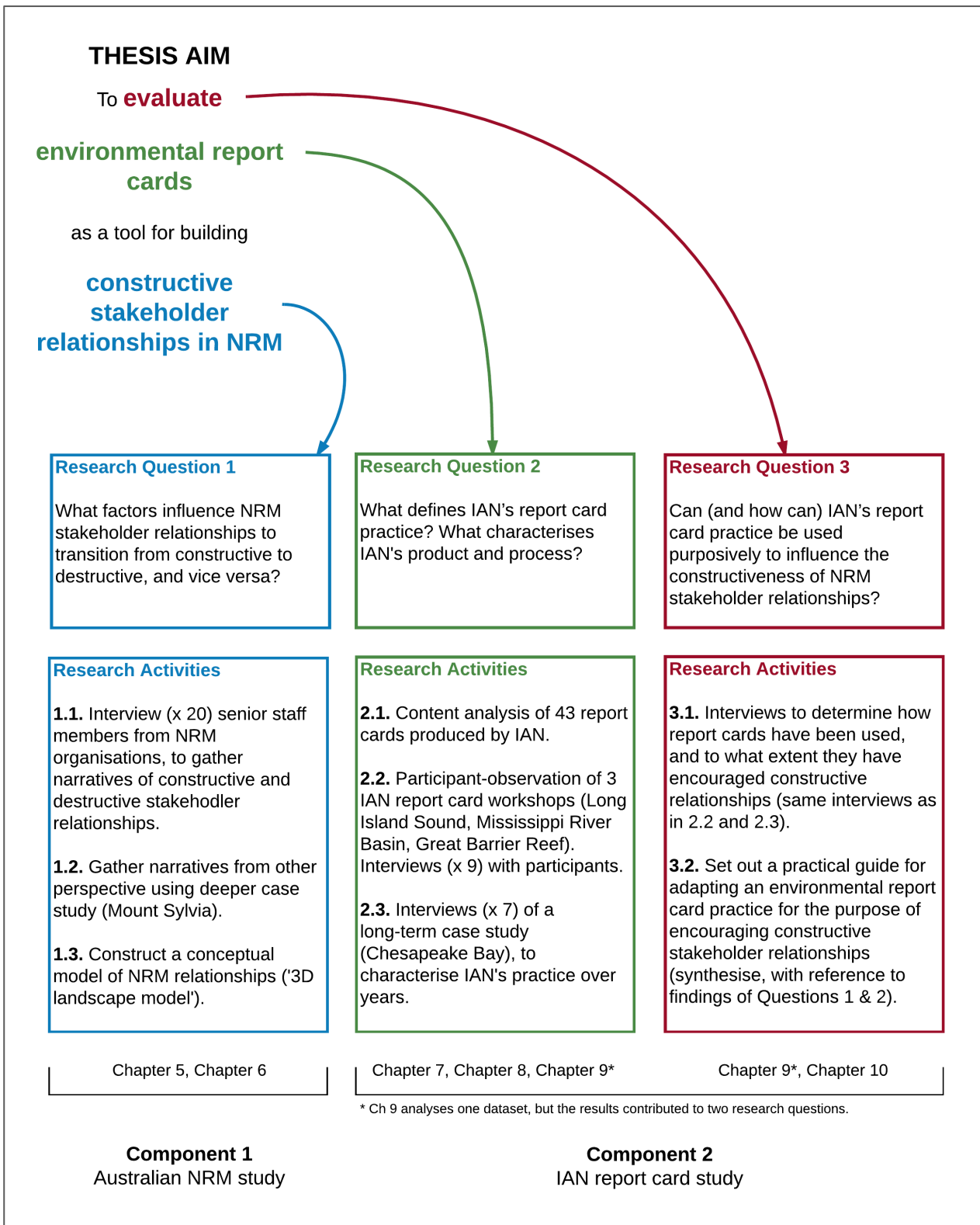


Figure 1–3 Thesis overview: aims, research questions, activities, components & chapters

1.4. Overview of qualitative social science methodology

As Table 1-1 shows, this thesis uses qualitative methods. These are discussed critically in Chapter 4. A brief explanation is provided here to orientate the reader to the methodological approach taken.

Qualitative research is a study of ‘things in their natural settings’, and an attempt ‘to make sense of, or to interpret, phenomena in terms of the meanings people bring to them’ (Denzin & Lincoln, 2000: 3). Qualitative research methods generally seek to elicit people’s interpretations of reality (e.g. through interviews, focus groups, content analysis, observations), although data gathered qualitatively can sometimes be treated quantitatively (e.g. statistical analysis of responses to open-ended questions; see Bryman, 2006: 100). It is difficult (even ‘futile’: Taylor & Trujillo, 2001: 161) to define qualitative research by reference only to methods; as Packer (2011: 2) emphasises, qualitative research is not merely ‘any kind of investigation that doesn’t use numbers’.

A deeper ontological perspective may be more helpful in characterising qualitative research. Merriam (2002: 3–4) writes that the ‘key to understanding qualitative research lies with the idea that meaning is socially constructed by individuals in interaction with their world’, and that ‘there are multiple constructions and interpretations of reality’. The researcher’s own construction and interpretation of reality is acknowledged. Packer (2011: 5) uses an analogy to make this point:

When we understand another person, we don’t merely find answers to our questions about them (let alone test our theories about them) but are challenged by our encounter with them. We learn, we are changed, we mature.

Therefore, designing qualitative social science requires careful and self-critical attention to *how* new social scientific knowledge is generated (the ‘research strategy’, *sensu* Blaikie, 2007: 56), as well as the ontological assumptions of the researcher. This thesis adopts a retroductive research strategy (Blaikie, 2007: 82–88), which seeks to identify unobservable structures and mechanisms of NRM relationships, and to explain observable patterns in such relationships. The retroductive research strategy is an iterative process by which a model is constructed to explain observed phenomena, then tested, and then refined and tested again (Blaikie, 2007: 83). A *subtle realist* ontology is adopted (Blaikie, 2007: 13–18). Realist ontologies understand reality to have existence independent of human minds (cf. idealist ontologies). Some sub-types of realist ontologies acknowledge that some knowledge is a human construct. *Subtle realism* sees reality as existing independently of human minds, but we (as humans and researchers) access such reality only by giving it a human construction (Blaikie, 2007: 17; quoting Hammersley 1992: 52).

This thesis sees NRM relationships as having some objectively existing components (*realism*), and also recognises that the pathway to analysing such relationships is through the understanding of the people in those relationships (*subtle realism*). Because qualities of these relationships are not directly observable, models of relationships are iteratively constructed in order to explain why they progress the way they do (retroductive research strategy). Consistent with the phronetic goal of social science, these models are not intended to be an absolutely correct or comprehensive representation of NRM relationships, but rather to provide useful ways to make sense of NRM relationships.

1.5. Significance of the research

In this section, 'significance' is considered in terms of the novelty of the research, as well as its practical benefit. This section provides a statement of the significance; justification is given in Chapters 2 and 3, and reiterated at the conclusion of the thesis in Chapter 11.

Recall that this thesis is divided into two components:

- A study of stakeholder relationships in NRM, with a focus on relationships as dynamic processes; and
- An exploration of how IAN's report card practice can be used to encourage constructive relationships.

The first component is novel because many studies of NRM relationships do not explicitly analyse the temporal dimension of such relationships. Often a list of attributes are submitted as leading to effective relationships (however defined), but how those attributes interact, and at what point in time, is neglected. Some scholars do examine NRM relationships as processes. Poncelet (2001) argues that conflict and collaboration, in an environmental management, should be researched as a process (specifically, as an ethnographic process). Yasmi et al. (2006) construct eight common patterns of conflict escalation in NRM. These papers demonstrate process models of NRM relationships, but not all process models are dynamic. This study imports into NRM scholarship emerging and resurgent applications of dynamic process methodology from the conflict literature (see Coleman, 2011; Vallacher et al., 2011; Vallacher et al., 2013) and the psychology literature (see generally Valsiner et al., 2009).

The second component is novel because it examines report-card production as a social process, by which stakeholder relationships can be nurtured. A literature review revealed no published study undertaking this investigation. There are some studies relating to indicators more generally, as opposed to report cards (e.g. Fraser et al., 2006; Reed et al., 2005, 2006, 2008). This thesis appears

to be the first to focus specifically on report cards, and certainly the first to examine the report cards produced by IAN.

Finally, this thesis is significant because it provides practical tools for encouraging constructive and productive relationships in NRM. Participatory approaches to NRM are likely to continue to be supported and implemented for the foreseeable future (Green & Dzidic, 2014; Lockwood et al., 2010; Head & Ryan, 2004; Whelan & Oliver, 2005); this thesis provides a practical way to implement principles of participatory governance.

1.6. Thesis in outline

Chapter 2 reviews the literature on relationship building, in the context of NRM relationships and beyond. In doing so, it argues that the commonly adopted frames of ‘collaboration’ and ‘conflict’ do not account adequately for relationships as dynamic processes. It argues that relationships constantly move through periods of conflict and collaboration, and that each inescapably involves the other. A better way of making sense of NRM relationships is to observe that relationships tend to gravitate towards ‘constructive’ and ‘destructive’ states – this framing is substantiated to justify its adoption throughout the thesis.

Chapter 3 reviews the literature on tools for building relationships, in NRM and other contexts, situating report cards within families of other tools.

Chapter 4 sets out the research design for this thesis. It explores the methodological choices made, and critically examines the methods used to undertake this study.

Chapter 5 reports the results from a study of constructive and destructive relationships in Australian NRM. In this study, 20 interviews were undertaken with senior staff at NRM organisations around Australia. An in-depth case study was also undertaken. The purpose of this study was to identify what factors influence the course of constructive and destructive relationships in NRM, and why. This chapter also functions to establish empirically attributes of constructive and destructive relationships, setting up the IAN research in later chapters.

Chapter 6 provides a mental model for conceptualising constructive and destructive relationships. It is presented because existing ways of understanding NRM relationships were found to be inadequate for representing the findings observed in Chapter 5. This chapter argues that, as relationships evolve over time, they can be thought of as moving through a ‘landscape’ of relationship states, where some features in the landscape are constructive or destructive.

Chapters 7, 8 and 9 examine IAN's report card practice. **Chapter 7** conducts a content analysis of 43 IAN report card *products*, to identify distinguishing features of IAN report cards.

Chapter 8 describes the *process* of creating IAN report cards. Two report card programs were examined, and are presented as case studies: (a) Long Island Sound (USA), (b) America's Watershed Initiative – Mississippi Basin report card (USA). There was an opportunity to observe a third program, the Great Barrier Reef climate change resilience index (Australia), and while observations from this program are recorded as research results, it was not systematically examined as a case study. This chapter argues that IAN's report card process demonstrates many of the factors identified in Chapter 5 as being conducive to constructive relationships.

The case studies in Chapter 8 are nascent report card programs, all conducted in 2013–2014. In order to document IAN's process and its effect on stakeholder relationships over a timescale of years, **Chapter 9** examines an established report card programs for Chesapeake Bay (USA), which began in 2006. Report card users were interviewed to assess how report cards have influenced their stakeholder relationships.

Chapter 10 synthesises the research into a practical guide for using report cards as a way of building constructive stakeholder relationships. It also links the IAN report card studies with the Australian NRM study, and provides directions for further research.

Chapter 11 evaluates how well the activities addressed the research aims and questions set out in this chapter. It summarises contributions to knowledge and an agenda for further research, and also reflects upon what I have learnt as a PhD student.

Chapter 2. Literature review I: why frame this thesis in terms of constructive and destructive relationships?

2.1. Introduction

The first purpose of this literature review is to set out established knowledge about relationships between stakeholders in NRM contexts – specifically, about what drives them to change. A special focus is placed on the collaboration and conflict literatures, because it is there that NRM stakeholder relationships have been most explored. The second purpose is to argue that neither the collaboration nor conflict literatures provide analytical frames that are suitable for this thesis, because neither adequately accounts for a *dynamic process* view of relationships. Instead, the concepts of ‘constructive’ and ‘destructive’ relationships are advanced. This chapter begins by exploring what is meant by ‘dynamic process’, before moving on to a review of the collaboration and conflict literatures respectively.

2.2. Justifying the focus on dynamic processes

In this thesis, ‘process’ refers to a distinction in the management literature between ‘process models’ and ‘variance models’. Van de Ven (2007) uses these terms to describe ways of explaining the effect of a management choice. Variance models focus on the variables that represent ‘the important aspects or attributes of the subject under study’; they ‘establish the conditions necessary to bring about an outcome’ (Van de Ven, 2007: 150–1). While variance models indicate ‘antecedents and consequences of something’, process models show how things ‘develop and change over time’ (Van de Ven, 2007: 158). Figure 2-1 illustrates this distinction: the variance model *lists* attributes that lead to an outcome, whereas the process model sets out *sequences* of events, activities, and choices to reach an outcome.

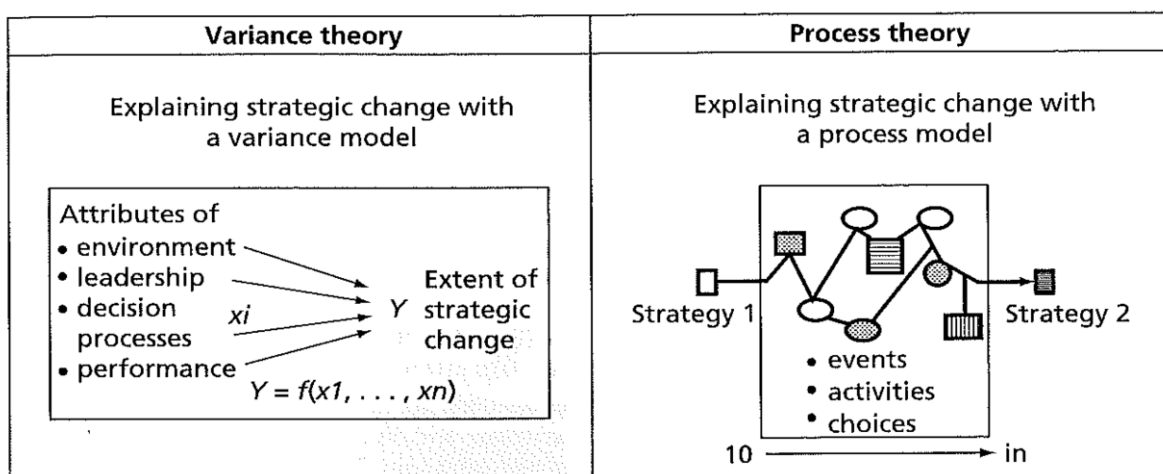


Figure 2–1 Variance versus process models
 Source: Van de Ven (2007: 149).

The choice of process model in this thesis is not to imply that process models are superior to variance models. Rather, a model is a ‘representation of reality’ (Wainwright & Mulligan, 2004: 6), and constructed to highlight particular aspects of interest. In this case, the aspect of interest is how relationships change over time, and it is of interest for two reasons. Firstly, relationships are dynamic: they change over time, and any analysis of why a relationship came to be the way it is must account for the history of interactions between the parties to that relationship. As Lauro-Grotto et al. (2009: 2) state:

In our opinion, the defining characteristic at stake is the explicit dependence on time... Any description that does not take into account the temporal evolution of the phenomenon would not show any power of explanation.

The dynamic nature of relationships is intuitive, even from one’s own interpersonal relationships: trust, camaraderie, commonality of interests, desire to get along (or not!) – all vary with time. Process models account for such variation.

The second reason for choosing a process model is pragmatic. A variance model may reveal the preconditions of a constructive NRM relationship, but may not illuminate how those preconditions might be achieved or lost through one’s choices. The question, ‘What needs to be in place to achieve constructive relationships?’ is different from ‘What should I do *now*?’, because the latter acknowledges that one’s choices are conditioned by what has come before and what might come concurrently and in the future. Using a process model gives greater practical guidance, and better fulfils the aim of *phronesis*.

This chapter now reviews the literature on NRM relationships, focusing on the collaboration and conflict literatures. The aim of the review is not only to capture the state of knowledge in relation to NRM relationships, but also critically to use the literature to formulate a dynamic, process-oriented conception of NRM relationships.

2.3. Collaboration in NRM

Literally, ‘collaborate’ means ‘to work together’, but its use in environmental management and governance has acquired deeper layers of meaning. Distilled, it describes various arrangements of people and groups working together, from agency–agency partnerships to public participation in political decisions (Whelan & Oliver, 2003). It sometimes connotes a parity of decision-making power, so that each collaborator must have a meaningful ability to influence decisions (Fung & Wright, 2003). In the context of public participation, IAP2 (2014) considers collaboration to be

more empowering than merely promising to reflect others' input, but less empowering than actual granting of decision-making power.

Several literatures converge in their general support of collaboration in environmental management. The adaptive management literature generally supports collaboration because it recognises that ecosystems and societies are so complex that nobody can fully predict the effect that management actions would have, nor the challenges that may arise in the future (Ison, 2010; Flood & Ulrich, 1991; Funtowicz & Ravetz, 1994; Walker & Salt, 2006). As Gunderson and Light (2006) note, adaptive management 'acknowledges the deep uncertainties of resource management and attempts to winnow those uncertainties over time by a process of using management actions as experiments to test policy' (citing Walters, 1986). Collaboration is way of diversifying the data sources available for monitoring the effects of management actions on a system and vice versa.

Concepts of social justice are also used to support collaboration (and other forms of participation) in environmental decision-making (Lukasiewicz & Baldwin, 2014; Smith & McDonough, 2001; Lawrence et al., 1997). Environmentally based social justice is commonly analysed in terms of distributive, procedural, and interactive or relational justice (Lukasiewicz et al., 2013; Gross, 2014). Distributive justice relates to the 'perceived fairness of a decision'; procedural justice to the 'processes of decision making'; and interactive justice to the 'perceived fairness of interpersonal treatment by decision makers' (Lukasiewicz et al., 2013). Procedural justice is exhibited where, for example, decision-making practices provide stakeholders with opportunities to voice their concerns, values and interests. The inclusion of additional perspectives may lead to better distributive justice (e.g. by informing decisions that lead to equitable distribution of resources). Where interactions among stakeholders are conducted with trust, respect, honesty and propriety, interactive justice outcomes may be achieved (see Lukasiewicz and Baldwin, 2014: 8). In this way, collaboration is supported by a social and environmental justice frame.

The political science literature offers similar justification for collaborative approaches. Providing for (at least) the procedural right to voice one's values and beliefs is a core principle of democracy (Fung & Wright, 2003). A collaborative approach may be an apt mechanism for realising such a right, especially if stakeholders' voices are not only heard, but also channelled towards constructive and creative outcomes (Deutsch, 1973; Daniels & Walker, 2001; Syme & Nancarrow, 1992; Syme & Sadler, 1994; Susskind et al., 1999).

Concepts of collaboration are a recurring theme within the NRM governance literature. Ostrom's seminal works on collective action (Ostrom, 1990, 2010a, 2010b, 2014) show that people can and do collaborate in order to create sustainable modes of self-governance. Indeed, when NRM

organisations are given freedom to self-govern, motivation to collaborate is often improved (Marshall, 2009; Curtis et al., 2014). Davidson et al. (2006) emphasise that good NRM governance requires inclusive and meaningful engagement of stakeholders, as well as inputs of knowledge from diverse perspectives. In the Australian NRM context, Head and Ryan (2004: 377) examine a particular mode of collaboration as ‘co-governance’, wherein governance is ‘managed through a strategic framework of cooperation rather than primarily through regulatory and legal mandate’. Lane (2003) and Wallington et al. (2008) examine the trend of decentralisation in Australian NRM governance, and caution that mere decentralisation does not make good governance, because actors benefiting from existing power structures can still dominate decision-making processes. Instead, ‘collaborative relations between diverse state entities, the market, and civil society’ ought to be fostered (Lane, 2003: 369), and a degree of state control is warranted, particularly in establishing and maintaining institutions for good governance – i.e. metagovernance (Wallington et al., 2008: 10). Despite these concerns, the collaborative institutional arrangement of Australian NRM is considered at least by some to be a ‘successful experiment’ (Curtis et al., 2014).

Additional literatures generally supporting collaboration include social learning and social capital. Social learning happens when people within a society ‘engage one another, sharing diverse perspectives and experiences to develop a common framework of understanding and basis for joint action’ (Schusler et al., 2003: 311–12). Social capital comprises networks of trust, and shared values, social norms and moral obligations (Putnam, 1993; Coleman 1994). It is accumulated when individuals feel confident ‘to invest in collective activities knowing that others will do so’ (Pretty, 2003: 1912; also Whelan & Oliver, 2005: 11; Schusler et al., 2003). These descriptions suggest that collaboration is seen as one pathway towards social learning and building social capital.

Despite general support, mere involvement of stakeholders in a decision-making process is not enough to make collaboration normatively ‘good’. In his work on NRM partnerships, Oliver (2004) points out that

conquerors could not win wars if they did not cooperate with their allies. Nazi Germany would not have been able to occupy most of Europe without the help of collaborators from the countries they occupied (citing Eisler and Koegel, 1996).

What, then, is required for ‘good’ or desirable collaboration? Conceptions of collaboration often involve some devolution of state-based power. Wondolleck and Yaffee (2000: 11–14) describe collaboration in North American NRM emerging in opposition to the command-and-control management paradigm of the 1960s and 1970s. They describe how technical expertise had traditionally been an authoritative basis for decision-making, but public values shifted as open

spaces dwindled and as television media brought environmental catastrophes to the public consciousness. Thus, some conceptions of collaboration hearken to democratic ideals or justice frames, perceiving collaboration as a way of ensuring that decisions are supported by those on whose behalf such decisions are made (Fung & Wright, 2003; Gross, 2014).

Because this conception of collaboration rests on a redistribution of power, the limits of collaboration often also relate to power relations between collaborators. Power here refers to the relationship between two people, rather than any quality held by a person unilaterally (Kelly, 2005; Ledyae, 1997). In her seminal paper reflecting on the American civil rights movement, Arnstein (1969) described a 'ladder of citizen participation' involving eight 'rungs' of power distribution. At the bottom rungs, participation is 'manipulation' or 'therapy' where it is merely an 'empty ritual' contrived to legitimise decisions made by incumbent decision-makers. At the top are 'citizen control', 'delegated power', and 'partnership', where citizens acquire 'decision-making clout' – that is, the capacity to have input that actually affect outcomes. 'Informing', 'consultation', and 'placating' comprise the middle rungs, where communication with the public is generally well meaning but the public lack ability to affect outcomes. Others have recognised that the rhetoric of collaboration may entrench unjust power relations while providing a veneer of legitimacy (Cooke & Kothari, 2001; Wallington et al., 2008). In NRM, it has been recognised that certain groups may be marginalised where 'the community' (with whom decision-makers seek to collaborate) is restrictively defined (Harrington et al., 2008; Curtis et al., 2014). Collaborators must have a certain parity of power in order for genuine collaboration to function (see Fung & Wright, 2003), although as noted above mere decentralisation is not itself sufficient (Lane, 2003). These preconditions have been considered highly relevant to collaboration in NRM (see generally Tan et al., 2012; Whelan & Oliver, 2003).

Therefore, the 'place and limits' of collaboration (Whelan & Oliver, 2003) appear quite uncontroversial: collaboration is a good approach to NRM, provided that certain preconditions are satisfied. However, the fact that there are so many caveats make 'collaboration' an unsuitable frame for assessing NRM relationships. Clearly, what matters is not the *mere fact* that people are working together (i.e. collaborating), but the *qualities* of their relationship – a parity of power, a mutual willingness work together, a shared quest for solutions, and so on. What other qualities might be used to define a constructive relationship, and how might they be organised into a process model? This review found that the conflict literature gave a more direct response.

2.4. Constructive and destructive conflict

The conflict literature is ‘mountainous’ (Wall & Callister, 1995) and the aim of this review is not to provide a comprehensive overview of the field, but (a) to identify qualities of constructive and destructive relationships, and (b) to construct a process model of such relationships. Note that the constructive/ destructive framing was not chosen only on the basis of a literature review. Rather, as discussed in Section 5.1.1, this frame was not actually explored until *after* the Australian NRM research was nearly complete. Analysing those results suggested that the original phase-model framing was a poor fit, and further exploration of the literature led to the adoption of this binary.

2.4.1. Why use the labels ‘constructive’ and ‘destructive’?

Conflict is defined variously, as Table 2-1 shows. All definitions involve some interdependence between the actors (or parties) within a conflict (else, they would not bother to fight), incompatibility or perceived incompatibility (otherwise there would be nothing to fight over), and action based on that incompatibility (otherwise the would-be conflict would not manifest). This thesis concerns itself with social conflict, which extends only to situations where the conflicting individuals or groups interact; thus, armed conflict between nation states is not social conflict (see Kriesberg & Dayton, 2012: 2) and not considered here.

Table 2–1 Definitions of social conflict

Author	Definition of social conflict
Coser (1956)	Social conflict is a struggle between opponents over values and claims to scarce status, power and resources.
Deutsch (1973)	A conflict exists whenever incompatible activities occur... one party is interfering, disrupting, obstructing, or in some other way making another party's actions less effective.
Folger et al. (2004)	Conflict is the interaction of interdependent people who perceive incompatibility and the possibility of interference from others as a result of this incompatibility.
Kriesberg & Dayton (2012)	A social conflict arises when two or more persons or groups manifest the belief that they have incompatible objectives.

Conflict is a neutral term, although it is associated with negative circumstances (McCorkle & Mills, 1992; Daniels & Walker, 2001: 27). In this way, conflict is a natural counterpoint to collaboration – both describe relationships between people, both are neutral, but one carries an instinctive positive connotation and the other negative. That instinct is misleading, however. There is general consensus that some social conflict is healthy. As Coser (1956: 31) states:

no group can be entirely harmonious, for it would then be devoid of process and structure. Groups require disharmony as well as harmony, dissociation as well as association; and conflicts within them are by no means altogether disruptive factors. Group formation is the result of both types of processes... Far from being necessarily dysfunctional, a certain degree of conflict is an essential element in group formation and the persistence of group life.

In other words, conflict is essential to social functions because it is a mechanism for expressing dissatisfaction, and for challenging and adjusting norms (Coser, 1956: 154). Equivalently, conflicts can involve ‘productive friction’, which ‘accelerates innovation through the interaction of different perspectives’ (Kofinas et al., 2007: 259; citing Hagel & Brown, 2005).

Of course, not all conflicts improve social function. Deutsch (1973: 351–99) distinguished between *destructive* and *constructive* (or equivalently, productive) conflicts by reference to their outcomes. Constructive conflicts leave participants satisfied with the outcome and feeling that they have gained something. Destructive conflicts leave participants dissatisfied, with a sense of having lost something. The terms ‘gain’ and ‘loss’ (often combined as ‘win-win’ or ‘win-lose’ scenarios; e.g. Fisher & Ury, 2012) are not limited to material interests, but extend to intellectual and emotional elements. Gains might include ‘new ideas, greater clarity of others’ positions, or a stronger sense of solidarity’ (Folger et al., 2005: 9). Non-material losses may include as loss of face, distrust, and feelings of hostility and estrangement (*ibid*).

Because conflicts can be desirable or undesirable, it is again difficult to use conflict *per se* as an analytical frame. Like collaboration, it is not the *mere fact* of stakeholders being in a conflict that matters, but the qualities of the relationship during the conflict. The conflict literature corroborates this conclusion: many texts on collaboration (e.g. Wondolleck & Yaffee, 2000; Whelan & Oliver, 2003) discuss the need for dispute resolution, conflict management, negotiation, and related processes. The implication is that conflict will occur even in the best collaborative relationships – though the NRM collaboration literature tends to adopt a more negative view of conflict than the conflict literature, seeing conflict as a problem to be addressed or prevented, rather than a potential opportunity for growth. Whelan and Oliver (2005: 35–36) provides an example:

Conflict is widespread and endemic in NRM culture generally... We agree and find it no surprise that ideas of control and domination cause conflict when people try or are forced to work outside their ‘cultural comfort zone’ and to collaborate or partner with others.

Texts that see conflicts as a problem to be addressed or prevented tend not to describe conflict processes in great detail; addressing conflict is an important but unproblematised task to be undertaken alongside ‘building trust’ and ‘linking actors’ (e.g. Folke et al, 2005; Pomeroy &

Douvere, 2008). Texts that overlap between conflict and collaboration (e.g. Daniels & Walker, 2003, which proposes a collaborative approach as a method of working through environmental conflict) tend to accept that conflict is neither good nor bad inherently.

2.4.2. Attributes of constructive and destructive conflicts

What are the qualities of constructive and destructive conflicts, and how might they be accounted for in a process model? Attributes of destructive conflict are widely documented, probably because there is greater demand for such analysis (intuitively, we turn to texts more when we have problems to solve, and less so when things are going well). Consequently, this review does not claim to be exhaustive. Table 2-2 below synthesises six key texts on conflict to describe what leads to destructive conflict. Four main, overlapping factors are suggested. They are:

- Expanding scope of conflict;
- Threats to something of central importance to parties;
- Widening distinction between self and other; and
- Blindness to constructive options.

Note especially that the table is structured to show how each factors lead to others. Figure 2-2 depicts the same factors as a concept map, which further highlights the interactions between destructive factors.

Table 2–2 Attributes of destructive conflict

Factors contributing to destructiveness, where those factors arise, and what they lead to.

Factor	Comes from	Leads to
<p>Expanding scope of conflict</p> <p>Rather than focus strictly on the issue at hand, a conflict can expand to other issues, making the issue bigger and more intense.</p>	<p>Often, scope expansion comes from a history of <u>conflict avoidance</u> (or otherwise repressed conflict): grievances accumulate, only to break out in intense, multi-issue conflict when triggered.⁶</p> <p>Repression and avoidance are themselves typical of <u>large power imbalances</u> between conflicting parties.²</p>	<p>Multiple issues tend to make the conflict <u>more central</u> to the parties (see next row), either because a key issue is drawn into the conflict, or because the sheer volume of accumulated grievances makes the conflict central.¹</p>
<p>Centrality of issues</p> <p>Threats to things of central importance to an individual or a group discourage cooperation.¹</p> <p>Such threats can include threats to one’s existence, identity, honour, or face.^{1,2}</p> <p>Conflicts become not problems to be solved, but contests of will.¹</p>	<p>Grievances may accumulate such that the conflict acquires <u>all-or-nothing stakes</u>;² sometimes, the issues are framed early on to be all-or-nothing or <u>win-lose</u>.^{3,6}</p>	<p><u>Increased tension</u> reduces intellectual resources to address conflict. Parties respond with <u>knee-jerk reactions</u>, with self-protection and retaliation the likely response.² There is a focus on immediate rather than overall consequences, which distracts from the issue at hand, thus <u>expanding the scope</u> of conflict.¹</p> <p>Knee-jerk reactions also promote simplistic <u>binary judgments</u> (good/ evil; for/against), which widens <u>self–other distinctions</u>.¹ Fear of revealing too much (a <u>suspicious, hostile attitude</u>) closes <u>communication</u>,¹ and increases likelihood of threats and coercion.²</p>
<p>Wide self–other distinction</p> <p>Groups define members and non-members as a way of defining their identity.⁶</p> <p>There is an attitude that one’s own group is superior or incompatible with others in the conflict.</p>	<p>In some cases, there is a clearly perceived boundary between groups (e.g. ethnic or religious groups).⁶ The relationship history between parties may also import a pre-existing a self–other distinction.²</p> <p>Reflexive responses like <u>binary judgments</u> and <u>defensive behaviour</u> can increase self–other distinctions.^{1,2,3}</p>	<p>Seeing others as very different <u>erodes hope</u> of successful cooperation, as well as reduces the ability to <u>trust</u> and the confidence to <u>communicate</u>.⁴</p> <p>It can enrage opponents when <u>behavioural norms within a group are suspended</u> when that group deals with others (i.e. permitting normally outrageous behaviour, as long as it is against the ‘other’).¹</p> <p>Alternatively, a party might <u>apply the wrong norms</u> to judge own or others’ behaviour, leading to <u>unpredicted responses</u> that shock and elicit more defensive behaviour.¹</p>

Factor	Comes from	Leads to
<p>Blindness to alternatives</p> <p>Parties become unwilling to consider alternatives, and/or are insensitive to others' signals indicating their willingness to cooperate.^{1,2}</p> <p>They may be trapped in a mindset that compels them to persist in an existing strategy.^{1,6}</p>	<p><u>Poor communication</u> can make a party unaware of shifts in others' attitudes.^{1,2} Some psychological traps may lead to such rigidity:¹</p> <ul style="list-style-type: none"> • <u>Gambler's temptation</u> (continued belief in chances of success despite repeated failure). • <u>Dissonance reduction</u> (inflating gains to be made—e.g. honour, status, survival—to justify the cost of past struggles). • <u>Circular, incremental magnification</u> (attributing failure of a strategy to not enough of that strategy). 	<p>Blindness to other party's cooperative overtures <u>reinforces self–other distinctions</u>.</p> <p>Parties become frustrated and worn down, increasing tensions and making parties <u>more rigid</u> and <u>more risk adverse</u>; hence less likely to try new, potentially innovative solutions.¹ (Though sometimes frustration can precipitate beneficial changes in strategy – see discussion on constructive conflict below.)</p> <p>Prolonged conflict may bind one's identity, honour, or 'face' to winning via a certain strategy, making it <u>embarrassing to change approaches</u>, thus increasing the centrality of winning by the existing, ineffective strategy.</p>

¹ Deutsch (1973), ² Folger et al (2005), ³ Fisher & Ury (2012), ⁴ Wondolleck & Yaffee (2000), ⁵ Sidaway (2005), ⁶ Kriesberg & Dayton (2012)

Attributes of *constructive* conflict are harder to discern from the conflict literature, perhaps because the primary focus of conflict scholarship relates to resolving destructive conflicts (as noted above, we turn to texts more when there is a problem to solve). Some (particularly Deutsch, 1973: 459) argue that conflicts become constructive when elements of creative problem-solving are present: namely, motivation to try new things, a safety net in case those things fail, and an environment that encourages new ideas. Like Deutsch, Lewicki et al. (2003) emphasise cognitive processes of ‘framing’ and ‘reframing’ in order to find ways out of intractable conflict, while others argue that a shared social identity is prerequisite to resolution (Colvin et al., 2015; Fielding & Hornsey, 2016). Others, like Folger et al. (2005), also emphasise environmental factors, such as a safe forum for discussion, the dignity of the actors involved, and a climate of trust and optimism.

The concept of trust is emphasised frequently in the conflict literature (Curşeu & Schruijer, 2010; Shrum et al., 2001; Sanders & Schyns, 2006; Balliet & Van Lange, 2013; Head, 2012), and specifically within the NRM context (Abbas et al., 2015; Beierle & Konisky, 2000; Tennberg, 2007). Trust is a complex and many-faceted concept, and is the subject of its own body of literature, having been discussed as a cognitive product, an interpersonal relational quality, an impersonal abstract quality (e.g. trust in public institutions), and the product of a rational choice (Hardin, 2002; O’Neill, 2002; Tennberg, 2007; Gambetta, 1988). Hoffman (2002: 376–7) reviews the literature to provide a useful working definition, adopted for this thesis:

Trust refers to an attitude involving a willingness to place the fate of one’s interests under the control of others... based on a belief, for which there is some uncertainty, that potential trustees will avoid using their discretion to harm the interests of the first.

Finally, many texts also recognise the potential for third party intermediaries to encourage productive negotiation, the discovery of mutual gains, and consensus-building (see Susskind & Field, 1996; Susskind et al., 1999, 2000; Christie, 2008; Blackburn & Bruce, 1995). O’Leary (1995: 29–30) reviews the literature to identify that mediators can move a conflict towards constructiveness by: identifying the costs and benefits of mediation (often highlighting the stakes of *not* coming to a mediated consensus); clarifying values at stake; addressing information asymmetries; and building trust. To do so, however, mediation must be the best alternative available (else there is no incentive to participate); all parties with substantial interests must be represented; they must accept the mediation process, the issues in dispute, and the agreed facts; and the mediator must be trusted and impartial (Blackburn & Bruce, 1995: 276–8). Provided that these circumstances are satisfied, intermediaries can help to bring about the preconditions of constructive conflict.

The role of third parties in bringing about such preconditions can also be expressed using a social justice and environmental justice frame, which was discussed in Section 2.3. For example, a neutral third party can help advance procedural justice by inviting otherwise disempowered groups to make their voices heard, and by suppressing decision-makers' biases (Lukasiewicz & Baldwin, 2014: 2, 6–7). An intermediary may also encourage interactional justice, by ensuring that interactions between parties are conducted with respect, honesty and propriety (*ibid*: 8). Seen in this way, constructive conflict is encouraged because it takes place with a sense of fairness and justice (Gross, 2014).

Table 2-3 synthesises the key factors leading to constructive conflict. Figure 2-3 depicts these factors as a concept map. Each factor links to the three broad preconditions identified above:

- **Motivation to solve problem** – parties are dissatisfied with the status quo, and want to find a solution that satisfies everyone. Moreover, parties must perceive that there is (at least) no strategic *disadvantage* in pursuing cooperation.
- **Feeling safe and trusting others** – each party trusts the others to take it seriously, and would not abuse cooperative overtures as opportunities to belittle or threaten. Feeling safe improves tolerance to ambiguity and risks, opening the way to creative solutions.
- **Climate of creativity** – free-thinking and ambiguity is encouraged, in order to find innovative solutions satisfactory to all.

Finally, it is notable that many of the attributes identified here are similar to those identified as prerequisites to collaboration: for example, a parity of power, a willingness to seek mutual solutions, and openness to others' values and aspirations. This commonality is not surprising – once it is accepted that conflict is a normal and common (even inevitable) part of social interactions, collaborations must necessarily involve constructive conflict. Later, this commonality will be used to argue for unifying the collaboration and conflict frames to establish the analytical concept of constructive/ destructive *relationship* adopted for this thesis.

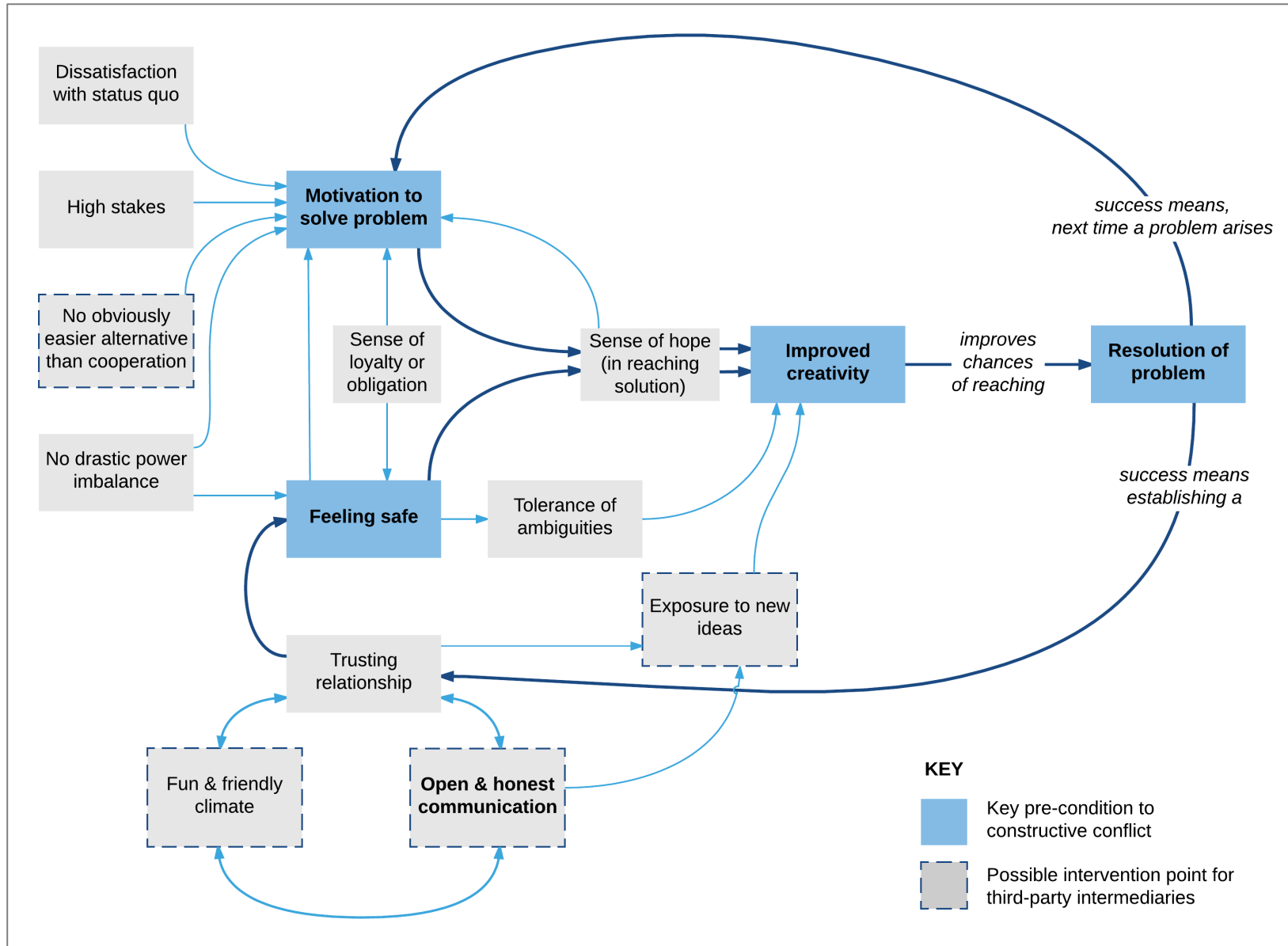


Figure 2-3 Factors leading to constructive conflict
 Note the self-reinforcing feedbacks. Further detail given in Table 2-3, next page.

Table 2–3 Factors leading to constructive conflict

Note: the ticks show how each factor links to one or more of the preconditions of constructive conflict, as discussed in-text.

Factor & how it manifests	Why it encourages productive conflict	Motivation	Feeling safe (trust)	Creativity
<p>Dissatisfaction with status quo</p> <p>Parties express their dissatisfaction, and make efforts to pursue a solution (rather than avoiding the conflict). Parties are <i>not</i> enraged, quiescent, helpless, or terrified.¹</p>	<p>Parties must be sufficiently dissatisfied to want to seek a solution, but not so dissatisfied as to be overwhelmed or discouraged.¹</p>	✓		
<p>No obviously better option</p> <p>Competitive approaches are not viable, perhaps because they do not exist, have been ineffective previously, or those who have power to do so make cooperation a more attractive option.²</p>	<p>Parties unlikely to cooperate where there are better alternatives to cooperation. Again, poor BATNA for both parties incentivises bona fide negotiation.³</p>	✓		
<p>High stakes for all</p> <p>The issues are important to the parties, as reflected in their efforts to pursue a solution.²</p>	<p>The importance of issues prevents one or more parties from abandoning the problem (that is, from <i>avoiding</i> the conflict).² However, if an issue is central to one or more parties (i.e. the dispute goes to the heart of one’s identity, or threatens one’s honour or very existence), then the likelihood of reconciliation is dramatically reduced.¹</p>	✓	✓	

Factor & how it manifests	Why it encourages productive conflict	Motivation	Feeling safe (trust)	Creativity
<p>No drastic power imbalance (parity of power)</p> <p>Parties are each able to influence events to some non-negligible degree. Needs are seen as legitimate. Viewpoints are not readily dismissed—either by others (not listening) or by oneself (self-defeating attitude). Few acts of desperation.²</p> <p>NB: sometimes a balance of power is the result of destructive acts preceding the achievement of such balance.¹</p> <p>NB: sometimes power can be devolved voluntarily by a high-power party.⁴</p>	<p>Near-parity of power means that the legitimacy of others' interests, and their abilities to pursue them, are recognised. Often, this creates the prospect of harm to oneself if the conflict were not resolved. Thus, there is an incentive to address the conflict, rather than suppress or ignore it (if a high-power party), or avoid it (if a low-power party).²</p> <p>Thus, a balance of relative power makes cooperating a more attractive choice than not cooperating; i.e., the BATNA (Best Alternative to Negotiated Agreement) is unattractive for both.³</p>	✓	✓	
<p>Open and honest communication</p> <p>Parties communicate commitment to their interests (but also communicate flexibility in how to achieve such interests – bargaining over interests, not positions).^{2, 3}</p> <p>Parties communicate willingness to work together.¹ They use persuasion rather than force, threats, or coercion.^{1,2} They recognise legitimacy of others' interests, and communicate such recognition, thus indicating willingness to work together.¹ There is free and honest sharing of information. Parties' special talents are utilised.¹</p>	<p>Communication allows parties to go beyond the stated problems and determine underlying issues. Parties benefit from others' knowledge and new perspectives. Builds trust and friendliness.</p>		✓	✓

Factor & how it manifests	Why it encourages productive conflict	Motivation	Feeling safe (trust)	Creativity
<p>Friendly, fun, hopeful climate</p> <p>The parties interact in a climate of friendliness and openness. ('Climate' refers to a diffuse quality of a social group arising from the interaction and behaviour of group members; the tone, flavour, or attitude of a group.²)</p> <p>Interactions between parties are fun.⁴ Participants sustain hope of success.⁴ There is a trusting, friendly attitude.¹ Parties seek to converge beliefs and values, rather than attempting to widen the difference; moreover, others' bad behaviour is seen as understandable aberrations rather than constitutive of character.¹</p> <p>Parties avoid blaming individuals for past mistakes, which saves face² and separates the people from the problem.³</p>	<p>It is essential to recognise parties as emotional beings.^{2,3} Having positive social interactions encourage people to persist despite frustration,⁴ and to forgive or overlook bad behaviour ('benevolent misperception').¹</p> <p>A climate of trust improves tolerance to risk, leading to a willingness to try new, potentially innovative ideas.²</p>	✓	✓	✓
<p>Issue control – focus on problem to be solved</p> <p>Parties focus on defining the problem to be solved. Issues are broken down into smaller sub-issues. Parties resist making any single issue critical.¹</p> <p>Parties are firm on their interests, but flexible in how to achieve those interests. Problem-framing focuses on interests rather than prematurely jumping to solutions (e.g. <i>not</i> 'where should we site new waste incinerators?', which presupposes a solution, but 'how can we deal with solid waste?')⁴</p>	<p>All-or-nothing issues are likely to be destructive, but a series of smaller issues lead towards productive outcomes¹ – especially where agreement on some points builds goodwill and momentum for discussion on more contentious points.^{3,4}</p> <p>Breaking down issues also helps to prevent any one issue from become central to parties. Where possible, conflict is not allowed to escalate to issues central to both parties (e.g. relating to a parties' existence or identity).¹</p>		✓	✓

Factor & how it manifests	Why it encourages productive conflict	Motivation	Feeling safe (trust)	Creativity
<p>Sense of loyalty or obligation to each other</p> <p>Past investments, legal obligations, loyalty, guilt, convenience, personal attachment, established ways of doing things – these may bind parties to continue to maintain their relationships.¹</p>	<p>Such commitments provide stability during cooperation, encouraging persistence despite fluctuations in personal attitudes and goals.</p>	<p>✓</p>	<p>✓</p>	
<p>Tolerance of ambiguities</p> <p>Parties openly accept uncertainty in knowledge. They carry out plans to fill knowledge gaps.⁴</p>	<p>Encourages use of objective criteria for assessing fairness to parties.³ Encourages exploration into fresh ideas in which innovative solutions may be found.^{2,4}</p>			<p>✓</p>
<p>Concurrent availability of ideas</p> <p>Parties share knowledge frequently. They hold forums and discussion groups.^{1,4}</p>	<p>The creative thinking process requires learning from each other and synthesising collective information into something new.^{1,4}</p>			<p>✓</p>

¹ Deutsch (1973), ² Folger et al. (2005), ³ Fisher & Ury (2012), ⁴ Wondolleck & Yaffee (2000), ⁵ Sidaway (2005), ⁶ Kriesberg & Dayton (2012)

2.4.3. Process and variance models in conflict scholarship

In seeking to describe conflict, some scholars have adopted variance models. For example, Nie (2003) lists 12 ‘drivers’ of ‘controversial, acrimonious and intractable’ (i.e. destructive) ‘natural resource-based political conflicts’, and discusses each with reference to a wide range of examples (Box 2-1). Nie’s work is detailed and insightful, and is useful for prompting the kinds of factors that have led to destructive conflict. However, because it clearly (though implicitly) adopts a variance model, it is unclear how these drivers *interact*, and at what point in the course of a conflict one can intervene in order to change that course. For example, it seems intuitive that media framing must come after a political controversy has begun – after all, the media would need something to report on. Yet it is conceivable that the media’s choice of frame may *create* or *spark* a political controversy that would not otherwise have manifested. This interrelationship is not explored in a variance model, except discursively and not as part of the model. Nor does the variance model guide practical action: supposing that divisive media framing were expected – what can a person involved in NRM conflict do to deflect such divisiveness? These criticisms echo the more general observations of variance models in Section 2.2, and for this reason variance models were not adopted for this thesis.

Box 2-1 Example of variance model of conflict

A variance model in conflict literature: ‘drivers’ of conflict by Nie (2003)

- **Scarcity** (of resources).
- **Policy surrogacy** (where policy problems are used as a surrogate for more controversial issues—e.g. using a wildfire to trigger a broader debate about excessive regulations).
- **Sacred and spiritual dimensions of place.**
- **Policy design** (e.g. creation of incentives to harvest a particular resource).
- **Policy frames** (e.g. using narratives relating to charismatic macrofauna like wolves).
- **Scientific disagreement and uncertainty.**
- **Electoral politics** (creating & nurturing controversy for advantage).
- **Political and interest group strategy** (as above, but for lobby groups).
- **Media framing** (constructing conflict as being waged by diametrically opposed sides).
- **Adversarial governance** (e.g. courts and other public hearings).
- **Legal language** (where vague, can legitimise any number of actions).
- **Distrust.**

Process models of conflict do appear in the literature, and are often called phase models (see Sidaway, 2005). Kriesberg and Dayton (2012), for instance, describe five general phases of emergence, escalation, de-escalation, outcomes, and long-term consequences. Sandole (1993) describes similar phases of initiation, escalation, controlled maintenance, de-escalation and termination. As another example, Delli Priscoli and Wolf (2009) identify ‘four stages in water conflict transformation’:

1. Adversarial stage (parties focus on rights to water);
2. Reflexive stage (focus shifts from rights to needs);
3. Integrative stage (parties begin building consensus); and
4. ‘Putting it all together’ (parties build institutions and organisational capacity, and share benefits).

The above list expresses iterative and sometimes simultaneous stages, rather than linear progressions. Delli Priscoli and Wolf (2009) suggest that all conflicts follow this pathway ‘over time’, with ‘creative thinking and human ingenuity’, even though some conflicts terminate in the early stages, regress, or lie dormant for years (*ibid*: 97). All of these phase models are similar because their phases all relate to *qualities* of conflict. In contrast, Yasmi et al. (2006) identify empirically the most common *events* through which environmental conflicts pass. Figure 2-4 shows how the most common sequences they found.

feeling anxiety → debate and critique → protest and campaigning → court
feeling anxiety → debate and critique → court
debate and critique → protest and campaigning → court
debate and critique → protest and campaigning → intimidation
debate and critique → access restriction → intimidation
debate and critique → protest and campaigning → access restriction → intimidation
lobby and persuasion → protest and campaigning → court
lobby and persuasion → protest and campaigning → intimidation

Figure 2–4 Common event sequences of NRM conflict
 Source: Yasmi et al. (2006)

These examples show that both variance and process models are well established in the literature. Section 2.2 above has already justified this thesis's choice of process models. The next section will argue that even phase models are too limited, and will introduce the 2D 'landscape' model (or 'basins of attraction' model) as a better basis for understanding NRM relationships.

2.5. Why focus on constructive and destructive *relationships*?

This section justifies the choice of NRM *relationship* as the defining frame for this thesis, as opposed to NRM collaboration or NRM conflict. So far, this chapter has established the need for a process model to account for the temporal dimension of NRM relationships. It has also suggested that the collaboration literature should not be adopted as the primary theoretical frame for this thesis, because conflict dynamics are insufficiently problematised and examined.

Two further arguments are made here. First, a conflict framing is also unsuitable, because it is difficult to draw boundaries around the conflict: when does a conflict start and end, and what happens in between conflicts? Second, the factors that influence the course of NRM relationships (or any human relationship) interact in ways so complex that a simple process model (X leads to Y, leads to Z) is inadequate – the attempt in Figures 2-2 and 2-3 are neat conceptual generalisations but potentially too prescriptive to express more complex circumstances. A dynamic systems ('landscape') model of relationships is introduced as a way of overcoming some of these limitations.

2.5.1. Difficulties using conflict as theoretical frame

Despite having advocated for process models over variance models, the phase model of conflict was also considered unsuitable. The first difficulty is that phase models are often too general to be *useful*. Many phase models are set out generalised phases; the dynamics *within* each phase are generally more like variance models. For example, in Kriesberg and Dayton's (2012) book, 'de-escalation' is one phase in a conflict's life. The authors then draw tremendous insight from a number of case studies as to what might drive the transition of a conflict relationship to de-escalate. However, these insights are effectively structured as lists: among the drivers of de-escalation are listed 'social processes', 'organizational processes', 'reaction and interaction processes', 'processes of involvement with other parties', 'internal changes' and so on. So while this phase model is at one level a process model, its finer detail is presented as a variance model. This thesis seeks a process-based examination at even the finer scales.

The second difficulty is that phase models also tend not to explain why some conflicts are harder to shift from phase to phase than others. Yet accounting for such inertia is critically important for

those wishing to understand why interactions end up the way they do. After all, the study of intractable conflict is premised on conflicts that appear impossible to shift (see Coleman, 2011; Lewicki et al., 2003; Nie, 2003). So, how does one get from one phase to another? What can a person do to shift the conflict? Yasmi et al.'s (2006) sequences appear to have no happy ending, unless one won in court – no solutions appear to be offered there. Thus, phase models sometimes provide limited practical guidance by not specifically exploring what an actor can do to shift the conflict from phase to phase.

The third difficulty is that phase models tend to treat conflict as the phenomenon to be studied, and tend not to examine the periods prior to the conflict. That is not to say that the prior history to the conflict is not acknowledged. On the contrary, actions, events and attitudes antecedent to the conflict are universally acknowledged in the literature as operative on the course of the conflict. For example, Sidaway (2005: 51) states that the history preceding a conflict is highly influential to its outcome. Colvin et al. (2015) draws on Pondy's (1967) model of conflict to stress the same point, that the 'legacy' or 'aftermath' of 'conflict episodes' in part determine its outcome. Kriesberg and Dayton (2012: 8–9) state that a conflict 'emerges, escalates, de-escalates, terminates, and results in an outcome that becomes the basis for another conflict.' It is the near-universal acceptance that conflicts are linked which makes it odd that the boundary of the study is drawn around the conflict episode itself, rather than the relationship as a whole – doing so risks constructing a static and reductive view of pre-conflict interactions, even though such interactions may be as complex as those during the conflict episode itself.

These three difficulties justify the rejection of collaboration and phase models of conflict as a theoretical framing for this thesis, although insights will continue to be drawn from both literatures. These difficulties also show why this thesis has adopted NRM *relationships* as the appropriate frame: this thesis considers periods of collaboration and conflict to be occurring constantly within an NRM relationship. Conflict and collaboration are *features in a continuous and ever-evolving landscape of interaction*; the focus of study in this thesis is how and why these landscapes (these relationships) change over time.

2.5.2. Dealing with complexity: a 2D landscape model of relationships

Having justified adopting *relationships* as the subject of study, the final piece is account not only for change over time, but also for the interaction between factors influencing the destructiveness/constructiveness of relationships. My synthesis of constructive/destructive factors in Figures 2-2 and 2-3 are an attempt to do so – they highlight how one factor leads to another, establishing temporal links that make them *process* models. In particular, the feedbacks in Figure 2-2 evoke the

concept of ‘spiralling out of control’ often used to describe destructive conflicts (Sidaway, 2005; Deutsch, 1973; Kriesberg & Dayton, 2012). Moreover, by making the feedbacks visually clear, a reader may identify points of intervention that they can control, in order to set a conflict onto a constructive path. The idea of intervention (or leverage) points echoes concepts from systems thinking (e.g. Meadows, 2008: 145), and this review now turns to a body of work that has explicitly adopted systems thinking to make sense of conflict. This work is herein called the 2D ‘landscape’ model of relationships (also the 2D ‘basins of attraction’ model), as developed by Coleman (2011), Vallacher et al. (2011, 2013) and others (cited in the latter).

As Coleman (2011) explains, the conflict literature is awash with competing explanations about what makes intractable conflict intractable – and by extension, what factors determine the destructiveness and constructiveness of a conflict. He writes (at p.31):

I spent a couple of years combing through the considerable amount of scholarly and applied literature in international affairs, psychology, and conflict resolution. After comparing various accounts, the good news is that I was able to identify the essence of the problem of impossible conflicts. The bad news is that there are roughly fifty-seven of them. Fifty-seven essences! ...

And the problem is that they are right. They are *all* right... As soon as one looks more deeply into the collection of fifty-seven factors...it becomes clear that there is something even *more basic* that intractable conflicts seem to share. These essences...are often connected to one another in a very particular way. They tend to be linked in such a way that they *support and reinforce* one other. In other words, they function like a system: one complicated, well-oiled system. That is their essence. [Original emphasis]

Coleman’s statement here is relevant for two main reasons. Firstly, it suggests that human relationships are extremely complex – and too complex to model with mathematical exactitude or predictive confidence. Blalock (1989) illustrated this impossibility, when he attempted to model meticulously a simple two-party conflict, which quickly became unnavigably complicated – not useful and therefore not apt for achieving the pragmatic, phronetic goals of this research.

Secondly, Coleman’s conclusion that conflict factors ‘support and reinforce’ each other to create stable relationship characteristics is consistent with the interconnectedness shown in Figures 2-2 and 2-3 above. It is also consistent with the broader conclusion drawn by Deutsch (1973: 365, 367), that ‘characteristic processes and effects elicited by a given type of social relationship ... tend also to elicit that type of social relationship’ – or less formally, ‘cooperation breeds cooperation, while

competition breeds competition'.³ That is, constructive relationships tend to stay constructive, while destructive relationships tend to stay destructive. This concept seems intuitive: you are likely to forgive transgressions of a friend; conversely, a distrusted acquaintance's friendly overtures gesture can be written off as manipulate, desperate, or weak. The deeper the friendship, the greater or more frequent the transgressions have to be before you consider that person no longer to be a friend; conversely, the deeper and fiercer the history of enmity, the more immune the relationship is to gestures of cooperation.

The landscape model developed by Coleman (2011) and Vallacher et al. (2011) is a way of making sense of these observations. It will be explored critically and in-depth in Chapter 6; a brief description suffices for now.

This model uses a landscape contours as a metaphor for the relationship between people. A ball (or a climber) represents the current state of the relationship. The ball moves as the relationship changes, in response to the parties' actions and attitudes. The basin in which the ball currently resides is either 'constructive' or 'destructive'. Figure 2-5 shows a destructive relationship. The ball tends to roll back into the destructive basin; it would take effort from the parties to move the ball into the constructive basin, but once there it is likely to stay within the new basin. This model captures the tendency of relationships to gravitate towards constructiveness or destructiveness.

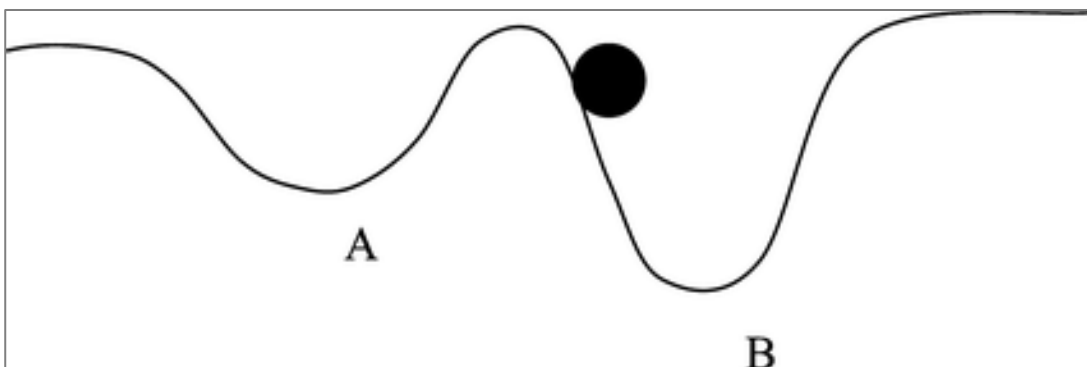


Figure 2–5 Two-dimensional landscape model of conflict

Source: Vallacher et al. (2011). Original caption states: 'A dynamical system with two attractors corresponding to constructive relations (A) and destructive relations (B).'

³ Note: Deutsch (1973) considered 'cooperative' relationships to lead to constructive or productive outcomes, while 'competitive' relationships lead to destructive outcomes. This thesis avoids introducing the terms 'cooperative' and 'competitive', given that they appear not to be any different from constructive and destructive in Deutsch's vocabulary.

2.6. Conclusion

This review was undertaken to discover in the literature ways to make sense of NRM relationships. It has canvassed the collaboration and conflict literatures, and argued that they are complementary ways of describing relationships between people. They contain rich insight, but neither provides much normative guidance: simply identifying the fact that parties are collaborating and/or conflicting does not help a person involved in an NRM relationship take stock of the state of that relationship.

It was identified that the mere fact of collaboration and/or conflict was unimportant. What mattered were the qualities of the relationship. The qualities identified as being desirable were those that led to ‘constructive’ relationships, while undesirable qualities led to ‘destructive’ relationships.

Identifying constructive and destructive qualities of relationships was still not enough to fulfil the pragmatic aims of the research. What was needed was a model of NRM relationship that accounted for changes over time. Such a model was termed a ‘process’ model. In phase models, the conflict literature provided some examples of process models, but these had two key shortcomings. First, parts of the relationship occurring before and after the conflict were considered important, yet excluded from the model. Second, phase models generally do not account for how a conflict might shift from phase to phase – in particular, why some relationships gravitate towards destructive (or constructive) states.

A landscape model found in fairly recent literature was nominated as one which (a) provided normative guidance in constructive and destructive terms; (b) accounted for changes in the relationship over time; and (c) accounted for the observed tendency of relationships to gravitate towards certain states. This model will be critically examined and extended in Chapter 6, after Chapter 5 reports on empirical research on NRM relationships in Australia. This model will then be used to make sense of and further probe the findings of the IAN report card studies. The next chapter completes the literature review of the thesis by canvassing the literature on report cards, and other related tools for science communication and collaborative planning.

Chapter 3. Literature Review II — why study report cards? Situating report cards within similar tools

3.1. Introduction

Recall that this thesis comprises two main components. The first studies stakeholder relationships in NRM, and the second examines how environmental report cards influence such relationships. The substantive output of this thesis is a tool, based on IAN's report card practice, that may be used to build constructive stakeholder relationships.

This literature review addresses the second component. Its overall aim is to justify this thesis's focus on environmental report cards. Although I do not claim to make a complete taxonomy of tools, I argue that report cards can be seen as belonging to two 'families' of tools – tools for reporting technical and complex information (a usage established in the literature), and a tools for building constructive stakeholder relationships (to be explored in this thesis).

This chapter begins by exploring the concept of 'tool'. The purpose is to establish clear terminology for the ensuing discussion, and to indicate the nature of the tool that is to be developed later in the thesis. Then, environmental report cards are described and defined. A gap in knowledge is identified: namely, that using report cards to build constructive stakeholder relationships has not been well explored in the academic literature.

Finally, tools from each 'family' are explored. Such exploration has two purposes. First, my assessment of IAN's report card practice draws on the scholarship underpinning these other tools, as does the relationship-building tool developed as an output of this thesis. Thus, this review develops an analytical starting point for the research in Chapters 7–10. Second, report cards are shown to be unique, if somewhat Frankensteinian: while they often comprise parts of other tools and therefore share similar characteristics, no other tool shares exactly the same characteristics. Establishing this uniqueness justifies the focus on report cards as potential tools for encouraging constructive stakeholder relationships.

3.2. Conceptualising 'tool': a tool *for what?*

This section explores the concept of 'tool', and argues that the intended purpose of a tool characterises it: a tool is what it does. This argument is important because the tool developed in this thesis is similar to IAN's existing report card practice. However, IAN's practice has not been used deliberately for encouraging constructive NRM relationships. The difference in intended purposes is fundamental, and demonstrates that two separate contributions of this thesis: documenting IAN's practice, as well as proposing a new tool based on that practice.

In Chapter 1, I noted the distinction, in the context of report cards, between the words ‘tool’, ‘practice’, ‘process’, and ‘product’. To remind the reader:

- *Product* means to the physical report card document, and the components of its design.
- *Process* means to the activities that lead to the creation of the product.
- *Practice* means the product and process of a particular person or organisation (involves describing how someone does something), plus the purpose of that particular person.
- *Tool* means a practice plus the purpose to which it is put (which may or may not be the same as the original practitioner’s purpose – if it is different, then it is a different tool).

The stipulation of a tool’s *purpose* in the last-most point is deliberate. In the academic literature, there appears to be widespread usage of the term ‘tool’ but little discussion of its meaning. For example, the SAGE Encyclopedia of Qualitative Research Methods (Given, 2008) contains no entry for ‘tool’, but it appears in 96 of its 464 entries. Similarly barren, in this respect, were other texts on research methodologies (Denzin & Lincoln, 2000; Salkind, 2010; Coghlan & Brydon-Miller, 2014).

Dictionaries provide a variety of definitions, which serves as another starting point for analysis. In the figurative sense, tool means (with my emphasis):

- A thing (concrete or abstract) with which some operation is performed; *a means of effecting something*; an instrument (OED Online, 2015).
- Something (as an instrument or apparatus) used in performing an operation or necessary in the practice of a vocation or profession; [...]; *a means to an end* (Merriam-Webster, 2016).
- Anything used as a *means of accomplishing a task or purpose* (Dictionary.com, 2016).

The common thread is that a tool is what it does: it is defined by the purpose to which it is put. Thus, a butter knife is a screwdriver if used to turn screws.⁴ The acclaimed fiction author, Philip Pullman, described tools in this way, as exposition about a magical knife:

⁴ Tangentially, one might ask whether a tool is *only* what it does – does a teaspoon *become* a butter knife if it is used to spread butter, or is it still a spoon notwithstanding its use? I think it depends on whether the spoon’s form or function is the focus. We name things according to their form (spoons are curvy plates attached to handles; butter knives are flat plates attached to handles), but these things’ qualities as tools change according to what it does, even if their form leads us to give it an unchanging name. It is entirely intuitive, for example, to say that one used a *rock* to *hammer* a nail—the rock is hammering; therefore it is a hammer. In the earlier example, both the teaspoon and the butter knife are ‘butter spreaders’—their names are immaterial to their nature as a tool for spreading butter.

The intentions of a tool are what it does. A hammer intends to strike, a vise intends to hold fast, a lever intends to lift. They are what it is made for. But sometimes a tool may have other uses that you don't know. Sometimes in doing what you intend, you also do what the knife intends, without knowing (Pullman, 2001: 161).

The argument that tools are defined by what they do is relevant for three reasons. Firstly, the tool developed in Chapter 9 of this thesis is similar from IAN's practice, but it is distinct. Not only is IAN's practice modified, but also the tool of this thesis is intended for a different purpose (building constructive NRM relationships, cf. communicating science), and therefore different.

Secondly, because I am interested in applying IAN's practice (albeit modified) to a different purpose, the empirical research in later chapters seeks to reveal the *unintended*, unconscious, and unplanned-for effects of the actions of IAN facilitators. (Pullman's last sentence above hints at this point.) That is, in intending to create a science communication product, does IAN's practice also happen to encourage constructive relationships? How, and to what extent? Focusing on unconscious elements of IAN's practice augments the novelty of this research – not only has it not been published in the academic literature, but also it is knowledge that is unlikely to be found in IAN's self-published materials.

Finally, this discussion operates to limit one of the claims of the thesis. What is developed is *a* tool for encouraging constructive relationships; other tools may achieve the same ends, and in certain circumstances some tools will be better than others. I disclaim any notion that the tool developed herein is the best or universally applicable. As the late Dr Peter Oliver (my initial principal advisor) was fond of warning me: 'when all you've got is a hammer, everything starts to look like a nail'.

With this preface, the chapter now turns to situating environmental report cards as potentially belonging to two families of tools: those that communicate science (report cards' native family), and those that build constructive relationships (the family into which this thesis will fit report cards).

3.3. Why study environmental report cards?

3.3.1. Overview of environmental report cards

A report card is a publication that reports performance across a number of selected areas. For example, education report cards are widely used to report student performance across the various subjects in a curriculum. Report cards have also been used to monitor performance of schools as a whole (Chafouleas et al., 2007), healthcare (Marasco et al., 2005), public administration (Coe, 2003), and human rights (Evans et al., 2006).

Since the 1990s, report cards that monitor environmental health have become increasingly widespread (Connolly et al., 2013; Harwell et al., 1999). In environmental report cards, overall ecosystem health may be determined by assessing the health of a number of indicators, including water quality, biodiversity, water supply, and vegetation coverage. Some extend to reporting socio-economic factors (e.g. GHHP, 2015). Often (but not always), an overall grade from ‘A’ to ‘F’ is assigned to the system as a whole, with ‘A’ indicating excellent health, and ‘F’ unacceptable health.

The conceptual rationale of adopting environmental report cards is to facilitate adaptive management (Connolly et al., 2013). ‘Adaptive management’ is an iterative process that occurs when a manager treats management actions as experiments, the outcomes of which are monitored so that subsequent action can be adjusted accordingly (Walker & Salt, 2012; Pahl-Wostl, 2009). By presenting synthesised monitoring results, report cards support adaptive management.

The practical rationale of report cards is often to justify funding for environmental programs (Harwell et al., 1999). Consequently, they have evolved in contrast to traditional technical reports. Both types of report can summarise monitoring results to support adaptive management, but those who make funding decisions may not always have technical expertise (Bunn et al., 2010; Schiller et al., 2001; Smyth et al., 2007; Harwell et al., 1999). Therefore, a defining feature of report cards is their comprehensibility to lay readers – mimicking a school report card may be a conscious attempt to present scientific findings in a way that resonates with the educational experiences of most of its readers.

Scientifically, the choice of indicators (what is monitored), as well as thresholds (what constitutes an A, B, C etc. grade), is a difficult task. It is helpful if indicators match regulatory requirements or management goals (e.g. some legislation might specify water quality criteria); sometimes these are termed ‘key performance indicators’ (see Parmenter, 2015). Indicators also need to be selected carefully in order to satisfactorily represent the system being assessed – otherwise, the report card cannot claim to ‘grade’ the overall health of the system. To ensure representativeness, conceptual models are often used to aid indicator selection (Connolly et al., 2013; Kuhnert et al., 2007).

Choosing indicators and thresholds are also problematic because they also represent social norms and values. For example, what makes an acceptable number of beach closures per summer is a reflection of social values rather than empirical findings, although what is an acceptable level of pollutants in a water system has more objective empirical parameters, such as biotic tolerance (Wong, 2006; Harwell et al., 1999). The normative element of indicators is reflected in the definitions of ‘indicator’ that Wong (2006: 4) quotes. Thus, Bauer (1966: 1) defines indicators as ‘evidence that enable[s] us to assess where we stand and are going with respect to our values and

goals, and to evaluate specific programs and determine their impact'. Similarly, Innes (1990: 5) suggests that indicators are a 'set of rules for gathering and organising data so they can be assigned meaning.' The social dimension of indicators will be explored critically in the next section.

To summarise the key characteristics – report cards:

1. Represent an assessment of environmental health within a region;
2. Use a range indicators to represent system health as a whole (and can include social, economic, and ecological indicators);
3. Are underpinned by a conceptual model of system functions;
4. Make findings from technical monitoring data;
5. Report environmental health using grades (or some other method of synthesis, like a percentage score); and
6. Present information in a non-technical way.

These six characteristics are consistent with the findings of Connolly et al. (2013), who provide the only systematic assessment of environmental report cards found in this review. In that report, the authors describe 'how report cards have been used to communicate the results of aquatic ecosystem-health monitoring programs around the world', and they review 14 report cards accordingly. Their key findings are reproduced verbatim in Box 3-1. A critique of this report is contained in the next section.

In this thesis, documents not displaying all six of the above characteristics are not considered report cards. For example, Blatt's (2011) monograph is entitled 'America's Environmental Report Card: Are We Making the Grade?'. While it does ostensibly assess America's environmental health, it is a discursive text that does not adopt a systematic, indicator-based approach to assessment, and generates no grade or score. In this thesis, it is not considered a report card. Similarly, the 'Arctic Report Card' (Jeffries et al., 2015) reports raw data only – while it is assessed as a report card in Connolly et al. (2013), I consider it a technical report rather than a report card. I note briefly that IAN report cards have all six characteristics; further detail is presented as results of primary research in Chapter 7.

The reason for defining report cards restrictively is to distinguish them from a broader range of indicator-based methods of assessing environmental health. For example, ecosystem services assessment sometimes involves the use of indicators (see Villa et al., 2014; Häyhä & Franzese, 2014; Martin-Lopez et al., 2014), but does not necessarily display all six characteristics (e.g.

information may be presented in a technical way). Some overlap is possible: the results of ecosystem services assessment may be published as a report card – but the use of indicators is not itself sufficient to be considered a report card in this thesis.

Box 3-1 Key findings from a review of 14 environmental report cards: Connolly et al. (2013)

1. More than half the programs have related methods, making them broadly similar
2. All but two programs use a brochure-style report with accompanying technical report.
3. All but three use an annual report card cycle.
4. The majority of programs are designed based on field-based research.
5. Most programs include physical-chemical and ecosystem indicators; two include physical-chemical and either social or economic; and one includes them all.
6. Twelve programs produce a grade, one allocates a percentage and one reports raw values.
7. Programs use either guidelines or reference sites, but usually not both.
8. Most programs require specialist skills to implement data analysis and reporting.
9. Most programs have custom-built software.
10. Programs cover very different geographic extents.
11. Only three formally link report card results with management outcomes.
12. Methods to engage stakeholders vary (interactive websites, videos, smartphone apps).
13. Only half routinely measure stakeholder engagement.

3.3.2. Knowledge gap: report cards as relational processes not well explored

Few reviews of environmental report cards have been undertaken. Extant reviews, such as Connolly et al. (2013), focus largely on the report card itself, as a published *product*. Reviews of the *process* by which report cards are created (i.e. prior to publication) are mostly restricted to the scientific method of determining indicators, analysing monitoring data, and assigning grades (e.g. Harwell, 1999; Dauvin et al., 2008; Bunn et al., 2010; Dennison, 2008).

Moreover, the social dimensions involved in report card processes are not well explored. Connolly et al. (2013) discuss briefly the need to engage stakeholders after publication, but pre-publication engagement is not discussed, and nor are more problematic questions of engagement, such as who is counted as a stakeholder, who decides who is counted, and how and to what extent stakeholders have equal voice. Other reviews similarly do not explore social dimensions of report card production (see Bunn et al., 2010; Harwell et al., 1999; Pantus & Dennison, 2005; Schiller et al., 2001; Williams et al., 2009). Therein is a knowledge gap that this thesis aims to address.

Moreover, it is a significant gap. Social and political considerations are critical to the effectiveness of report cards, because they reflect social values and are often intended to influence political decisions, as noted earlier. Indeed, some report card programs may have been initiated in response to conflict over environmental policy. For example, the Gladstone Harbour report card (GHHP, 2015) was initiated following widespread concerns that marine dredging had triggered fish disease (Hendry et al., 2011). While contemporaneous flooding events were the more likely trigger (Wesche et al., 2013), suspicions remained (Australian Senate, 2014). The legitimacy of this report card product depends on its social dimensions – namely, how well the grievances and interests of conflicting parties were addressed in the process leading up to its publication.

Beyond the report card literature, ‘participatory indicators’ has emerged as a term denoting participatory approaches to developing indicators. For example, Fraser et al. (2006) show that stakeholder participation improved the comprehensiveness and relevance of the indicators, and defused tensions between disparate stakeholders (one might say that the process built a constructive relationship). Similarly within the rubric of ‘participatory indicators’, other studies emphasise community empowerment (Sandoval & Rongerude, 2015); improved relevance for decision-makers (O’Ryan & Pereira, 2015; Mickwitz et al., 2006); and the ability to harness local knowledge within a scientific assessment (Yegbemy et al., 2014; Reed et al., 2008). Thus, there is academic precedent for examining the social dimensions of developing indicators. Indicators being a crucial part of report cards, this knowledge is of course transferrable to report card scholarship. However, report cards involve more than an indicator-based assessment; consequently the opportunity remains open to contribute to scholarship on the social dimensions of creating report cards.

3.3.3. Why IAN is used as a case study

This thesis does not claim to study all report cards, but focuses on IAN’s report cards as a case study. IAN was chosen for three main reasons. First, IAN is a leading producer of report cards (among other science communication tools). Since 2007, it has published 81 report cards, variously situated in the USA, India, Samoa, Australia, the Philippines, the Caribbean (Mexico, Belize,

Guatemala, and Honduras), and the South Caucasus (Georgia, Armenia, and Azerbaijan).

Appendix A lists all of IAN's report cards. IAN's practice actually predates its existence: many of the initial staff members of IAN had developed report cards for South East Queensland, Australia, since 1998 (Longstaff et al., 2010: 94; Pantus & Dennison, 2005; Dennison et al., 2007).

Second, IAN was chosen because it uses a collaborative process. All of IAN's report card programs are undertaken at the request of and in partnership with a client. Clients are typically government agencies or non-profit organisations (such as philanthropic organisations). The focal point of each program is one or more collaborative workshops held with a range of stakeholders invited by the client and/or by IAN. The goal of the workshops is to create, collaboratively, a first draft of the report card. Because collaborative processes generally demonstrate attributes of constructive relationships (as Chapter 2 established), IAN's practice was a suitable candidate for this thesis.

Thirdly, IAN's practice has not been systematically documented in the academic literature since Dennison et al. (2007), and its value as a social process has not been explored explicitly. Dennison et al. (2007) emphasise the benefits of representing scientific information visually as conceptual diagrams, developed collaboratively. The authors stress the importance of *process*:

The process of developing and communicating an integrated ecosystem assessment creates common ground between multiple stakeholders and is as important as the product itself.

The 'common ground' envisaged seems limited to intellectual common ground rather than emotional or relational common ground; yet Chapter 2 argues that emotional and relational elements are critical to constructive relationships. The following extracts illustrate this limitation of the paper by Dennison et al. (2007). Scientific perspectives are emphasised (pp.307–8):

Visual representations of the system can facilitate communication by encouraging resource experts to work toward consensus on the most important ecosystem attributes and on the relationships that need to be included in the diagrams.

The perspectives of broader categories of stakeholders are later acknowledged, but the focus remains on intellectual and scientific aims (Dennison et al., 2007: 308):

Visualizations and conceptual diagrams can act as a communal language among scientists, managers, and stakeholders, providing a common knowledge base for further communication.

The authors do discuss the consensus-building benefits, but again relational and emotional elements are not specifically studied (Dennison et al., 2007: 309):

The process of developing first drafts of conceptual diagrams provides a central focus in working toward consensus on key structural and functional properties of an ecosystem. Conceptual diagrams can help to clarify thinking; words can be ambiguous but images link to the message being portrayed. They facilitate communication, both one-way (the presentation of the idea) and two-way (idea development). By providing both context and synthesis, the process of developing conceptual diagrams can be used to identify knowledge gaps, priorities, and other essential elements.

None of these critiques implies that the ideas of Dennison et al. (2007) are faulty. My point is that the *social process* of IAN's report card practice has not been studied systematically. Thus, there is a knowledge gap specific to IAN report cards mirroring the knowledge gap of report cards generally.

3.4. Tools related to environmental report cards

Having characterised environmental report cards and justified scholarly attention on them, this section now canvasses a number of tools that bear some relation to report cards, or could offer ideas that might improve report card practice. The intention here is more descriptive than critical: the goal is to identify characteristics and design principles of these tools, to better inform later assessment of IAN's report card practice. The particular focus of this part of the review is on characteristics that promote the two purposes of environmental report cards: (a) the communication of technical and/or complex information (report cards' original purpose); and (b) promote constructive relationships among users of the tool (the purpose specifically explored within this thesis).

For clarity, the section is structured along these two purposes. However, dividing the tools into either category is somewhat artificial: some tools are used to fulfil both (and other) purposes simultaneously and to varying degrees. Table 3-1 synthesises the information and re-sorts it tool-by-tool. The table summarises the attributes of each tool according to its stated purpose, as well as the elements that make it up. The contents of the table are justified in the subsequent discussion. Environmental report cards are included as a comparison; the question marks denote areas of inquiry within this thesis. It can be seen that environmental report cards have the potential to incorporate elements of a number of different tools, in order to fulfil different purposes.

Table 3–1 Comparison of tools related to environmental report cards

Tool	Tool elements (according to literature)						Intended purpose (according to literature)				
	Uses icons relevant to situation	Uses other kind of non-verbal communication	Shows interaction between ideas	Shows interactions between system elements	Places information in spatial/geographic context	Engages through narrative	Process develops participants' understanding of complex situation	Communicate complex ideas and/or technical information to non-participants	Elicit information from participants	Build emotional & relational links	Resolve/manage conflicts
Rich pictures	●	X	○	●	X	X	●	X	●	X	X
Social mapping	○	○	X	X	●	X	○	●	○	○	○
Infographics	○	●	○	X	○	●	X	●	X	X	X
Conceptual diagrams	X	●	●	○	X	X	○	●	○	○	○
Photovoice	X	●	X	X	○	●	●	○	●	●	○
Conflict management	X	○	X	X	X	○	●	X	●	●	●
Serious play	X	●	X	X	X	●	●	X	○	●	○
Report cards	?	●	?	○	●	?	?	●	?	?	?

Legend

- Well established in the literature; a defining characteristic.
- Appears in the literature but not a defining characteristic.
- X Does not appear in the literature (yet).
- ? Not known—subject of research in this thesis.

3.4.1. Tools for communicating complex and/or technical information

(a) Rich pictures

Using pictures to express ideas is, really, visual art. As a specific term, ‘rich picture’ refers to a ‘free form type of diagrammatic representation which has a wide role of functions within human artifice, but especially as a tool to help groups arrive at a consensual analysis of a situation’ (Bell & Morse, 2013b: 332). An example of a rich picture is given as Figure 3-1. While not all diagrams are rich pictures, rich pictures are reviewed upfront in this section because many of IAN’s report cards appear to use rich pictures (as discussed in Chapter 7). Other types of diagrams are discussed below in Section 3.4.1(d).

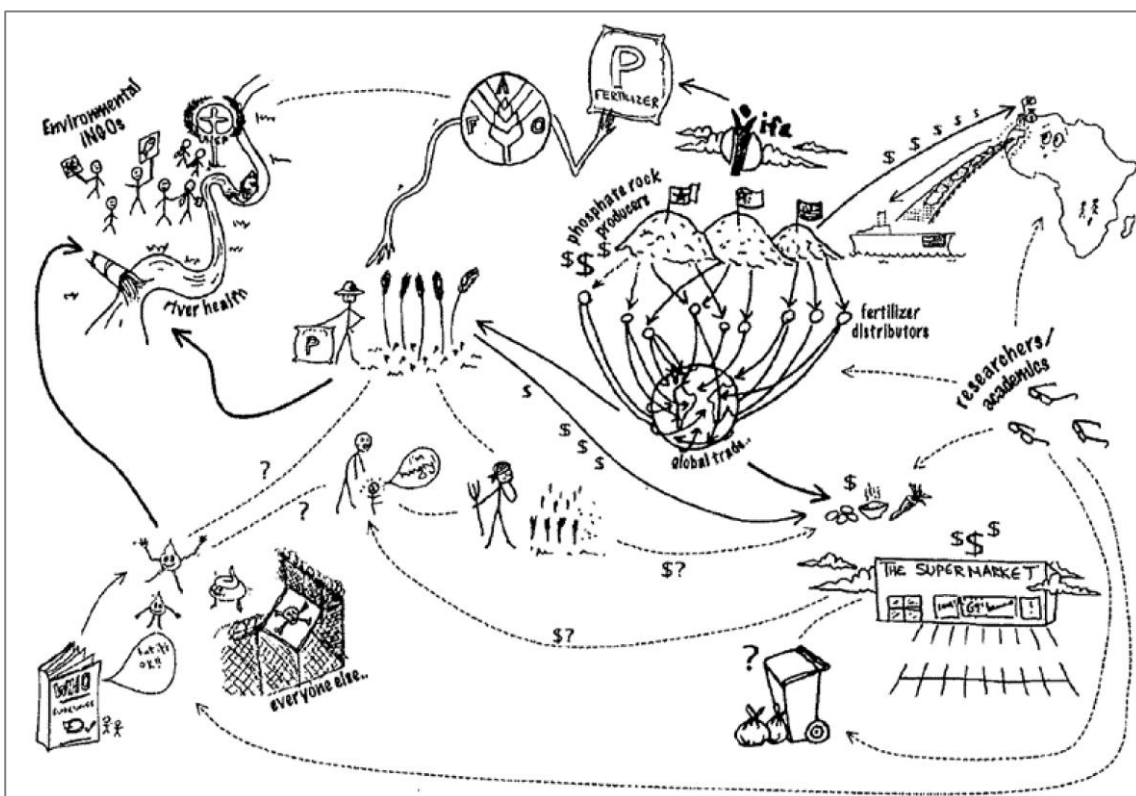


Figure 3–1 An example of a rich picture.

From Armson (2011: 75). Original caption reads: ‘This rich picture was drawn by a researcher investigating the sustainability of global phosphorus resources for future food security.’

Rich pictures’ likely origins are traceable to Soft Systems Methodology (SSM) developed by Checkland and colleagues (Checkland & Scholes, 1990). SSM is ‘an organized way of tackling messy situations in the real world’ (*ibid*: 1). It has a basis in systems thinking, and its underlying rationale is that ‘complex systems need to be studied in their totality to provide feasible solutions to problem situations’ (Berg & Pooley, 2013: 31). Operationally, applying SSM requires participants to make sense of a ‘real world situation of concern’ by modelling it, to use that model to challenge perceptions of the situation, and thence to decide upon some ‘purposeful action’ that would improve the original situation (*ibid*: 6).

Rich pictures enter the first stage of that process. As Bell and Morse (2013b: 335) point out, Checkland (1975: 281) encourages participants to understand the situation by drawing it: ‘The end point of this stage in the analysis should be a picture of the problem situation, one as rich as can be assembled in the time available.’ What makes a picture ‘rich’ is not explicitly defined. Armson (2011: 65) emphasises that rich pictures must be used to represent the *situation* rather than the *problem*, lest the participant inadvertently pre-empts a solution without understanding the system as a whole. It is important to encompass parts of the system, including all stakeholders, their interrelations, their concerns, and system processes and constraints (Checkland & Scholes, 1990; Armson, 2011; Avison et al., 1992).

This background helps to define ‘rich picture’ in a number of ways. Rich pictures can be defined by their *form* – they are pictorial, with verbal explanations expressly discouraged (Bell & Morse, 2013b: 334; Armson, 2011: 63). They use icons to express complex ideas, and as a result develop quite complex iconographies (Berg & Pooley, 2013). As noted above, they represent systems.

Rich pictures can also be defined by their *purpose*. The primary reason for applying rich pictures is to uncover complexities of a situation that would be difficult to do without pictures. Using pictures stimulates thinking in non-verbal ways. Bell and Morse (2013b: 336) write:

Drawing rich pictures can return you to the simplicity of a childhood vision where you mirror directly what you observe, and in that process reveal how you feel about it. This seems to bypass the mental filters which tend to frame that vision in terms of the generally accepted story, or to obscure the things it is hard to say without offending. The use of humour and imagery make it possible to say things it is otherwise difficult to raise; they can provide a space within which you have licence to say something that would otherwise be taboo.

According to this quote, drawing does not only elicit intellectual ideas, but also creates an environment in which emotional or socially difficult ideas can be expressed. The authors go on to describe rich pictures as having a ‘surfacing’ or ‘exploratory’ impact. Armson (2011: 57–9) mirrors this idea. For this reason, rich pictures are often intended to foster group dialogue, in order to reach a consensus about the problem situation (Cristancho, 2015; Bell & Morse, 2013a, b).

A limitation of rich pictures is that they are rarely seen as ends in themselves. The original SSM usage of rich pictures was to spark debate, but once sparked the rich picture was no longer kept (see Checkland & Scholes, 1990). Bell and Morse (2013b: 336–7) specifically premise their paper on this limitation, and suggest that rich pictures have a ‘sad transience’, because

they become left behind as the group strives to ‘do’ the next stage of the process. The rich picture may be left on the table or perhaps put up on a wall, as a reminder, but the context has been captured and bottled and the group moves on.

The transience of rich pictures appear to be a pattern of practice, in that disposing of the picture after sparking the desired discussion is what people using rich pictures tend to do. But given that Checkland (1975) did not define ‘rich pictures’ as a term, it is arguable that preserving a rich picture for posterity does not make it any less rich. In other words, transience is not a defining characteristic of rich pictures. Rich pictures are relevant to the thesis because, as Chapter 7 will discuss, IAN’s report cards do tend to use diagrams that could be considered rich pictures, but for the fact that they are published and not transient.

(b) Social mapping

Social mapping is a *process* by which social data (that is, data relating to people and their institutions and inter-relationships) are arranged along spatial dimensions (Campbell & Gregor, 2004; Tyrväinen et al., 2007). The *product* is a map that represents both the physical geography of the area studied and the spatial distribution of data within that geography. Figure 3-2 is an example of a simple map showing the layout of a village, household composition, and household wealth. Social maps can vary in scale and complexity.



Figure 3–2 Example of a social map
 Source: Wilde (2001: 59).

In natural resource management, a participatory process of social mapping is often adopted. Participatory social mapping adds the benefits of (and limitations) participation, as described in Chapter 2 – namely that localised knowledge can be elicited (which improves the quality of the information gathered and empowers those whose voices are heard in the process), and that the exercise of working together can improve participants' relationships with each other. Thus, social mapping has been used as a method of engaging stakeholders in conflict. Rockloff and Lockie (2004) used social mapping to manage a conflict unfolding on the central Queensland coast, Australia, where heavy industry was (and still is) undergoing development within the general proximity of the Great Barrier Reef. The authors observed, in that case study (p.91):

Stakeholder analysis and social mapping were advantageous in being able to identify stakeholder attributes to inform stakeholder and researcher understanding of the social landscape and the conflict that was both evident and hidden. Social maps of stakeholder attributes re-interpret base information to provide clarity to a multi-stakeholder situation and gave insight into values, interests and objectives shared by different stakeholders.

The authors go on to note the relational benefits of the process, namely that participatory social mapping changes the 'stakeholder environment', and in turn 'new understandings are built and stakeholders learn to foster greater understanding, trust and respect' (Rockloff & Lockie, 2004: 92). Similarly, Cronkleton et al. (2010) applied participatory social mapping to forestry-related conflicts in rural Bolivia. They emphasised the value of eliciting local knowledge using this method – in this case, customary land ownership was known only to locals, so determining the legitimacy of various claims would otherwise have been impossible. They also noted that the local community appeared to consider the experience empowering, because participants agreed to invest labour into the mapping exercises without compensation. This study does not emphasise relational benefits; indeed, the authors state that mapping is not itself adequate for resolving conflict but is only 'a basis for initiating mediation and negotiation processes' (Cronkleton et al., 2010: 74).

In summary, the primary purpose of social mapping is to organise social data spatially – the spatial element is essential to its character as *mapping*. When conducted as a participatory process, additional purposes are imported: eliciting information, empowering participants, and building trusting relationships among participants.

(c) Infographics (and other data visualisation tools)

An infographic is a portmanteau word for ‘information graphic’. Broadly, it refers to the use of visual cues to communicate information (like a non-verbal road sign); more specifically, it refers to a poster-like publication (often published online), characterised by ‘illustration, large typography, and long, vertical orientation displaying an assortment of facts’ (Lankow et al., 2012: 20). The main focus here is on the latter and the data visualisations they contain. Figure 3-3 provides an example.

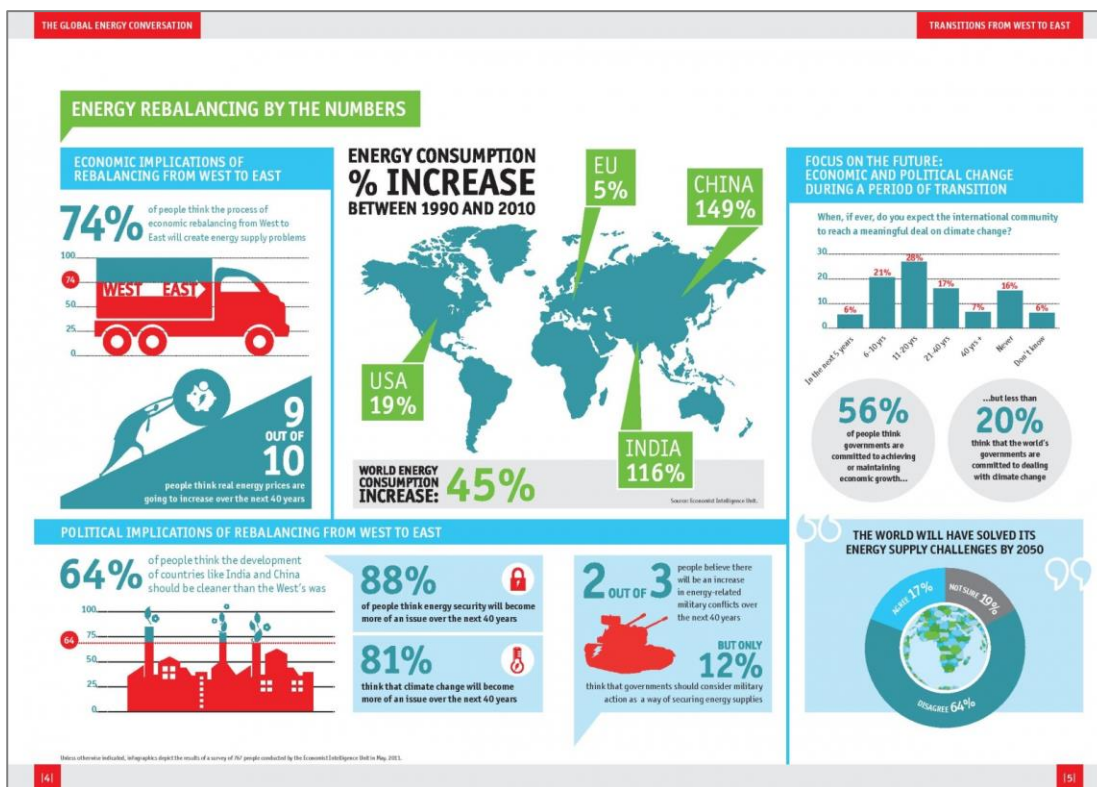


Figure 3–3 Example of an infographic

Source: *The Economist*, 2011.

Principles of data visualisation (or information visualisation) are probably most comprehensively contained in Tufte’s famous 1983 text, ‘The Visual Display of Quantitative Information’ (revised: Tufte, 2001). However, data visualisation far predates Tufte’s work – early endeavours include Florence Nightingale’s use of diagrams in 1858 to convince the British Parliament to improve the health of its troops (see Lankow et al., 2012: 14). The range of texts on this subject is enormous and mostly comprises practical manuals for designers (see Ware, 2012; Krum, 2013). This review does not delve into specific design advice, but common themes arise:

- **Cleanness of the visualisations.** All resources on this subject emphasise humans’ tendency to be drawn to images. Text is to be minimised, such that the meaning of the information is communicated without further explanation – infographics are ideally standalone (Ware, 2012; Krum, 2013: 291). The need for a legend indicates bad design, according to Krum (2013: 293–

5); see Figure 3-4 for an example of using visual design to eliminate the need for a legend. The choice of colour palette is also a consideration.

- **Storytelling.** Creating a narrative or story is emphasised – infographics are not mere facts; they are facts connected by a narrative (Lankow et al., 2012; Krum, 2013). There is strong emphasis on having a clear central message; Lankow et al. (2012: 205) warn against creating illustrations that are aesthetically beautiful but detract from the information presented.
- **Based on data.** Recalling that infographics are intended to be visualisations of data, all texts devote significant discussion to graphs, charts, and other ways of representing quantitative data. Krum (2013: 295) specifically advises designers to ‘be data transparent’, which means setting out the source, age, and credibility of the data on the infographic itself, thus enhancing confidence in the source of the information.

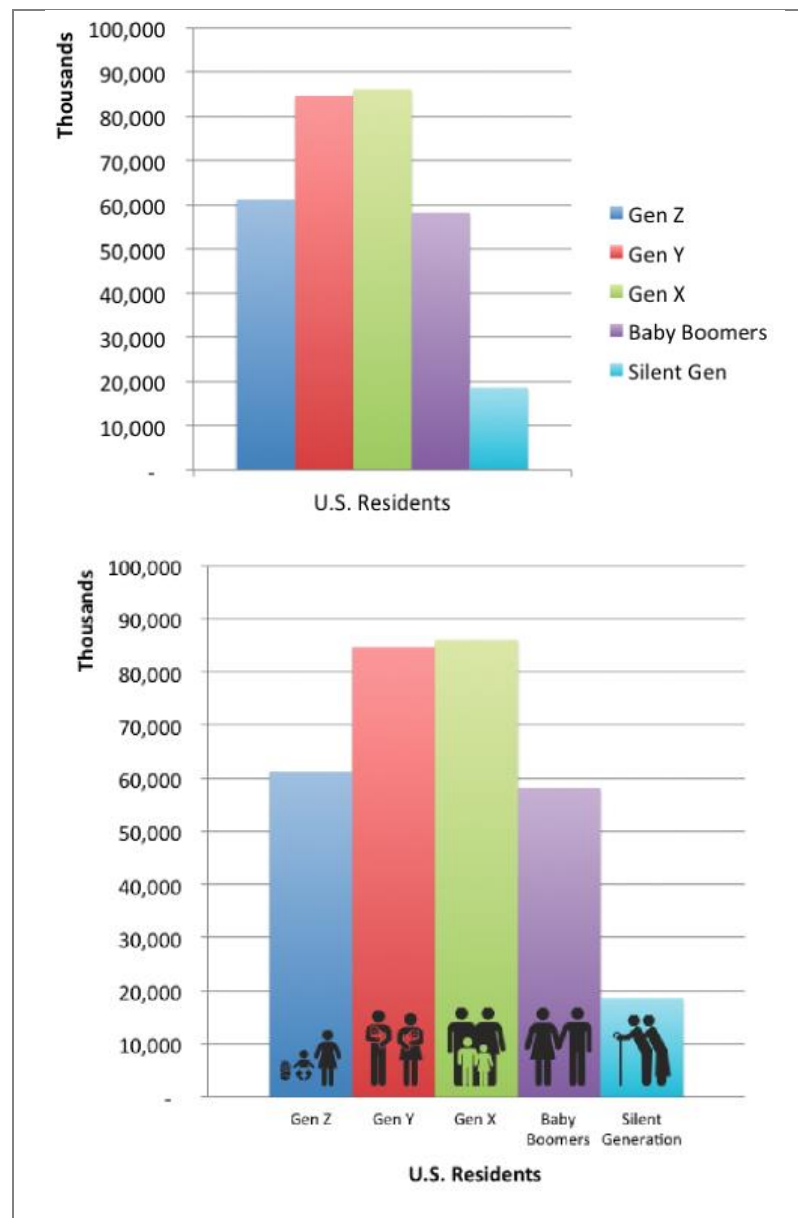


Figure 3-4 Using icons to make text-based legends obsolete
Source: Krum (2013: 294-5)

(d) Conceptual diagrams (and related tools)

A very broad range of concept-visualisation tools exists, and collectively labelled here as ‘conceptual diagrams’. A conceptual diagram is a visual representation of ‘relationships among a set of concepts, factors, or variables about a particular hypothesis, question, context, problem or topic’ (Paradies & Stevens, 2005: 1012). This definition highlights the defining characteristic of conceptual diagrams; namely, their function in depicting the relationship between ideas.

Some scholars make further distinctions within this broad definition. Eppler (2006) compares four types of visual conceptual visualisation tools (see also Figure 3-5):

- **Concept maps**, which are top-to-bottom diagrams that break down concepts into sub-concepts, and are typically used to communicate elements of an abstract concept.
- **Mind maps**, which are radial diagrams that show hierarchical relationships between topics and sub-topics, and are typically used as personal tools for note-taking.
- **Conceptual diagrams**, which are narrowly defined as depictions of abstract concepts situated within pre-defined category boxes, typically used to analyse a situation through a pre-defined framework (though note Chapter 7 will discuss a different sort of conceptual diagram, specific to IAN’s practice).
- **Visual metaphors**, which uses an easily recognisable icon around which ideas are arranged.

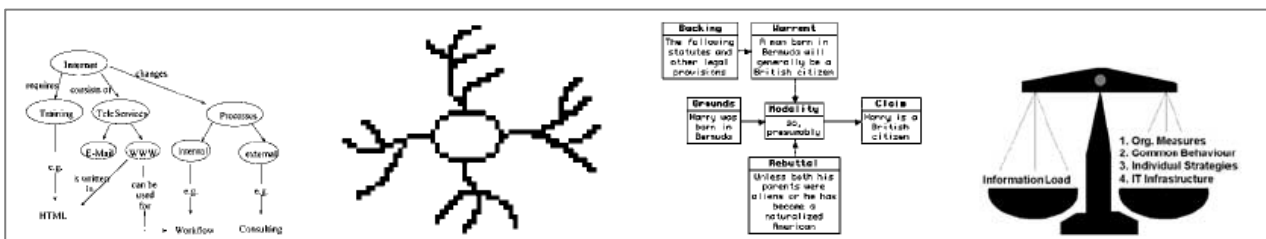


Figure 3–5 Examples of conceptual diagrams

Source: Eppler (2006). L-R: concept map, mind map, conceptual diagram, visual metaphor.

Eppler’s (2006) categories seem to be somewhat artificial – there are so many permutations of similar tools, and so many ways to describe them, that these four tools cannot be taken to be a comprehensive typology. Paradies and Stevens (2005), for example, describe ‘causal/ associative’ conceptual diagrams and ‘descriptive/ structural’ conceptual diagrams. Voinov (2008) describes a sequence of steps in a processes using a conceptual diagram that incorporates a temporal scale, among other diagrams. Pidd (2003) variously describes ‘spray diagrams’, ‘causal loop diagrams’, and ‘cognitive maps’, among others. Britt and Chen (2013) demonstrate many examples. Figure 3-6 shows some of these diagrams. Eppler’s intent, however, appears not to be to create an exhaustive

typology, but to observe different ways of representing relationships between ideas, as a precursor to recommending the particular applications to which each is suited. It is in this spirit that this section is written: it is an illustrative but not comprehensive review of the broad range of meanings expressed by the term, ‘conceptual diagram’.

The purposes of conceptual diagrams are similarly broad ranging. There is general consensus that conceptual diagrams are useful communication products, and moreover that the process of creating such a diagram helps the creator to learn (Britt & Chen, 2013; Eppler, 2006; Voinov, 2008; Paradies & Stevens, 2005). Participatory approaches to conceptual diagramming have also been discussed, importing the benefits of information elicitation and participant empowerment as discussed above (Kesby, 2000; Clark & Morriss, 2013; Jackson, 2013).

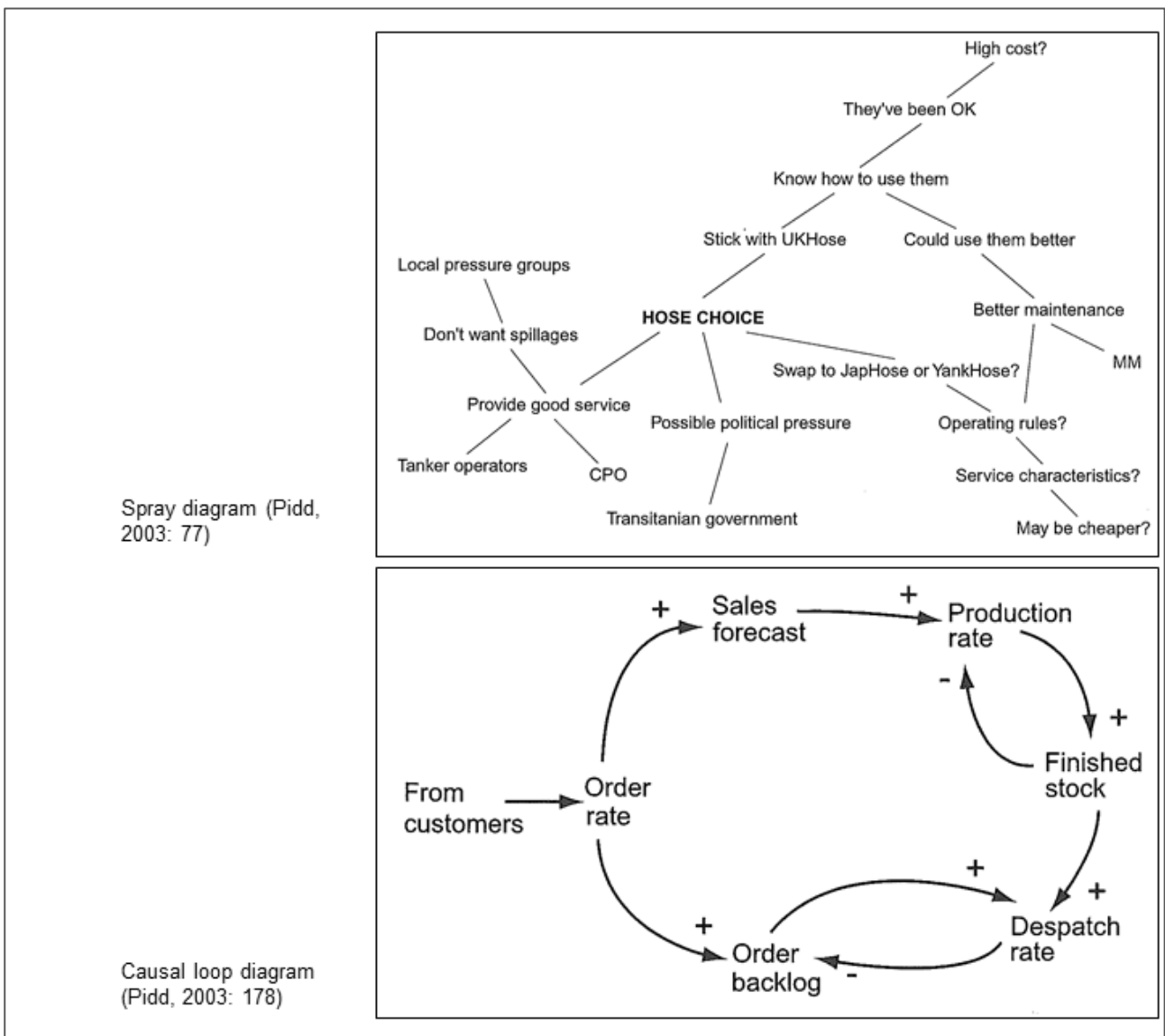
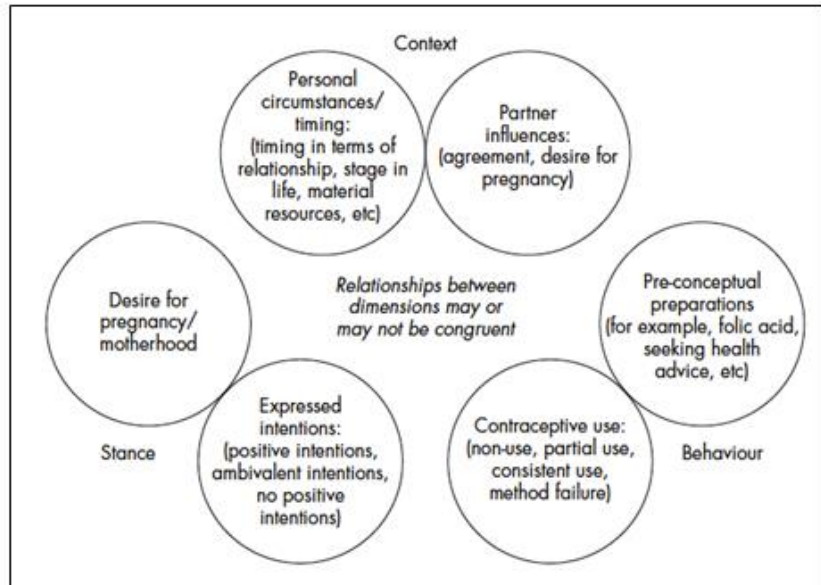
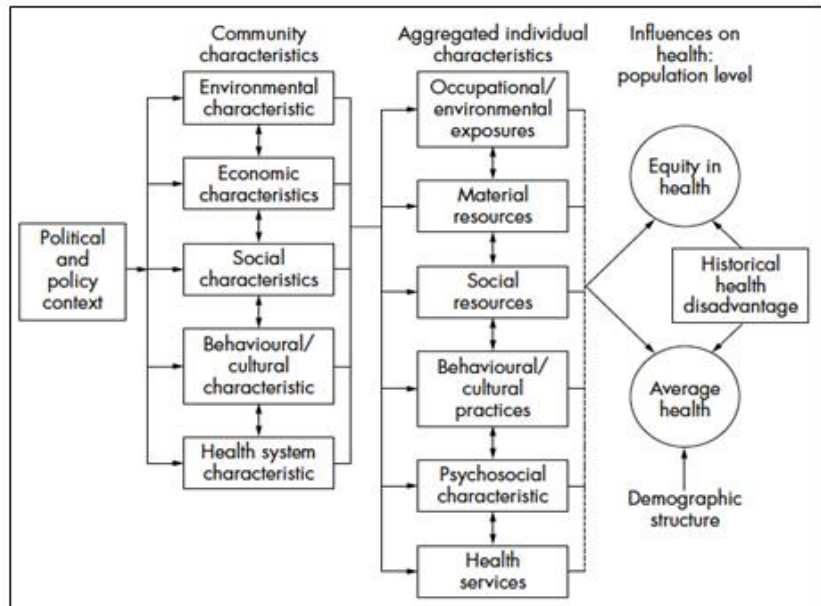


Figure 3–6 More examples of conceptual diagrams

Descriptive/ structural diagram
(Paradies & Chen, 2005: 1013)



Causal/ associative diagram
(Paradies & Chen, 2005: 1012)



Process diagram
(Voinov, 2008)

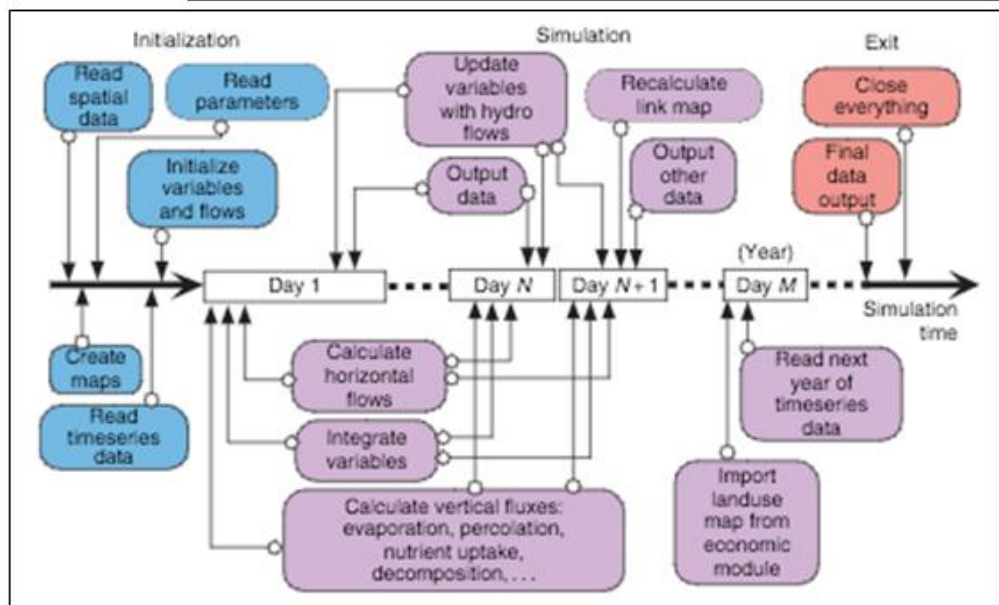


Figure3-6 (cont'd) More examples of conceptual diagrams

3.4.2. Tools for building relationships between people

(a) Photovoice (participatory art/ photo novella)

Photovoice (also called participatory art and photo novella) is a method in which participants are asked to take photos of a certain category of subject, which then prime later discussion. This tool has its conceptual roots in empowerment education (Freire, 2000), feminist theory, and documentary photography (Wang & Burris, 1994). Wang and Burris (1994) used the ‘photo novella’ to ‘document and discuss [the] life conditions’ of 62 women in rural China, with three conceptual roots identified:

- **Documentary photography.** The women’s photographs were documentary photographic evidence of their lives.
- **Empowerment education.** Because *they* were the photographer, they were empowered to think about and communicate their perspectives.
- **Feminist theory.** They were women expressing their perspectives as authorities on their own lives, enabling them to ‘to construct their own knowledge about women according to their criteria as women, and to empower themselves through knowledge making’ (Frankenburg, 1993; quoted in Wang & Burris, 1994: 174).

This analysis of photovoice emphasises a purpose of empowerment. Carlson et al. (2006), who used photovoice with both men and women in a lower-income African–American community, adds that this tool allows researchers to elicit rich perspectives because it sparks both emotional engagement and critical reflection – the combination of which they called ‘critical consciousness’. They assess the tool thus (Carlson et al., 2006: 849–50; my emphasis, with references in original omitted):

As a social process, cultural norms of interpretation tend to be self-reinforcing and are usually quite difficult to interrupt and shift. Evidence suggests that *novel experiences, such as photovoice, that are able to arouse strong emotional reactions and challenge the assumptions embedded in cultural norms, lead to more significant cognitive changes than would occur without the emotional element. Literature also suggests that this emotional engagement is a necessary key ingredient for communal healing.* Storytelling becomes a fundamental means to this emotional engagement as a prerequisite to shifting the cognitive-emotional interpretations that create individual reality. Our findings support these suggestions.

However, emotional engagement is not sufficient to raise critical consciousness. Community interventionists have consistently found that critical thinking does not happen spontaneously. When it does happen at all in historically marginalized and oppressed communities, it most often must be facilitated. *Our photovoice project used an elicitation approach that specifically*

called for critical reflection by focusing attention on both positive and negative issues within the community. We believe this was a pivotal key to emotional engagement and the critical reflection necessary to raise critical consciousness.

Baldwin (2008) extends the application of this approach explicitly to natural resource conflict. In support of a consensus-building approach (see Susskind et al., 1999, 2000), photovoice was used to elicit stakeholder values relating to water planning in two rural regions in Queensland, Australia. Baldwin (2008: 291) echoes the previous two studies, suggesting that the non-verbal nature of photovoice helps to elicit information as well as to equalise the voices of participants to build shared understandings among them:

Since individuals differ in their ability to communicate verbally, photovoice minimised distortion of the communication process with the photos offering visual cues and explanations rather than a solely verbal way of communicating. It facilitated the researcher and participant to arrive at a shared understanding. It enhanced the ability to share values and interests about water to reach socially constructed shared meanings within and between stakeholder groups.

In summary, photovoice empowers participants by creating a means of self-expression; it engages participants emotionally because it is novel and non-verbal, leading to greater critical consciousness of the subject matter; and it builds shared understanding among participants.

(b) Conflict management tools

The literature on managing conflict is voluminous, and this review does not intend to describe every tool of conflict management. However, a number of interrelated principles for improving conflict situations can be discerned.

- **Understand the situation.** Conflicts can be resolved (or at least managed) only when the situation is understood. ‘Situation’ is a broad term, and can refer to parties’ material interests, as well as psychological interests (such as an interest in saving face). The literature distinguishes between ‘interests’ and ‘positions’ – interests are the underlying desires of a party, while positions are overt demands (Fisher & Ury, 2012). A person’s underlying desires can be reached through ‘dialogue’, defined as communication which aims towards mutual understanding, is conducted with empathy and without intimidation or coercion, and in which interlocutors reflect on their assumptions and those of others (Yankelovich, 1991; Sleaf et al., 2013). Susskind et al. (1999: 270) referred to a similar concept as having the parties be ‘participants in a conversation’. Some approaches advocate having an objective third party undertake a ‘conflict assessment’, in which parties’ perspectives are collected anonymously

and presented to all parties (Susskind et al., 1999). Consciously applying different framings may aid understanding (Lewicki et al., 2002; Fisher & Ury, 2012).

- **Encourage trust and respect.** One desirable effect of reaching an understanding of a conflict situation is the development of trust and respect among the parties. The general principle is to ensure that all parties feel that their interests are understood and legitimated (Susskind et al., 1999; Sidaway, 2005). Dialogue may achieve trust and respect (Yankelovich, 1991), but participation in collaborative processes (as described earlier in this chapter, and in Chapter 2), may also lead to trust and respect, especially where such collaboration leads to a discovery of shared values (Daniels & Walker, 2001: 11).
- **Use objective criteria.** Fisher & Ury (2012) suggest that conflicts are more likely to be resolved satisfactorily where all parties agree on what makes a fair or a good outcome. They suggest that parties determine objective criteria for determining fairness and goodness in context, and thence apply those criteria to the dispute being negotiated.
- **Focus on tangible output.** Writing down agreements during a conflict resolution process maintains a sense of progress and discourages parties from reverting to initial positions or otherwise recanting on agreements already made (Susskind et al., 1999; Fisher & Ury, 2012). To do so, Fisher & Ury (2012) advocate a ‘one-text’ approach to negotiated agreements, where parties take turns to edit one draft of a memorandum of understanding. The resultant document can be seen as a joint effort evidencing agreement among the parties. I note here that rich pictures, social mapping and participatory conceptual diagramming (all discussed above) provide visual methods for recording consensus.
- **Make use of impartial third parties.** Mediators and other third parties can help to introduce new perspectives that help parties understand each other and devise innovative solutions (Lewicki et al., 2002; Daniels & Walker, 2001). The consensus-building approach described in Susskind et al. (1999, 2000) relies on third-party facilitators for this reason. Blackburn and Bruce (1995) also provide guidance on the use of third parties, which was discussed in Section 2.4.2, above.

While this summary list does not represent an exhaustive analysis of conflict management principles, it is relevant to the thesis because a tool that is intended to encourage constructive NRM relationships should embody these principles.

(c) Serious Play

Serious Play is explored as a participatory communication method by Hinthorne and Schneider (2012). Those authors draw on other studies to define play as a human activity characterised by a number of features. Specifically, involvement is voluntary (Andersen, 2009), and engagement means participation and not mere observation (Mann, 1996). Play is an ordered activity governed by the game's rules (Mann, 1996), and it has the effect of encouraging narratives that reflect and represent 'real life' – as Hinthorne and Schneider (2012: 2807) write, play 'allows participants to view or experience familiar problems in a new way and creates a safe space for experimenting with novel solutions.'

Serious play is play with a defined purpose. Such purposes can include encouraging critical or reflexive thinking in order to build understanding among players, or to generate novel solutions (*ibid*). Serious has been used in a number of fields, such as education, management, and international development; activities making up play extend to role-play, storytelling, model building, drawing, making music, board games, and LEGO® (Chambers, 2002; Gauntlett, 2007; Holliday et al., 2007; Tan, 2010; Watson, 2011). By using play in a serious context, this technique encourages new avenues of understanding among its participants.

3.5. Conclusion

This chapter began by defining 'tool' with reference to its intended use, or purpose. By doing so, it established that environmental report cards can become a different tool if applied with a new purpose in mind. More specifically, this chapter substantiates the focus on IAN report cards. IAN report cards are intended to communicate the health of an environmental system; the gist of the second component of this thesis is whether IAN's report card practice can be adapted so as to become a tool intended to build constructive NRM relationships. Such an inquiry is novel, because it appears that no published study evaluates environmental report cards for this purpose.

In order to facilitate later assessment of IAN's report card practice, a number of tools were explored. These other tools suggested a number of design principles, which IAN's practice may demonstrate already, or may be adopted. Specifically those principles are:

- **Non-verbal thinking elicits hidden information.** Visual and tactile tools help people access different ways of thinking, which can elicit information hidden behind reticence, social norms, or within the subconscious mind. This lesson was particularly evident for rich pictures, photovoice, and serious play.

- **Narratives improve engagement.** Many tools encourage participants to develop a narrative, which appears to foster emotional engagement. This lesson was evident in infographics and photovoice.
- **Complex situations require attention to understand them first, before problems can be addressed.** Rich pictures and some conflict management sources converge on the need to gather information and perspectives impartially, before addressing complex problems or conflicting interests. Social mapping, concept diagrams, and rich pictures suggest methods of organising information.
- **Divert focus onto a tangible product.** Focusing participants on a tangible product (like a drawing, diagram, map, or memorandum of understanding), which is collaboratively created, appears to encourage creative thinking, or at least a sense of progress (in the case of one-text approach in conflict management).
- **Keep the products of participatory visual tools.** Rich pictures are not usually kept, but only used to inspire ideas in those who draw the rich pictures. However, there is potential to develop them into standalone products that can communicate complex ideas to non-participants.
- **Participation can be empowering.** While the limits to participation were discussed in Chapter 2, it can be seen that many participatory tools attempt to place agency in the hands of the participants. Photovoice, participatory social mapping, and participatory conceptual diagramming explicitly sought this outcome.

These principles are not intended to be exhaustive, but nonetheless they establish a starting point and a vocabulary for primary research on IAN's report card practice. The next chapter details the methodology by which the primary research of the thesis as a whole is conducted.

Chapter 4. Methodology

In discussing methodology, this chapter carries out three purposes. It allows the reader to see in one place the primary research undertaken for the thesis. It assesses and defends the validity of the research undertaken (since claims made will be supported *and limited* by the methods used). Finally, it demonstrates my awareness and understanding of social science methodology, which indicates my capabilities as a PhD candidate.

The chapter begins with an overview of the overall research design. This discussion follows from Chapter 1, which described the thesis as taking a phronetic social science approach, with a *subtle realist* ontology and an iterative, retroductive research strategy. Following the research design, a critical review of research methods is given. Lastly, the methods and activities applicable for each research question are critically described. This description is given as overview only – finer detail is recorded in the chapters reporting and discussing results (Chapters 5, 7–9).

4.1. Research design

This thesis aims to evaluate environmental report cards as a tool for building constructive stakeholder relationships in NRM. Three research questions are set:

- What factors influence NRM stakeholder relationships to transition from constructive to destructive, and vice versa?
- What defines IAN's report card practice? (What characterises its products and processes?)
- Can (and how can) IAN's report card practice be used purposively to influence the constructiveness of NRM stakeholder relationships?

Practically, this aim is achieved through the two components of this thesis:

- A study of stakeholder relationships in NRM, with a focus on relationships as dynamic processes (Australian NRM study).
- An exploration of how IAN's report card practice (product and process) can be used to encourage constructive relationships (IAN report card studies).

Figure 4-1 is reproduced to illustrate how the thesis fits together.

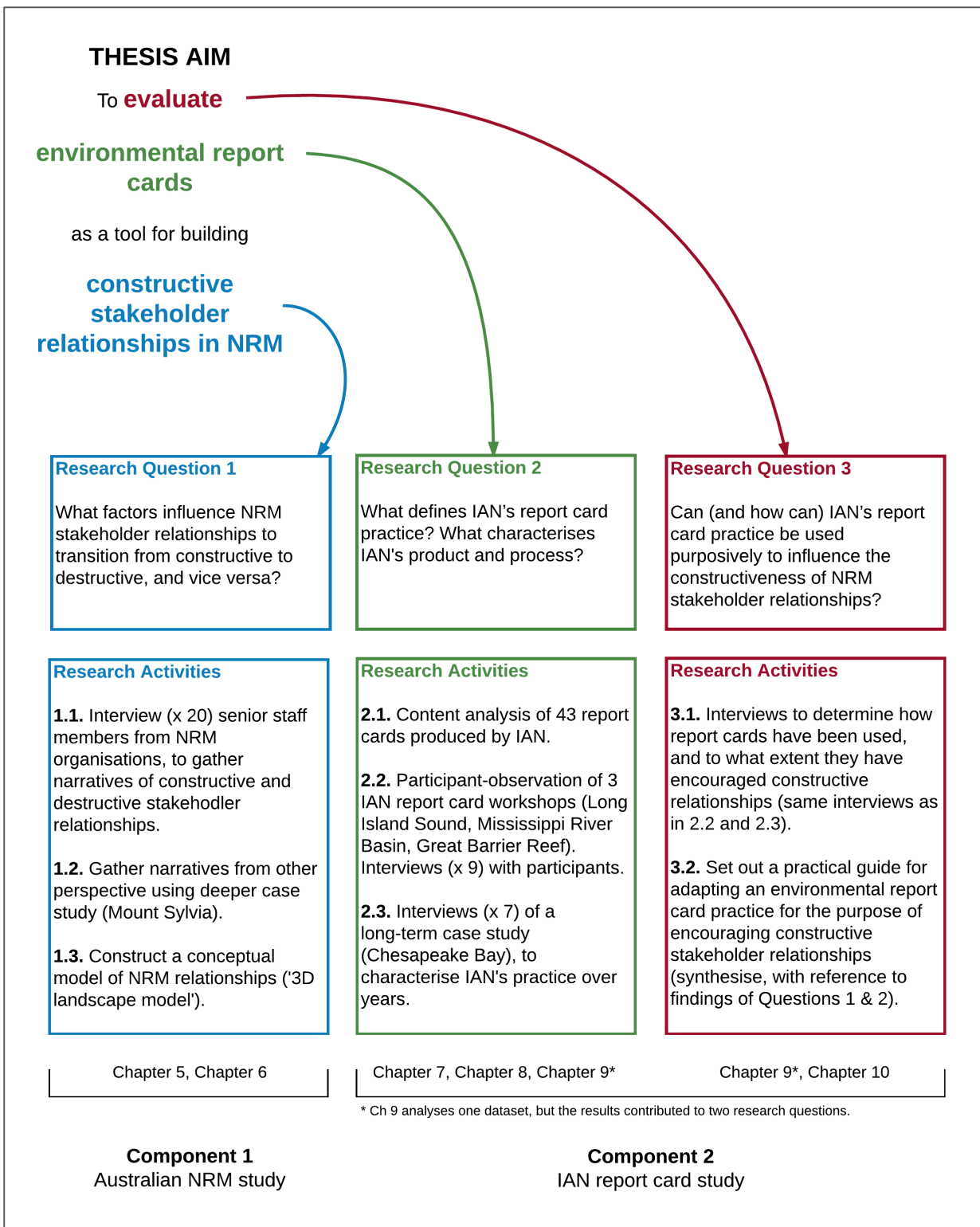


Figure 4–1 Thesis overview: aims, research questions, activities, components & chapters
Reproduced from Chapter 1.

4.2. 'Messy' research: two meanings, both applicable here

Subsequent sections describe a range of research techniques. At times, this description will evidence so-called 'messy' research, which can refer to the unplanned aspects of research (Clark et al., 2007), or to the use of a mix of research methods to investigate a problem (Sapford, 2006). Both of these meanings are applicable to this project.

In relation to the first meaning: the framing for this thesis has changed over the 4 years of its undertaking. It was initially framed as seeking a tool for knowledge-sharing and cross-cultural communication in NRM. Then, the focus shifted to cross-cultural conflict in NRM, and thence to conflict in NRM. Finally, the framing evolved to one of NRM relationships. The last iteration was driven primarily by the realisation that the conflict literature did not provide a sufficiently useful framing (see Chapter 2).

Changes in frames raise difficulties, because data collected prior to the change may not directly relate to the new frame. Indeed, the thesis was described to almost all interviewees as examining environmental *conflict*, not *relationships*. Responses were given with conflict in mind. These interviews were not wasted: conflict is an inseparable part of relationships (Chapter 2), and the decision to change frames exemplifies the iterative nature of retroductive research. However, the data needed to be re-analysed with the new frame, and later (particularly in Chapter 5), I discuss how the original conflict framing may have led to an underrepresentation of constructive narratives.

Changing the framing is an example of messy research, in the sense that it was an unplanned aspect of the research process. In writing this thesis, I have resisted the temptation to obscure such the messiness because, as Clark et al. (2007: 110–112) state:

The unabashedly messy aspects of the research process are often hidden from published view, and are therefore not available to encourage and instruct... Writing often tidies up the loose and ugly ends of research, and yet the process of dealing with those parts is often one of the most productive for a project.

The second meaning of 'messy research' also applies. This meaning refers to using 'a mix of methods in a comparatively unfocused way' to evaluate social situations as a whole (Sapford, 2006: 171). In contrast, in focused experiments the researcher controls the variables. Describing messy research into a housing problem, Sapford (2006: 172) writes:

Messy research does not provide a clear-cut assessment of the outcome of one intervention as, say, in a field experiment or quasi-experiment. However... it does permit more complex evaluation. By applying a wide range of methods, some well designed and some more

‘scrappy’ and opportunistic, it was possible to produce information useful for all the different players involved.

This meaning of ‘messy research’ is also applicable to the thesis, due to its mix of methods and its adoption of serendipitous research opportunities. Accordingly, this chapter presents the methods actually used, firstly to record my process of dealing with the messiness of this study, and secondly to recognise the complex evaluation taking place.

4.3. Overview of methods used

This section gives a critical – though general – description of the methods used. I aim to clarify the rationale for choosing each method, as well as to establish the vocabulary with which the chapter will discuss the validity of the research conducted. This section is, in effect, a conceptual literature review on the research methods used, with how they were actually used set out later in the chapter (Sections 4.4–4.6).

4.3.1. Case studies approach

This thesis primarily makes use of case studies as an approach to research. Each research question uses cases to reach an answer, and the thesis as a whole uses IAN’s practices as a case study for developing other collaborative tools to encourage constructive relationships.

When are case studies suitable? Yin (2014: 8) writes that case studies are capable of being used for exploratory, descriptive, and explanatory purposes. There is ‘no formula’ for choosing a case study method, but it is most relevant where the research seeks to explain ‘some present circumstance (e.g. “how” or “why” some social phenomenon works)’, as well as provide an ‘extensive and “in-depth” description of some social phenomenon’ (Yin, 2014: 4). Additionally, case studies are preferable ‘when examining contemporary events, but when the relevant behaviors cannot be manipulated’, or when behaviours cannot be manipulated ‘directly, precisely, and systematically’ (Yin, 2014: 12).

These guidelines express why the case study approach has been adopted here. This research is interested in the effect of a collaborative report card process on NRM relationships. It asks *why* and *how* NRM relationships become constructive and destructive, and *how* and *why* such a process might encourage constructive relationships. In contrast, neither a survey approach nor an experimental approach would have been suitable: each relationship is a unique product of a history of interactions (and hence difficult to reduce into survey questions), and being real-world situations, often in the past, they could not have been manipulated into an experimental design.

On a deeper methodological level, defining ‘case study’ is problematic, because it depends on the research being undertaken (see Ragin, 1992; Platt, 1992). Broadly, it is a method of ‘matching ideas and evidence’ (*ibid.*: 221). The word ‘method’ is chosen deliberately to reflect a *process* of inquiry; Ragin (1992: 225) uses the verb form ‘casing’ to emphasise this process:

Casing is an essential part of the process of producing theoretically structured descriptions of social life and of using empirical evidence to articulate theories. By limiting the empirical world in different ways, it is possible to connect it to theoretical ideas that are general, imprecise, but dynamic verbal statements. In this perspective a case is most often an intermediate product in the effort to link ideas and evidence. A case is not inherently one thing or another, but a way station in the process of producing empirical social science.

This description of ‘casing’ suggests that the case study approach is not defined by what a case *is*, but rather what *purpose* the case fulfils – namely, to provide empirical evidence to support a theoretical description of a social phenomenon. This purposive view aligns with Stake (2005), who suggests that cases might be conceptualised according to the reason for being interested in them. He suggests three types of case studies. *Intrinsic* case studies are so-named because they are intrinsically interesting – the researcher (or reader) is interested only in that particular case. An example might be a doctor interested in a particular patient (the patient being the case). *Instrumental* case studies are interesting because they provide generalised insight into a broader issue. A *multiple* or *collective* case study is an ‘instrumental study extended to several cases’; using multiple cases increase the generalisability of the conclusions drawn (Stake, 2005: 445–6). These types are not mutually exclusive, because one might have multiple interests in a case (or cases).

Choosing multiple case studies (as this thesis does) requires establishing ‘abstract dimensions’ (Stake, 2005: 451) to formulate selection criteria. Initially, such dimensions are based on literature, and subsequently refined as new considerations emerge as a result of retroductive research. (This will be seen in Chapter 5, which uses empirical data to refine dimensions of constructive and destructive relationships specific to NRM.)

Multiple case studies are also used to *triangulate* data. Triangulation is ‘a process of using multiple perceptions to clarify meaning, verifying the repeatability of an observation or interpretation’ (Stake, 2005: 454). Triangulation is necessary because:

Case researchers greatly rely on subjective data, such as the testimony of participants and the judgments of witnesses. Many critical observations and interview data are subjective. Most case study is the empirical study of human activity. The major questions are not questions of

opinion or feeling, but of the sensory experience. And the answers come back, of course, with description and interpretation, opinion and feeling, all mixed together. (Stake, 2005: 454)

Triangulation helps to overcome a key limitation of the case study approach: that the researcher has little control over case variables. By triangulating perspectives, and by comparing multiple case studies, what recurs and what is idiosyncratic may become apparent.

In summary, a case study approach is chosen because this thesis has exploratory and descriptive purposes in seeking to understand how NRM relationships develop, and how they respond to a report card process. Case studies are also used because the complexity of NRM relationships makes it difficult to control the variables. A multiple case study approach helps to triangulate different perspectives, and to highlight different aspects of these variables, helping to capture the richness of the phenomenon.

4.3.2. Data gathering methods

This thesis is interested in people's experiences of NRM relationships. The data gathering methods chosen reflect the need to record observable experiences (e.g. attending a meeting and the activities that occurred in that meeting), as well as subjective experiences (i.e., phenomenological research; e.g. someone's thoughts about the meeting). Specifically, semi-structured interviews and participant observation were the primary data gathering methods. Document analysis was used to analyse IAN's report card products (i.e. the report card documents). I re-emphasise that the following sets out the general principles of these methods only; the specific methods used in each research question is detailed below.

(a) Semi-structured interview

The interviews were used for all research questions. The interview technique used in this thesis is semi-structured. Semi-structured interviews are suitable for phenomenological research in which the purpose of the research is set prior to the interview (Frey & Fontana, 1991: 184). In this thesis, the pre-set purpose was to discover various interviewees' experiences of NRM relationship (or *conflict*, as initially framed; see section 4.2 above), and of IAN's report card processes. By comparison, an unstructured approach would not have allowed the researcher to probe these particular aspects, while a structured approach (e.g. a survey interview) would have obscured the unique narrative of each person's experience (Babbie, 2012: 316–7).

Conducting semi-structured interviews requires direction from the researcher. As Galletta (2013: 77) writes in her book on semi-structured interviews:

Carrying out your interview relies on two orienting tasks: the first is to listen closely to the participant for points in need of clarification and further generation of meaning; the second is to locate and place on hold points in the interview to which you may return later for elaboration or on which you may invite the participant to critically reflect. These processes reflect the reciprocity you as a researcher offer the participant during the interview.

Here, reciprocity means ‘creating an exchange between the empirical data as it is collected and analyzed and the theory embedded in one’s questions, framework, and design’ (Galletta, 2013: 77). In other words, the researcher shapes the direction of the interviewee’s response by directing it towards what is theoretically relevant to the research.

Other scholars have also explored the role of researcher in shaping and directing the interview data. Scheurich (1995: 241) suggested that, historically, interviewees were considered objects from which the ‘juice of the lived experience [is] squeezed out’. Later perspectives have emphasised ‘empathetic interviewing’, in which an interview is ‘not merely the neutral exchange of asking questions and getting answers’ (Fontana & Frey, 2005: 696). Rather, an interview is an interactive process between two or more people that leads to a ‘contextually bound and mutually created story’ (*ibid*) that is re-told through the understanding of the researcher (Atkinson & Silverman, 1997; Scheurich, 1995; Fontana & Frey, 2005). Thus, interviews are not neutral but a collaboration – a ‘methodology of friendship’ between researcher and interviewee (Kong et al., 2002: 240).

In conducting and analysing interviews, I have been conscious of my role in influencing the conversation between interviewees and myself. I have tried to be vigilant to instances where I may have led the interviewee to a certain response by using particular words. In particular, I note Galletta’s (2013: 77) warning about *over*-directing interviews:

It is important not to overload an interview with excessive attention to your search for converging and diverging thematic trends in the data. This approach has the potential to dull your sensitivity to what is said and not said during the interview. It also may slant your questioning in pursuit of confirming evidence. In general, then, it is best to focus the interview on the task at hand: eliciting from the participant the meaning he or she gives to the focus of study and capturing that meaning as accurately as possible.

Here, each interview was conducted with broad questions in mind, but interviewees were generally free to describe their experiences. These broad questions are provided in Sections 4.4–4.6 when discussing the methods used for each research question.

(b) Participant observation

Participant observation was used for the IAN report card studies (Questions 2 and 3). Specifically, I observed the practices of IAN staff over a period of 8 months. To a limited degree, I also participated in such practices.

Generally, observation is the ‘fundamental base of all research methods’ in social science (Adler & Adler, 1994: 389). It involves ‘the systematic description of events, behaviors, and artifacts in the social setting chosen for study’ (Marshall & Rossman, 2015: 143).

The term *participant* observation refers to a type of observation in which the researcher is immersed in the community to be studied, and builds a rapport with members of that community (Angrosino, 2005: 732). The research intent may or may not be known to those being studied (Becker & Geer, 1957: 28; Babbie, 2012: 299). According to Angrosino (2005), this type of observation is distinguished from unobtrusive or non-reactive observation (where research subjects are not aware of being studied *and* the researcher is not immersed in the community) and from reactive observation (where settings are controlled and research subjects are aware of being studied – as in a behavioural laboratory).

Participant observation gives the researcher access to ‘backstage culture’ (de Munck and Sobo, 1998: 43; quoted in Kawulich, 2005). It allows the researcher to directly observe ‘how things are organized and prioritized, how people interrelate, and what are the cultural parameters’ (Schensul et al., 1999; quoted in Kawulich, 2005). Immersion over long periods of time opens opportunities to be involved in activities to which an outsider would not normally be invited (Bernard, 1994).

The extent of the researcher’s immersion can vary. Gold (1958) describes four levels:

- *Complete observer* (no participation – researcher is an outsider);
- *Observer as participant* (researcher is an outsider who participates in group activities);
- *Participant as observer* (researcher is part of the group and makes observations for research);
- *Complete participant* (researcher participates without making observations for research, but may write a reflection later).

Where the researcher positions himself or herself on this spectrum can raise issues of objectivity. As Babbie (2012: 300–301) notes, at one extreme, being a complete participant risks ‘going native’ – that is, losing ‘scientific detachment’ as a result of identifying too closely with the interests and

perspectives of the people in the study. At the other extreme, being a complete researcher would preserve detachment, but may close opportunities to understand an insider's perspective.

For the IAN report card studies, an *observer as participant* approach was taken. The reasons were partly pragmatic: I could not be a *complete participant* or a *participant as observer* because I lacked the expertise to take on many of the duties expected of IAN staff members. This approach, which was mostly observation with some participation, suited the research, because losing scientific detachment was a distinct risk: IAN staff members shared similar professional and academic backgrounds to mine, and one of IAN's founders was a close friend of my first principal advisor, Dr Peter Oliver. Further details on the participant–observation undertaken at IAN are given in Section 4.5. As a general principle, however, I made efforts to observe from both an insider's and outsider's perspective (sometimes called *emic* and *etic* views: Babbie, 2012: 301).

Finally, regardless of the level of immersion, participant–observation methods are susceptible to 'reactivity'. Reactivity refers to changes in the way people behave when a researcher is present (Bernard, 1998). In the IAN report card studies, the subjects (i.e. IAN staff) were aware that I was a researcher, as were workshop attendees whose participation I observed. Accounting for potential reactivity was part of the data analysis; I note for now that little reactivity was expected, because the focal point of IAN's practice is workshops with stakeholders, who are outside of IAN's community, and whom IAN staff would presumably want to impress out of professional pride. I expected that my presence would change little here.

(c) Document analysis

Document analysis is 'a systematic procedure for reviewing or evaluating documents' (Bowen, 2009: 27). Documents are materials that contain words and images (*ibid*), and they are seen as 'social facts' (Atkinson & Coffey, 1997). Analysing documents can provide contextual information, refine research questions, add to other sources of data, and track changes over time (Bowen, 2009). It is an efficient method of gathering data and not usually susceptible to reactivity because the document is usually not produced with the researcher's intervention; however, the very fact that the document is produced for purposes other than for research may lead to sparse relevant detail (Yin, 2014; Bowen, 2009).

The analysis of documents generally requires coding: that is, interpreting its contents, identifying what is relevant to the research question, and grouping relevant content into themes to reveal patterns in the data (Strauss & Corbin, 1998; Charmaz, 2006; see also Section 4.3.4 below). The

researcher must take care to examine documents critically, rather than take the content of the document at face value (Bowen, 2009: 33).

Aside from literature reviews (which can be considered document analyses of academic literature), document analysis is used in this thesis to characterise IAN's report cards. Rather than a textual analysis, a visual analysis was the primary focus. Visual analyses encompass a wide-ranging set of methods for analysing visual content (see Margolis & Pauwels, 2011); visual content generally refers to 'photographs, moving images, paintings, drawings, and sculptures' (Bock et al., 2011: 266). Usually, visual content analysis is concerned with how a set of visual content portrays people, events, and situations (Bell, 2004), but this thesis is more concerned with characterising the design characteristics of IAN's report cards. In this thesis, only a shallow visual analysis of IAN's report card documents is undertaken.

4.3.3. Data recording and analysis methods

(a) Interviews

Interviews were audio-recorded and transcribed. The transcriptions were then coded using a grounded theory technique as described in Strauss & Corbin (1998) and Charmaz (2006). This technique involves identifying concepts in data and organising those concepts into themes (open coding), and then iteratively re-coding the data guided by the concepts identified earlier (axial coding and selective coding). 'Coding' involves creating short, descriptive labels to data, and then grouping the data by label (Charmaz, 2006). The purpose of coding is to develop a theory, defined as 'a set of well-developed concepts related through statements of relationship, which together constitute an integrated framework that can be used to explain or predict phenomena' (Strauss & Corbin, 1998: 15). Such a theory is called 'grounded' because it is built *ex-post* from the data, rather than built from speculation and tested from data (*ibid*: 12). It is a method of content analysis (see preceding section).

Coding carries with it the risk of the researcher interpreting data idiosyncratically, so that the research becomes irreproducible. Strauss and Corbin (1998: 266) note:

Given the same theoretical perspective of the original researcher, following the same general rules for data gathering and analysis, and assuming a similar set of conditions, other researchers should be able to come up with either the same or a very similar theoretical explanation about the phenomenon under investigation.

In order to guard against the risk of idiosyncratic interpretation, my principal advisor checked my coding. This was done in two ways: open coding was checked by providing substantial extracts of a

subset of interviews (corresponding to approximately 10 minutes' interview time), and comparing our interpretations; more specific (axial and/or selective coding) was checked by providing a selection of short extracts (ranging from several sentences to a paragraph) and asking the checker to match each extract to labels I developed. Deviance in both cases was then discussed; coding labels and theory were refined accordingly.

(b) Participation observation

Data gathered as a participant observer was recorded using field notes, which is the most common way of capturing participant observations (Kawulich, 2005). Rough field notes were then expanded into more discursive accounts. Mack et al. (2005: 24) emphasise the importance of writing an expanded set of notes within 24 hours of the observations taking place, although this was not always possible (e.g. in a 2-day workshop where the workday ended around midnight and resumed at 7 o'clock the next morning).

Taking field notes is both data collection and front-line analysis, because the researcher has to decide which details to record (Kawulich, 2005). Direct observations and the researcher's own thoughts should be kept separate, lest the researcher later take his or her own interpretation to be definitive (Schensul et al., 1999).

Field notes are coded using a process similar to that described above, but with slightly different intent, because field notes already originate from the researcher. Thus, while the researcher still intends to identify and organise meaning from the field notes, there is greater emphasis placed on 'weed[ing] out extraneous information (de Munck & Sobo, 1998). Coding for field notes was not systematically verified (unlike interview coding); however, discussions with advisors did help to sort the irrelevant from the relevant – for example, an advisor might ask probing questions that drew my attention to a previously overlooked detail.

4.3.4. **Ethics clearance**

Because this thesis involved research with humans, research ethics clearance was required. This study was cleared by the School of Chemical Engineering Ethics Committee in accordance with the ethical review guidelines and processes of the University of Queensland. These guidelines are endorsed by the University's principal human ethics committee and the Human Experimentation Ethical Review Committee, and they comply with the National Statement on Ethical Conduct in Human Research. No approval number was given – logging ethics applications in that manner was, at the time, not the practice of the School of Chemical Engineering Ethics Committee.

4.4. Australian NRM study

This section details the research activities undertaken for Research Question 1. This section is largely descriptive, with more detailed and critical methods given in Chapter 5.

Overall, the aim of the Australian NRM study was to understand what factors influence NRM stakeholder relationships to transition from constructive to destructive (and vice versa). Within the thesis, this study set up dimensions of constructive and destructive relationships in NRM that formed the analytical framework for the IAN study.

Two sets of interviews were taken, with one to triangulate the other.

- Set 1: a broad set involving 20 senior staff from Australian NRM groups.
- Set 2: a smaller set of 6 interviews targeting other stakeholders from two case studies (Mount Sylvia and Barmah–Millewa cases).

The rationale for these choices is overviewed below.

4.4.1. Why choose NRM groups (Set 1)

In Australia, ‘NRM group’ refers to one of the 56 State and Territory organisations and supported by the federal government (NLP, 2014). Each State and Territory has at least one NRM group, and each is tasked with planning and managing natural resources for a specified region (often a catchment). NRM groups were targeted for research because they bear primary responsibility for administering and delivering natural resource management in Australia (Robins & Dovers, 2007; Peters, 2007). As organisations, they are likely to have many rich and varied experiences in managing stakeholder relationships.

As Section 5.1.1 discusses in detail, all 56 groups were contacted, with 20 consenting to an interview. The 20 respondents were assessed for representativeness along two dimensions: their State/ Territory, and how the organisation was constituted (statutory authority, non-statutory body with government-appointed board, or member-governed). Representing all States/Territories would allow claims to be made about *Australian* NRM (cf. e.g. restricting claims to the east coast of Australia). The group’s constitution was expected to affect how they interacted (some interviewees discussed this also): non-governmental, member-governed groups tended to be – potentially *needed* to be – more consensus-based, while statutory authorities could act as the arms of government they were. Representing each constitution type would help to confirm, refine or reject this expectation. While three of the eight States/Territories were represented, all constitutions were represented.

If this study were deeper, other dimensions of representation might have been considered. Would stakeholder relationships progress in different ways where the NRM group was in an urban area versus a rural area? What about a coastal versus inland region? Rich/ poor? Proportion of Indigenous population? Voting patterns? These questions could be extremely interesting, but the scope of this study extended only to establishing, with empirical evidence, the main factors influencing constructive and destructive relationships in NRM, to serve as an analytical basis for the IAN study. A systematic exploration of these more detailed patterns is left for further research.

4.4.2. Choosing to interview senior NRM staff

Senior NRM staff were chosen because they were expected to contribute greater historical context and richer perspectives than more junior staff, by virtue of having worked in the NRM sector for an extended period of time. Specifically, requests for interview were addressed to the CEO, General Manager, or a similar position. Senior staff were expected to bring professional reflectiveness, and NRM groups' role in *managing* natural resources meant that they were less likely to have vested interests in an issue (cf. a landowner or an advocacy group).

Seeking only the viewpoint of managers would have been too narrow: a 'success' or a 'good outcome' for a manager may be a 'failure' or a 'bad outcome' for another (see Dukes, 1993). Set 2 interviews were to triangulate managers' perspectives; why the specific cases were chosen is discussed in the section after the next.

4.4.3. Conduct of interviews with NRM staff

Interviews were conducted by phone. While this resulted in a loss of face-to-face rapport, it was more resource-efficient than visiting each consenting NRM group (which are spread across Australia). Each interview lasted about 1 hour, and was recorded and transcribed for analysis (grounded theory; see Section 4.3.3).

Since the original framing was of conflict (see Section 4.2 above), interviewees were asked to tell 1–3 stories about conflict that they had managed in their careers. Interviewees were told that stories were not limited to experiences whilst employed at the NRM group, but also extended to the individual interviewee's past positions. This allowed the interviewee to choose the most interesting stories, while sacrificing some of the certainty in sampling (e.g. where an interviewee from a member-governed, consensus-based NRM group recounts an experience from her time in a government department, then that story does not represent a community organisation's approach to conflict and relationships). However, only two interviewees (NRM07 and NRM 18) related experiences other than those arising during employment at an NRM group, so this effect is small.

Interview questions were semi-structured, with guiding questions from the researcher. Table 4-1 lists the sort of questions asked, in order to prompt reflection on the dimensions of conflict (which was the focus of the thesis at the time). The prompts were conversational in tone, and no attempt was made to ‘tick off’ each dimension or sub-dimension if the interviewee did not discuss it after some prompting. The dimensions themselves were constructed from the literature, as the table shows: this is an example of research being undertaken with ‘abstract dimensions’ initially drawn from the literature (Stake, 2005; see Section 4.3.1).

Overall, a total of 49 stories were collected from 20 interviewees. They were analysed using a grounded theory approach (Section 4.3.3).

Table 4–1 Interview prompts given to interviewees (where necessary).

Dimension	Sub-dimensions	Questions for interviewees
<p>Incompatibility</p> <p>Daniels and Walker (2001); Folger et al., 2005.</p> <p>Kriesberg (2007: 7) similar—‘issues in contention’.</p>	<p>Daniels and Walker (2001, p. 30), citing Wehr (1979):</p> <ul style="list-style-type: none"> Fact-based Values-based Interests-based Jurisdiction-based Person-based History-based Culture-based. 	<p>What was the issue?</p> <p>What was seen to be the issue?</p> <p>How did the conflict start off?</p> <p>What caused the conflict?</p> <p>What was the dominant cause of conflict?</p> <p>Were there other causes?</p>
<p>Interdependence</p> <p>Daniels & Walker (2001);</p> <p>Kriesberg & Dayton (2012, p. 13)—‘relations between adversaries’</p>	<p>Power to exert influence over each other (Folger et al., 2005)</p> <p>Perceived commitment to resolving the incompatibility, or lack of alternatives (Bacharach & Lawler, 1980)</p> <p>Importance of the conflict; the stakes (Jehn et al., 2008)</p>	<p>Who were the parties? What was the relationship between them?</p> <p>What were the stakes? What did they want from each other?</p> <p>Was one party dominant over another?</p> <p>What choices did the parties have? Why didn’t anyone just walk away?</p>
<p>Exacerbating factors</p>	<p>Institutional design barriers (Nie, 2003; Daniels and Walker, 2001)</p> <p>Adversarial mindset/ cognitive frame (Daniels and Walker, 2001; Kriesberg, 2007)</p> <p>Incentives to perpetuate conflict/ conflict industry (Daniels & Walker, 2001; Nie, 2003)</p> <p>Increasing size of conflict—snowball effect (Kriesberg & Dayton, 2012)</p>	<p>What happened next?</p> <p>Was there much pride at stake?</p> <p>Did anybody benefit from the conflict?</p> <p>Did the conflict merge or snowball with other conflicts? Did it increase in size, either in persons affected or in geographical area covered?</p>

Dimension	Sub-dimensions	Questions for interviewees
Alleviating factors	Change in mindset/ cognitive frame; sometimes a shock (Pruitt & Kim, 2004) New cause for optimism (Pruitt & Kim, 2004) Interventions (Daniels & Walker, 2001)	What happened next? What did you do about it? Did anyone try to do anything about it?
Outcome Kriesberg (2007)	Win/ loss Separation of groups or integration Step towards further conflict Form of outcome—mediated settlement, agreement, litigation, stalemate (Kriesberg, 2007; Maser & Pollio, 2012)	How did it end up? Do you think conflict will fire up again?

4.4.4. Case study investigation (Set 2)

The need for Set 2 cases was to broaden the dataset beyond managers' views, as discussed above. They were chosen out of the narratives collected from the Set 1 interviews, in order to build on the manager's perspective already obtained. Section 5.1.2 (next chapter) gives greater detail; in summary, the criteria for choosing the two case studies were:

- One constructive and one destructive (preferably transitioning from one to the other).
- Original NRM group interviewee receptive to follow-up interviews.
- Preferably different category of NRM group (e.g. statutory authority and member-governed).
- A range of stakeholders identifiable.

The two case studies chosen were the Mount Sylvia and Barmah–Millewa cases. The Mount Sylvia case appeared to represent a transition from destructive to constructive relationship. According to the NRM interviewee, this relationship arose after damaging floods occurred in southeast Queensland, 2011. During these floods, a road was washed out, cutting off access to certain communities. The Department of Transport and Main Roads (TMR) was tasked with rebuilding the road, to restore access. However, the restoration works removed vegetation from a creek – an environmental advocacy group, the NRM group, and some members of the local community considered the works to be environmentally damaging and to risk worse flooding in future. TMR reportedly refused to listen to criticism, but continued dialogue led to an ultimately constructive outcome. This account summarises the NRM group's perspective only, because its purpose is to

explain why the case was chosen – namely, because it appeared to show a transition from destructive to constructive. Chapter 5 gives further details.

The Barmah–Millewa case appeared to show the opposite transition. The central dispute related to management of internationally significant red gum forests, which straddled the Victorian and New South Wales (NSW) state border. The Indigenous people of that region, the Yorta Yorta, had made a native title claim, which, had it been successful, would have granted them certain land rights over some of the forest (Strelein, 2005; Ritter, 2009). The rejection of native title was politically controversial, especially for those in the Yorta Yorta community (Atkinson, 2000). However, the Victorian State government responded by entering into a number of joint management agreements with the Yorta Yorta (DEPI, 2016), which reportedly turned what was a destructive conflict into a constructive one, although there remained dissatisfaction on the part of the forestry and grazing industries (Long, 2010). The NSW government made no such agreement. However, it made legislative changes that tightly controlled commercial logging in the region, leading to political and legal disputes (Pickerill, 2009; see also Landline, 2007). The NSW side of the same case appeared to be one of deeply destructive conflict.

There were practical difficulties in securing interviewees. In the Mount Sylvia case, of the five key stakeholders identified, two could not be interviewed (no response to request for interview). In the Barmah–Millewa case, of the six key stakeholders, three could not be reached. In the next chapter, Section 5.1.2 discusses these limitations in depth. It was concluded that the Barmah–Millewa case could not proceed, because the missing perspectives were indeed the ones who could challenge the initial impression recounted above. Specifically, the Yorta Yorta, forestry, and grazing perspectives were not represented. The Mount Sylvia one could proceed; justification is left for Section 5.1.2.

Overall, the Australian NRM case study aimed to produce an evidence-based set of factors that influence the constructiveness or destructiveness of stakeholder relationships. It *was* able to do so, but the evidence base is skewed heavily towards management perspectives, and its conclusions should be qualified accordingly. Nonetheless, in the context of the thesis, the purpose of this study is satisfied – namely, it created a set of concepts and a vocabulary that could be used for analysing IAN’s report card practice in the following chapters.

4.5. IAN report card studies

The aims of the IAN report card studies were to (a) characterise report card practice, and (b) develop a tool, based on IAN's report card practice, with which NRM stakeholders can steer stakeholder relationships towards constructive modes. (Recall the definitions of 'tool', 'practice', 'product' and 'process', as shown in Figure 1-1.) The choice of IAN as a case study is justified in Chapter 3; the main reasons are because IAN is a commercially successful organisation producing report cards around the world, and because the collaborative nature of its process makes it likely to build constructive relationships among participants. This section outlines the methods used for the research activities depicted in Figure 4-1 above. As for the Australian NRM study, detailed methods are left for subsequent chapters; this section provides an overview of the activities undertaken.

4.5.1. Characterising IAN's report card product

While the process (rather than the product) of IAN's practice is the focus of this paper (recall the discussion about process models in Chapter 2), Chapter 7 nonetheless characterises the *product* because the process is intended to create the product – to understand the process, one must understand to what end it is being applied. A more concrete reason for characterising the product is that the study of IAN's *process* makes reference to elements in the report card, and it was necessary therefore to define the terms used to signify those elements (e.g. suppose part of a workshop focused on creating a conceptual diagram; the term 'conceptual diagram' would need defining).

The sample was drawn from the report cards listed on IAN's website (IAN, 2016d), which lists 81 report cards published since April 2007 (Appendix A lists all report cards). Of those, 43 were produced by IAN directly, with the remainder produced by other organisations that were trained, supported, or indirectly influenced by IAN (e.g. by copying IAN's style, under authorisation). Non-IAN report cards were excluded, because they did not necessarily represent IAN's report card product. All 43 IAN-produced report cards were chosen for analysis.

The analytical method was a visual content analysis, where elements of each document were coded, and the codes collated to yield patterns in how the report cards were constructed (see Section 4.3.3). The results were not entirely consistent, but suggested five broad categories (contemporary, historical/ legacy, historical-technical, technical, and extended report). Chapter 7 reports the results.

Overall, this was a shallow analysis, with the five categories not quite neatly capturing every report card analysed. A shallow analysis served the primary purpose of coding the report card product – namely, in order to establish a set of concepts that could be referred to when undertaking the deeper analysis of the report card *process*.

4.5.2. Characterising IAN's report card process (workshop focus)

(a) Participant observation of two case studies

To understand IAN's report card process, I was hosted at IAN's head office in Cambridge, Maryland USA, from November 2013 until July 2014 (a cumulative total of 8 months). This immersion allowed me to witness directly IAN's process, as well as ask IAN staff clarifying questions about their work. Case studies were chosen to focus my participant observation. For this component, a 'case study' refers to the actions relating to the production of one or more report cards bounded within a geographic area (thus, three report cards produced for different parts of Long Island Sound make up one case study). The case study selection criteria were:

- **Timing:** opportunity to observe as many workshops for each case as possible.
- **Likelihood of conflict** manifesting within workshops: the more fractured the relationships, the better the opportunity for testing the robustness of IAN's process as a method for building stakeholder relationships.
- **Case study size:** a relative mix of large *and* small number of participants was desirable, to represent different group dynamics.
- **Physical proximity** (for budgetary considerations).
- **Willingness of the client** to admit the researcher: a mandatory requirement.

Two case studies were chosen: Long Island Sound, and Arkansas and Red Rivers (part of the Mississippi River Basin report card program). Below, Table 4-2 sets out the key attributes of each case study (for convenience, the right-most column addresses interviews, which are described in the next section). The Long Island Sound case study was small, involving no more than 10 workshop attendees, while the Arkansas and Red Rivers case involved over 50.

Note that the Arkansas and Red Rivers report card was part of a larger series of six report cards commissioned by America's Watershed Initiative (AWI), a non-profit organisation, for the entire Mississippi River Basin. Only the workshop for the Arkansas and Red Rivers report card was observed. While the other five workshops were held during my stay in the USA, until the Arkansas and Red Rivers workshop, I had intended on pursuing another case study in Louisiana. That client cancelled the project, necessitating a hasty re-focus on the Arkansas and Red Rivers case study: an example of the vicissitudes of messy research.

A third workshop was observed (the Great Barrier Reef case) – however, that observation was opportunistic (it happened to be held in Australia while I had temporarily returned to visit family), and not a systematic case study. Observations are presented briefly in narrative form in Chapter 8.

In all cases, informal conversations with participants and IAN staff were written up as field notes, and quoted selectively in the results.

Table 4–2 Case studies for characterising IAN's report card process

Case study	Description	Area covered	Observed	No. of interviews*
Long Island Sound New York & Connecticut (USA)	Three report cards deliverable: (i) whole-of-Sound; (ii) Hempstead Harbour; (iii) Norwalk Harbour Reporting on ecological health.	3,000 km ²	Pre-workshop listening tour (3 days, Mar 2015). Meeting between funders (IAN's client) and local partners from Norwalk and Hempstead harbours (half day, Apr 2014). Workshop (2 days, Jul 2015).	3 (of 6-10 workshop attendees)
Arkansas & Red Rivers Colorado, Kansas, Oklahoma, Arkansas, Texas, Louisiana (USA)	Whole project to deliver one whole-of-Mississippi report card, plus 5 sub-basin report cards. This paper focuses only on the sub-basin report card for the Arkansas & Red Rivers. Reporting on environmental, social and economic health.	605,000 km ²	Workshop (2 days, May 2014).	6 (of approx. 50 workshop attendees)

**Number of attendees excludes members of IAN team. Count is approximate only, because not all attendees were present for whole workshop.*

(b) Interviews

In both case studies, participant-observation was corroborated against interviews with participants in the process. All participants were invited to be interviewed, either by phone or in person. Importantly, the number of interviewees is low compared to the number of attendees. This is a clear limitation, discussed further in Chapter 8. For now, I note that this limitation means that claims must be qualified as coming from a narrow set of perspectives. However, the primary data source was direct observation rather than interviews, which played a triangulation role. While the narrowness of the interview set reduces the confidence in the observations (since they are not widely corroborated by others), the results remain valid and valuable.

(c) Analytical methods

Coding of field notes and interview data was done to develop a grounded theory of IAN's report card process (Section 4.3.3). As part of a retroductive strategy, an initial model of the report card process was constructed, which was iteratively refined with observation and interview data.

Specifically, a simple model of IAN's process was constructed around three invariable milestone events of every report card process: the initiation of the project by IAN's client, the collaborative workshop(s) conducted by IAN, and the publication of the final report card. Thus, IAN's report card process was divided into three phases:

- *Before* the workshop (from the moment of client initiation up to the workshop),
- *During* the workshop, and
- *After* the workshop (up to the publication of the report card).

Generally, these phases were not challenged by the results, and this structure was retained by the end of the research. Two additional phases, however, were not part of this model. First, the effect of any pre-existing relationship between IAN and the client prior to project initiation was not explored (since neither case study represented this scenario). Second, the post-publication phase was not initially explored. It transpired that this was an important phase; the next section discusses the methods used to examine it.

4.5.3. **Characterising IAN's report card process (post-publication focus) & usefulness of report card for encouraging constructive relationships**

Chapter 8 involved nascent report card programs: both the Long Island Sound and the Arkansas & Red Rivers cases were initiated during the period of observation. This allowed research to focus closely on social dynamics before and during the workshop, because they were unfolding during the researcher's period of immersion. In order to examine whether the report card process generated long-term constructive relationships, a long-term case study was required. The Chesapeake Bay case was chosen for this purpose, because it is IAN's longest-running program, the first report card having been published in 2007.

Aside from investigating the long-term effect of report cards on stakeholder relationships, the second function of the Chesapeake Bay case was to document the handover phase, in order to more fully record IAN's report card process (Research Question 2). Chapter 9 details the history of the Chesapeake case. In brief, the Chesapeake Bay is a large (the largest) estuary in the USA, spanning six States (Williams et al., 2009). IAN was commissioned to create an annual whole-of-Chesapeake Bay report card, plus two tributary-level report cards (see Appendix A, list of all report cards). Subsequently, tributary-level organisations took over production of those report cards, with training

and other support from IAN. I conceptualised this as a *handover* phase (starting after publication of the first report card), added to the *before*, *during*, and *after* phases outlined above.

Both functions were fulfilled using interviews only. Section 9.1 provides further detail. Briefly, different types of users were targeted. Three key user types were identified: non-profit, tributary-level conservation organisations (usually carrying out citizen-science programs), philanthropic organisations (who funded the former), and policy-makers. Passive readers (e.g. community members) are users in the sense that they engage with the report card product, but because they are not using report cards purposively as a tool to achieve purposes involving stakeholder relationships, they were not targeted for research.

In total, six interviewees consented to be interviewed (4 x local tributary groups, 1 x policy-maker, 1 x funder). An additional tributary group member gave some thoughts over email; while these thoughts are included as data, they are not heavily relied on because email communication gave only limited opportunities to probe for further nuance. Due to time constraints, I did not seek further interviews. This is a small set, but they appeared to cover a range of perspectives – not only because of the sectors represented, but also because there was a mix of people who formerly used report cards but no longer; people who initially resisted report cards but now use them; and people who have consistently supported report cards. Nonetheless, this sample is small. Section 9.1 justifies the validity of the research, but overall the findings in this part of Chapter 9 are taken to have *detected* patterns for further research, rather than making wholly confident claims.

4.6. Conclusion

In this chapter, two of my aims were to set out what work was done for the thesis as a whole, and to evaluate the overall validity of the research. On the latter point, the main weakness of both the Australian NRM study and the IAN studies is the patchy representation of certain interview sets. With the exception of the Barmah–Millewa case, this patchiness does not fatally damage the validity of the studies (finely detailed argument on this point is left to subsequent chapters). However, the claims made need to be qualified to reflect these limitations. Chapter 11, which concludes the thesis, indicates that these weaknesses are partly by design: each component might well have been the subject of a PhD thesis in itself, but I chose a shallower but broader design in order to produce *useful* research that would address my original motivation for this thesis (as noted in the Preface). By pointing out the limitations, defending the validity of the research, and qualifying the claims, I hope I have achieved my last aim for this chapter – namely, to demonstrate a critical understanding of social science methodology.

Chapter 5. Constructive & destructive relationships in Australian natural resource management

This chapter is an empirical study of constructive and destructive stakeholder relationships, in the context of Australian natural resource management (NRM). The aim of this study is to understand what influences the course of stakeholder relationships. The word ‘course’ is used deliberately to imply that the way relationships progress can be conceptualised within a *process* model, which highlights how relationships change over time (recall Section 2.2). This chapter is premised on the fact that relationships do change over time; the inquiry built upon that premise is what *makes* them change. The overarching research question for this chapter is: what influences NRM stakeholder relationships to become more constructive or destructive?

Note that the endpoint of this chapter is merely to identify such influences. It is not until the next chapter that these influences will be arranged as a process model; specifically, the two- and three-dimensional landscape models introduced in Chapter 2 will be used in Chapter 6 to make sense of the research results presented in this chapter. Thus, this chapter has a descriptive purpose (*what* influences stakeholder relationships), while the next chapter has a greater analytical component (*how* these influences can be interpreted in a process model).

Within the broader context of the thesis, this chapter establishes focal points for analysing IAN’s report card practice. Chapters 7–10 will suggest that parts of IAN’s report card practice encourage constructive stakeholder relationships because they exert the same sort of constructive influences discovered in this chapter. The converse is expected also – that parts of IAN’s report card practice exhibit some of the destructive influences reported in this chapter. By identifying what can change the constructiveness and destructiveness of stakeholder relationships, this chapter supports the analysis of IAN’s report card practice.

The literature review in Chapter 2 establishes the conceptual background to this chapter. In particular:

- Section 2.4.2 synthesised the main attributes of destructive and constructive conflict from a number of literatures, including social psychology, organisational conflict, international conflict, negotiation practice, and natural resource management (Deutsch, 1973; Folger et al., 2005; Fisher & Ury, 2012; Wondolleck & Yaffee, 2000; Sidaway, 2005; Kriesberg & Dayton, 2012).

- Section 2.5.2 highlighted recent work that explicitly uses a destructive and constructive framing to build a dynamic (i.e. process-based) model of conflict (Coleman, 2011; Vallacher et al., 1997, 2011, 2013).
- Section 2.4.3 showed that others have used process models (specifically, phase models) to conceptualise *environmental* conflict (Sidaway, 2005; Delli Priscoli & Wolf, 2009; Yasmi et al., 2006). Here, environmental conflict is defined in accordance with Daniels and Walker (2003: 28), who say that conflict occurs where there is a perceived incompatibility between two or more interdependent parties, and that incompatibility involves an environmental issue.⁵

These three parts of the literature review demonstrate the knowledge gap that this chapter is intended to address. Firstly, the destructive/ constructive framing has not been applied specifically to environmental conflict, nor to stakeholder relationships within the environmental sector. While the words destructive and constructive have been used to describe environmental conflict (Driscoll, 1996; Gladwin, 1980; Maser & Pollio 1995) – and sometimes with express reference to Deutsch’s (1973) work (Opotow & Weiss, 2000) – my review found no study using the destructive/ constructive binary as an analytical framework.

Secondly, this chapter makes a novel contribution because it is an empirical characterisation of environmental stakeholder relationships within Australia. The literature contains many studies relating to conflict and collaboration in Australia (see, for example, the special issue on collaborative planning in Australia (in the *Journal of Hydrology*, edited by Syme, 2012; see also Lane et al., 2003, 2009; Kals et al., 2004; Altangerel & Kull, 2013; Adams, 2004; Head & Ryan, 2004). However, all relate to a particular setting or case study. Only Mercer (2000) appeared to characterise environmental conflict across Australia, and even then the focus was on substantive issues of conflict (timber and forests, tourism, agriculture, mining, etc.), rather than on the dynamics of conflict or stakeholder relationships. Consequently, this chapter appears to be novel as it empirically characterises the dynamics of environmental stakeholder relationships in Australia. To be clear, this chapter is not expected to be a comprehensive, detailed characterisation of environmental stakeholder relationships in Australia. Such a study would likely require a much deeper inquiry that would take the chapter beyond the role it plays within this thesis (namely, to establish concepts that will aid analysis of IAN’s report cards). Nonetheless, the patterns detected in this chapter are novel in providing a broad-brush picture of Australian NRM relationships.

⁵ For example, a dispute over the protection of a wildlife habitat is an environmental conflict; a dispute about employment conditions within an environmental organisation is *not* an environmental conflict, because the contested issue does not relate to the environment.

The next section sets out the research design for this study. In brief, 20 interviews were undertaken with senior staff members at NRM organisations around Australia, yielding 50 examples of stakeholder interaction. Two examples were followed up with additional interviews in order to gain perspectives other than from NRM organisations, although only one was ultimately analysed. Overall, the research results were used to identify common influences on the course of NRM stakeholder relationships in Australia. The results are reported in Section 5.2, and are further discussed in Section 5.3.

5.1. Research design and methods

This study aims to identify what moves NRM stakeholder relationships in Australia towards greater constructiveness or destructiveness. The research collected narratives ('stories') of NRM stakeholder relationships, which were analysed to find patterns in how such relationships unfolded. The term 'narrative' is equated with 'stories' after Hinchman and Hinchman (1997: xvi):

Narratives (stories) in the human sciences should be defined provisionally as discourses with a clear sequential order that connect events in a meaningful way for a definite audience and thus offer insights about the world and/or people's experiences of it.

This definition matches the research objective here, which is to obtain representations of sequences of events, told from interviewees' experience of stakeholder relationships, with the intention to extract meaningful insights about the constructive and destructive natures of such relationships. More specific meanings of 'narrative' (e.g. in sociological research interested in the shaping of identity through social interactions; or as an interpretive technique; or as supporting quantitative research) are not implied here: see Elliot (2005); Sandelowski (1991).

Two sets of interviewees were sought:

- Set 1: a broad set involving senior staff from Australian NRM groups; and
- Set 2: a smaller set of interviews targeting other stakeholders.

This section sets out the research methods for each set: sampling, data gathering, and analysis. The rationale for having these two sets of interviews is that, while NRM groups can (and did) yield a rich set of stories about stakeholder relationships, those stories were generally told only from a manager's perspective. As Dukes (1993) warned, what constitutes a good outcome from a manager's perspective may differ significantly when seen from the viewpoint of another. Set 2 interviews sought non-manager perspectives on this basis.

5.1.1. Set 1 (NRM staff interviews)

(a) Sampling – why use Australian NRM groups

While ‘natural resource management’ and ‘environmental management’ are often used interchangeably (Daniels & Walker, 2001: 26; Crowfoot & Wondolleck, 1990), the term ‘Australian NRM’ has a specific meaning in this chapter. In Australia, NRM refers to a suite of environment and agriculture programs administered by 56 State and Territory organisations and supported by the Australian federal government (NLP, 2014). Each State and Territory has at least one NRM organisation, and each is tasked with planning and managing natural resources for a specified region (often a catchment).

NRM organisations are constituted variously as statutory bodies, corporations, and advisory bodies, and while many started as community organisations, they have been ‘moulded, homogenised and professionalised’ to deliver government programs (Robins & Dovers, 2007). How NRM organisations are constituted affects how they operate. For example, statutory authorities operate as an arm of government, sometimes resulting in top-down, politically driven agendas (Robins & Dovers, 2007: 117; WalterTurnbull, 2006; Whelan & Oliver, 2005: 129). Robins & Dovers (2007: 118) note that political involvement is also present in NRM groups that are not statutory authorities, but whose boards are appointed by the executive government. The remainder are member-governed organisations, the boards of which are established through membership voting, and these are least susceptible to political interference (*ibid*).

NRM groups were targeted for sampling because they:

- Provide a cross-section of NRM in multiple Australian jurisdictions;
- Work at the interface between multiple stakeholders; and
- Manage the natural resources in a variety of land use contexts.

As organisations, they are likely to have many rich and varied experiences in managing stakeholder relationships. In seeking a representative sample covering regions across Australia, all 56 NRM groups were invited to interview (20 consented). All interviewees were senior staff, with requests for interview addressed to the CEO, General Manager, or an equivalent position, because they are likely to have had long careers in NRM, and were likely to be rich repositories of experiences relating to stakeholder relationships.

Table 5-1 shows the distribution of those interviewees according to how the organisation is constituted. While not every jurisdiction is represented, each type of organisation is represented at

least once – although there is only one example of a non-statutory organisation with a government-appointed board.

Table 5–1 Set 1 interviewees (x20) sorted by organisation type & jurisdiction.

Constitution	Jurisdiction (State/ Territory)	Interviewee code
Statutory authority	Victoria (Vic)	NRM23, NRM24, NRM45, NRM54
	New South Wales (NSW)	NRM07, NRM 09, NRM13, NRM39, NRM52, NRM53
Government-appointed board (but not statutory organisation)	South Australia (SA)	NRM28
	Australian Capital Territory (ACT), Northern Territory (NT), Tasmania (Tas)	None
Member-governed organisation	Queensland (Qld)	NRM05, NRM08, NRM31, NRM44, NRM49, NRM56
	Western Australia (WA)	NRM01, NRM04, NRM18

(b) Data gathering & analysis – semi-structured interviews

Semi-structured interviews were chosen as a method because it is suitable for probing specific aspects of stakeholder relationships identified in the literature, while retaining the unique narrative elicited from the interviewee (recall Section 4.3.3). In this study, interviews were conducted for approximately one hour each. Interviewees were asked to describe 1–3 ‘stories’ of NRM *conflict* that they had managed in their careers (more on conflict framing below). While interviewees were generally free to relate their stories as they saw fit, they were guided using the questions shown in Table 5-2 (in the previous chapter, Table 4-3 presented the same questions with links to the literature). Interviewees were also not restricted to telling stories from their employment at the NRM group – in order to broaden the set of available stories (and to account for some interviewees only recently being employed at the NRM group), interviewees were told that they could draw on experiences gained elsewhere.

As noted in Section 4.2, this study was originally framed as one about NRM *conflict*, but subsequent reflection suggested that a more appropriate frame was NRM stakeholder *relationships*. This shift in framing does not invalidate the data – as Section 2.5 argued, conflict is a feature in a continuous and ever-evolving landscape of interaction (the relationship), and observations about conflict and collaboration enable conclusions to be drawn about relationships more generally. However, this framing may have led to an underrepresentation of scenarios where stakeholders have consistently cooperated constructively. Interviews were analysed using a grounded theory approach, as described in Section 4.3.4.

As a methodological sidenote, this chapter represents an early stage of an iterative, retroductive research strategy (Blaikie, 2007). At the time, my conceptual framework reflected a phase model of conflict, as the questions in Table 5-2 suggest. The decision to reframe the thesis as relating to relationships rather than conflict, and to adopt the constructive/ destructive binary, was driven directly by the research results below. That is, I only read Deutsch (1973) and works based on those ideas *after* this study. I make this sidenote for two reasons: firstly to acknowledge the messy reality of social science research (recall Section 4.2), and secondly to claim that the data analysis was *not* influenced by preconceptions about constructive and destructive conflict – rather, my analysis suggested the very same binary independently.

Table 5–2 Guiding questions for semi-structured interviews

Reproduction from Table 4-3; citations & sub-dimensions omitted for clarity

Dimension	Guiding questions
<i>Incompatibility</i> (Issues in contention)	What was the issue? What was seen to be the issue? How did the conflict start off? What caused the conflict? What was the dominant cause of conflict? Were there other causes?
<i>Interdependence</i> (Starting relations between adversaries)	Who were the parties? What was the relationship between them? What were the stakes? What did they want from each other? Was one party dominant over another? What choices did the parties have? Why didn't anyone just walk away?
<i>Escalating factors</i> (Making conflict worse)	What happened next? Was there much pride at stake? Did anybody benefit from the conflict? Did the conflict merge or snowball with other conflicts? Did it increase in size, either in persons affected or in geographical area covered?
<i>De-escalating factors</i> (Making conflict better)	What happened next? What did you do about it? Did anyone try to do anything about it?
<i>Outcome</i> (Whether constructive or destructive in outcome)	How did it end up? Do you think conflict will fire up again?

5.1.2. Set 2 (deeper case studies)

(a) Sampling – choice of case studies & interviewees

Two case studies were chosen for further analysis. They were chosen out of the stories told by the NRM group interviewees because such a case study would build on the manager's perspective already collected. These cases were also selected after an initial analysis of Set 1 interviews, from which a constructive/ destructive binary was derived.

Therefore, the criteria for choosing the two case studies were:

- One constructive and one destructive (preferably transitioning from one to the other).
- NRM group interviewee receptive to follow-up interviews.
- Preferably different categories of NRM organisation between the two cases (e.g. one statutory authority and one member-governed group).
- A range of stakeholders identifiable.

The two case studies chosen – the Mount Sylvia and Barmah–Millewa cases – are described in Table 5-3. After the Set 1 interviews, the Mount Sylvia case appeared to represent a constructive set of relationships arising from a destructive beginning. The Barmah–Millewa case, which straddles the Victorian/ NSW border, represented a deeply destructive relationship on the NSW side and a constructive relationship on the Victorian side arising from a destructive starting point. On this basis, these case studies were chosen for further investigation. Table 5-3 describes each case briefly; further case study context is given as part of the results (Section 5.2).

Table 5-3 also shows which stakeholders were interviewed. The greatest limitation is that key stakeholders were missing from both case studies. In the Mount Sylvia case, the Department of Transport and Main Roads (TMR) was one of the key parties to the conflict, and yet no response to multiple requests for interview was received. The local government member (particularly the mayor of the Mount Sylvia community) also did not respond to requests for interview; however, the local government appeared to be less central than TMR, according to the original informant from the NRM group. These omissions mean that the conclusions drawn must be considered carefully. If the purpose of this study was to characterise the Mount Sylvia case, then the omissions are probably fatal, because there is insufficient data to represent the range of stakeholders. Nevertheless, the purpose of this study is to generate broad patterns in how NRM conflicts unfold, and to triangulate managers' perspectives with non-manager's perspectives. The Mount Sylvia case can still indicate how confident one can be about the Set 1 findings. For this reason, the Mount Sylvia case was included in the study.

Table 5–3 Description of in-depth case studies and list of interviewees

Case	Description	Why chosen	Stakeholders identified (& whether interviewed)	
Mount Sylvia Flooding of Blackfellow Creek, Mt Sylvia, Queensland	Floods in the summer of 2010/2011 destroyed road access to a community. The Department of Transport & Main Roads (TMR) was urgently tasked to rebuild the road. The NRM group disagreed with the design of the new road, arguing that it was vulnerable to destruction in future floods, and moreover was damaging on riparian habitats. The dispute between the NRM group and the Department was managed by referring the decision to the community, and with consultation from the local council.	Appeared to show a constructive relationship. Queensland NRM groups are member-governed.	NRM group – SEQ Catchments	Y– coded as NRM56
			Dept. of Transport & Main Roads	N– no response to requests for interview
			Environmental/ conservation group – Queensland Conservation Council	Y– coded as MS01
			Local government (council)	N– no response to requests for interview
			Local community – anonymous individuals	Y– coded as MS02
Barmah–Millewa Management of Barmah–Millewa Forest, Victoria & NSW	The Barmah–Millewa forest is internationally significant due to its wetlands and river red gum (<i>Eucalyptus camaldulensis</i>) population. Straddling the border of NSW and Victoria, the region has competing Indigenous, environmental, and timber harvesting interests. The management styles of the NSW and Victorian governments differed. The NRM group interviewee reported that the NSW forests experienced decades of politicised conflict, while the Victorian forests led to cooperative management agreements among stakeholders.	Appeared to show a destructive relationship on the NSW side, but a constructive relationship on the Victorian side. NSW and Victorian NRM groups are statutory authorities.	NRM group (NSW)	Y– coded as NRM13
			Environmental/ conservation group – Friends of the Earth (FoE)	Y– coded as BM01
			Victorian government agency – Victorian Environmental Assessment Council (VEAC)	Y – coded as BM02
			Yorta Yorta Nation (Indigenous)	N – no response to requests for interview
			Timber industry (NSW)	N– declined an interview
			Cattle industry (Vic)	N– no response to requests for interview

The Barmah–Millewa case missed three critical perspectives. First, Indigenous perspectives are absent. This perspective is critical to the Victorian side of the case, because while government and environmental interviewees portrayed the case as one of a constructive relationship, it cannot be assumed that the Yorta Yorta peoples shared the same attitude (see generally O'Faircheallaigh & Corbett, 2005; Carter & Hill, 2007; Lane & Williams, 2008; Langton & Longbottom, 2012). Ethics approval to conduct interviews was required from the Yorta Yorta Nation Aboriginal Corporation – however, no response was received from the CEO, despite correspondence with administrative staff, introductions via mutual contacts, and an in-person visit to Yorta Yorta country.

The other two perspectives missing are those of the timber and cattle industries. While a suitable representative for each industry was identified (where ‘suitable’ means having been involved in many of the historical events relevant to the stakeholder relationship), one declined to be interviewed and the other, having retired, provided no response.

Of the two additional interviews conducted and analysed (BM01 and BM02), neither shed light on how the relationships unfolded. BM01 was not involved in all of the events, and BM02's involvement focused more on conducting a scientific study of the area, and was not deeply involved in any negotiations or conflict. These shortcomings led this case to be abandoned.

Left with only one set of triangulating case studies, the findings in this chapter need to be considered with caution, because the data are skewed heavily towards management perspectives. Nonetheless, while it cannot be claimed that the factors identified represent the most common or predominant influences on NRM stakeholder relationships in Australia, it *can* be claimed that these factors do exist, and are supported by evidence. Moreover, these findings have additional purposes within the context of the thesis: namely, that they set up concepts and vocabulary with which IAN's report card practice will later be assessed. This purpose is fulfilled. For these reasons, this chapter remains a key part of the thesis.

(b) Data gathering & analysis – semi-structured interviews

The rationale for using semi-structured interviews is the same as for the Set 1 interviews. Likewise, a grounded theory approach to data analysis was adopted, albeit with one modification: by this stage of the research, the constructive/ destructive binary had been constructed from the Set 1 interviews; this data was analysed in order to confirm, modify, or invalidate this framing. In more formal terms, the coding was more restricted for Set 2 interviews than for the first: the constructive/ destructive framing, as well as the initial interview with the corresponding NRM group, influenced axial coding for these later interviews. (The coding process is described in Section 4.3.4).

5.2. Results: Set 1 interviews (Australian NRM groups)

The twenty Set 1 interviews yielded 50 stories of NRM stakeholder relationships (framed as conflict), with most interviewees recounting one, two, or three stories. From those 50 stories, four broad themes were derived using a grounded theory approach:

- Dialogue & communication.
- Partisan politics & the media.
- Use of evidence.
- Involvement of third parties.

This section presents evidence relating to each theme. The interview data show that each theme can (and do) manifest as both constructive and destructive influences. The following sub-sections reports how these influences arose in the interviewees' stories. Coding labels are italicised to highlight the analysis process. A synthesis of the influence themes appears at the end of this section, as a discussion of Set 1 interview results.

5.2.1. Dialogue and communication

Of the 20 interviewees, almost all (17) indicated that communication was critical to encouraging constructive stakeholder relationships. For example, NRM53 suggested that *feeling understood* is essential to building rapport:

I'm a master of the angry phone call ... [I try to] get people to calm down enough to say what it is that they are worried about. (NRM53, NSW)

Similarly, NRM24 described a situation where angry stakeholders were given opportunity to *air grievances freely*. This story involved a township that had experienced repeated flooding, and felt that the NRM group had not done enough to prevent flooding. While NRM24 did not entirely accept blame for the flooding (the community 'didn't look at how much rain they did have in that period'), the NRM group did *accept a share of responsibility*. (Note: CMA stands for 'Catchment Management Authority', another name for NRM group.)

[The flooded community] felt that the CMA and local government hadn't really done anything to fix the problem. So they had a real anger towards the CMA particularly, and local government. They felt like no-one had done anything to help them. And they were very, very upset. And we had a couple of public meetings particularly straight after the third flood, that were very vocal. And we had people in extreme stress. You know, had lost a fair bit of their possessions, and in some cases had fixed it after the previous flooding and it had flooded again.

They were quite concerned, and they needed someone to blame. And that was us. (NRM24, Vic)

Listening to grievances and ensuring that stakeholders were *feeling understood* appeared to lead to *improved trust and willingness to cooperate*:

We ran a couple of workshops with town aerial photos, and we actually got the community to tell us what they saw, what happened. So we gained some of their local knowledge. And they were actually really happy that someone wanted to listen to them. So that was really good in terms of getting a bit of trust from the community, and also – they were still angry, but it was over that real initial anger, and they were starting to think about, well what does this mean, and where to go from here. (NRM24, Vic)

Other interviewees expressed similar ideas. NRM28 described how relationships with Traditional (Indigenous) Owners of land improved after concerted efforts to understand local values, and were expected to continue to improve into the future:

We put in a fair bit of money in to support community consultation. We culled a small number of camels. Some people said, ‘what a waste of money for a few camels.’ But this is the first time we've spent a large amount of time consulting about culling some camels. The point is we actually got permission to cull some camels, so next time it'll be easier, and the time after that it'll be easier. (NRM28, SA)

In contrast, those who were seen to be *wielding authority over others* tended to encourage destructive relationships. NRM24, a statutory authority, was sensitive to the perception that his NRM group was seen as part of a lineage of government agencies dictating natural resource policies to that community.

They have a long history – maybe 50 years – of government coming in and telling them, 'have we got a good deal for you, we're going to this and this'. In hindsight they've seen some impacts on the local environment. So they have a real distrust of government in general. (NRM24, Vic)

Similarly, NRM56 described how *authorities failing to give reasons for their decisions* led to later conflict over flood restoration works:

There was an unfortunate perception built by years of stonewalling by the regulator... [F]rom a layman's perspective, [landholders] had been concerned about the imbalance of vegetation in-stream and on the bank. When they tried to take that [in-stream vegetation] out, they weren't allowed by the regulator. But... what the regulator *didn't* say was, “we'll allow you to take some of the in-stream out if you'll allow us to arm some of the banks with a bit more vegetation”

...Because [the regulator] didn't have money and they didn't have time, it was a “no, you can't touch the vegetation in the creek”, and that was the answer. Any time someone came along wanting to manage the creek, they couldn't do it. So when the flood happened, [the regulator was blamed]. (NRM56, Qld)

The party seen as wielding authority is not always a government agency. NRM49 recounted a story where a private company with a permit to carry out extractive petroleum activities also wielded authority, resulting in resentment from the community:

Where the conflict has come from was the *way* they came in, without exception... They just came in under a legislative banner – they were given the blessing, and they would come in and take what was rightfully theirs. So their engagement process was atrocious. (NRM49, Qld)

The mode of communication was also seen as important. There was general support for *face-to-face communication*, particularly where the interaction is informal and serendipitous. NRM54 (Vic) described ‘car bonnet sessions’, in which it learnt of community attitudes during chance meetings whilst shopping. Some suggested that the mode of communication *per se* was not important, but rather the underlying respect for others’ perspectives. A ‘*bullish*’ attitude led to resentment between an NRM group and a local community, even though face-to-face meetings were frequent (NRM28, SA). In contrast, NRM49 described a staff member whose *respectful attitude* helped to convince an initially sceptical community to invest funds in a fish weir:

But the secret ingredient was the coordinator. We have a principal project officer for the river, and he's just the people person, and had huge respect for everybody. (NRM49, Qld).

In particular, opportunity to understand another person beyond their professional roles tended to build trust and respect. NRM31 describes the effectiveness of a liaison officer in the capital city, located over 1,200 km away, in terms of *understanding the whole person*:

He wasn't just an administrator; he had an environmental background. He started to understand; he started to learn about our local issues. During that 12 months, too, he came out for a trip, so that helped, too. That's so important, to meet people face-to-face, look them in the eyes, and talk about things beyond your work. I found about what he liked, and didn't like – to get to meet those people as human beings, not just someone running a program. (NRM31, Qld)

The same theme arose in a story by NRM18, who described how 2-day meetings and social gatherings helped to bring conflicting stakeholders closer together:

[T]hey were quite clever meetings. They would have day meetings, but every now and then they'd have 2-day meetings, so people had to eat together and get to know each other as well...

[T]hey realised that, suddenly having a barbie [barbecue] after the meeting, they couldn't sit at different tables and carry the shit on. They had to make an attempt... You got to beer in your hand, and talk about the footy or something... And once you've got a different handle on what sort of bloke (and I mean both genders), then you actually can have better discussions about the issue (NRM18, Qld).

Some further specified that the communication must be *genuine, authentic and honest* to encourage constructive relationships. *Communication to achieve ulterior motives* is destructive, because others see the communicator as 'very calculating and very selfish' (NRM23, Vic). This observation related to flood protection works (a levee) that an individual put in place to protect his own property, but had the effect of increasing the risk of flood damage to downstream landowners. The levee was unlawful without an application, so the individual sought to gain favour from decision-makers:

When [landowners] are looking to put in an application [after having already begun works], they'll speak to a number of different officers, or when one officer leaves, they'll try and sweet-talk the next person in that role. It's often very collusive, planned... (NRM23, Vic).

NRM53 (Vic) described a similar *erosion of trust*, where a person made complaints about a road crossing in order to bring about a construction contract favourable to a friend.

5.2.2. Partisan politics and the media

Of the 20 interviewees, six discussed the effect of partisan politics and the media. While there was consensus that *politicising environmental issues* tends to obstruct constructive stakeholder relationships, there were also examples where efforts to prevent politicisation led to constructive outcomes. The destructive examples are presented first.

(a) Destructive politicisation

Two interviewees, NRM39 (NSW) and NRM13 (NSW), recounted intense, persistent and decades-long conflicts exacerbated by politicisation of issues. (Note: they described two different conflicts.) In each case, *representatives of government took substantive positions*, despite ostensibly being neutral. In one of NRM39's stories, this interference came in the representatives' personal capacities:

So for example, there was an irrigation application put forward. ... [T]here were State agency bureaucrats on their days off going down and helping people fill out their applications to oppose it. ... And that's moving into an area that bureaucrats should not go. (NRM39, NSW)

In NRM39's other story, political views went intruded beyond bureaucrats' personal lives into their professional tasks:

[We had] some elements of the government supporting irrigation development, and some areas of the government supporting environmental protection, and being kind of aligned to either side of the debate... I think, actually, agencies acting as lobbyists themselves rather than holders of information, developers of good, sound policy, holders of technical information – but getting involved in the cause itself, I think magnifies the conflict immensely. (NRM39, NSW)

NRM39 attributed this politicisation to bureaucrats' own personal values.

[The bureaucrats] were very passionate about environmental issues – that's how you get into NRM, and come from quite a passionate position on environmental issues... But it is very difficult, because if you are passionate about something, then you do want to see a good outcome. So it's quite a disciplined position to say, “actually, I'm not going to get involved in the content of this; I'm only interested in helping to support a way through it.” (NRM39, NSW)

As a result, there developed between interest groups and government administrators connections that were ‘ideologically strong, as well as personally strong’ (NRM39). These connections encouraged interest groups to seek changes at the policy level, which, if successful, were likely to have been more advantageous than what could have been achieved through negotiation. Thus, *having government allies disincentivises cooperation*:

While they've been told to sit in a room and work it out, there have been other opportunities for them to influence the process: political opportunities, media opportunities; people are using other influence avenues in preference to sitting down together and working it out... If you cooperate, and the other side doesn't, you're a chump... That is our biggest problem – you look weak. (NRM39, NSW)

For NRM13, the political interference in decision-making was less personal, and more driven by *electoral politics* – particularly the incentive to gain votes in urban areas.

[I]n the past 10-15 years..., we've seen the situation where the public service has become incredibly politicised. You're seeing things where public policy, particularly around NRM, is starting to be driven by short-term political cycles, as opposed to longer-term variables... So you're seeing a real push to political outcomes that are being centralist-driven. And by 'centralist-driven', I mean decisions that suit Sydney, Newcastle, Woollongong, Melbourne, Geelong [all major urban centres] – whatever the case may be. That's where the votes are, that's where the seats are, that's how you get yourself into power. (NRM13, NSW)

Appealing to voters in this manner, according to NRM13, required *simplifying the issues*, for the purposes of media releases, into a ‘very, very simple argument’:

Do you like cutting down trees? No? Then you will support the conversion of these to national parks? Yes. Do you wish to save the [threatened species] that's being killed by trees being cut down? Yes. Therefore, support this petition to turn it into a national park. (NRM13, NSW)

NRM13 added that more nuanced opinions were not disseminable via the same media channels, because ‘you can't counter that claim in a 30-second media grab... or, for that matter, a 2-sentence tweet on Twitter’.

Like NRM39, NRM13 suggested that politicised issues become entrenched, and efforts to cooperate are no longer likely to succeed. When asked about encouraging a negotiated outcome as a solution, NRM13 said:

I've seen many examples in NRM debate where that's worked and it's worked highly successfully. In fact, that's probably the first tool that I would put into place, no question... But [in this case] my experience was, when you got those polar extremes in the room, locked them in the room, and try to get them to come to a solution, what they did was to use that as an information-gathering session, to find small weaknesses that they can exploit, and they would twist that exploit that out in the public arena. Interestingly enough, one-on-one, if I spoke to those groups one-on-one, away from the media, out in the bush where no-one else could listen, or hear, and they would never, ever admit that they'd said it: they could actually see each other's point of view. But it did not meet [their] political needs. (NRM13, NSW)

In NRM13's case, politicians had an incentive to take substantive positions. In addition, some lobby groups (including the news media) positively had an *interest in creating and maintaining conflict*:

If this conflict were resolved, they'd be out of a job. They live on conflict. If there's not conflict, they're not generating cash out of donors and philanthropists, and those sorts of things. I mean it is an industry. If these things were resolved and resolved amicably, they'd be out of a job. (NRM13, NSW)

These interests, according to NRM13, intensified each other, making the conflict intractable.

(b) Constructive non-politicisation

While the previous stories suggested that politicising environmental issues led to destructive relationships, other stories suggest that *preventing partisanship* was successful in creating constructive conditions. NRM53 (NSW) and NRM56 (Qld) stated that *keeping disagreements*

private was a deliberate strategy to prevent destructive conflicts. NRM53 stated that ‘policy decisions can be made literally on a whim, on a piece of bad press’, and consequently tended to keep all discussions and negotiations private.

Similarly, NRM56 described a story in which post-flood restoration works were carried out by a government department. A conservation group asked the NRM group to address the design of the works, which would reportedly damage riparian habitats. The government department was initially dismissive of this feedback, and there were newspaper articles condemning the works. According to NRM56, relationships improved after *keeping disagreements private*:

We purposefully avoided circumstances where there were arguments in front of landholders.
We purposefully avoided circumstances where they would be criticised in a semi-public forum.
[We then] kept them engaged with people who they didn’t feel were pointing the finger at them, to have them sit down with technical people so they could have a constructive relationship with them. (NRM56, Qld)

In contrast to the stories of the previous section, *refusing to take sides* resulted in more cooperative outcomes. As a counterpoint to the stories already related, NRM39 told another story in which the *absence of alternatives to cooperation* led to constructive outcomes:

Farmers and environmental groups were basically locked in a room until they could come up with something they could all live with. And there was some really good, firm, and [long-lasting] relationships developed that continue to this day, between personalities from both sides of that debate. (NRM39, NSW).

NRM18 similarly explained the strategic calculus that took place where there is *no alternative but to cooperate*:

If you don't show up to a meeting, then someone might make decisions that don't suit you! If you haven't had your say, and if you're not there in the decision-making – if it's a majority decision-making – then you've got to be there. (NRM18, Qld)

However, a *non-partisan stance must be communicated*, as NRM01 indicated:

So our approach...has been to provide information without fear or favour, both sides of that, as much as we can. [I]t's required pretty active communication as to what our role is, definitely...I think there have been perspectives that we'd been particularly partisan on a particular issue or another. But I think once we've managed that response and communicated that [neutral] position accordingly, then we move past that. But that's something that's had to be managed actively all the way along. (NRM01, WA)

5.2.3. Use of evidence – transparency of decision-making process

Six interviewees indicated that *transparent and unbiased use of evidence* led to constructive relationships. NRM49 recounted a project in which the NRM group wanted to convince a reluctant council to spend funds on a fish weir:

[After] six years [of resistance]...it was only last week when we stood in council and the main barrier [i.e. opponent to the weir] said to us, "you won us over, you've changed our minds". So we've got a good ending to the story. Really, it wasn't instantaneous – the way we managed the conflict was really with good science. (NRM49, Qld).

Similarly, NRM31 described how monitoring data helped to convince administrators to agree to a program. *Data was made comprehensible* and relevant to the issue at hand:

We didn't blast them with data – I synthesised information, to something really quite succinct and simple, but I could attribute to all my sources all the time. I'm just a great believer in meticulous scientific evidence to back up emotion. Emotion doesn't work in these cases! (NRM31, Qld)

An NRM group can, as a third party, help others reach constructive relationships by *providing data for others to consider*:

So one of the big value-adds that we've been able to provide in all these circumstances is just providing a lot of data and information to both sides of the conflict. (NRM04, WA)

Our approach to that has been to provide information without fear or favour, both sides of that...So for us, we provide the factual information as much as we can, and allowing other people to make up their minds in interpreting that information (NRM01, WA)

So a lot of the NRM groups are known as your 'honest brokers' or your 'information brokers', and quite often requested to verify some of the data that government people are throwing out. (NRM44, Qld)

Interestingly, the above five quotes all came from non-statutory NRM groups. Statutory NRM groups may experience greater scepticism over the quality or impartiality of the information they provide, because they are seen as government agents. NRM39, for example, suggested that distrust of government or statutory agencies is exacerbated where the *basis of decision is not understood*, and/or *the use of data is not comprehensible*:

[We] have never been able to resolve a lot of that conflict, because the regulations and the operations to meet the Act, of what you can do, is very difficult. The systems [to support

decision-making] are designed to assess a range of algorithms – threatened species, cultural heritage, riparian vegetation...[A]t the end of it – the computer most of the time says 'no'. And the process for doing that is quite complex, and not able to be easily explained to the layman. So it's a bit of a black box process, where people ask the black box whether they can clear, and it says 'no'. We can't explain to them why. (NRM39, NSW)

Finally, NRM24 described a story relating to environmental water allocations (volumes of water in a river system set aside for environmental uses). Despite having comprehensive models, the *overriding policy concern* was for 'water security' for consumptive users. Scientific evidence was not able to overcome these concerns:

But basically, one of the issues was that we could manipulate the flows [in our models] to get better environmental outcomes, providing that it didn't have an impact on the reliability of supply. We were trying to work through those issues and it got pretty heated..., particularly between the water authority, the irrigators, and the environment. We wanted water for the environment, and they wanted their security maintained... [W]e were hamstrung to some extent by the process, which really supported security of supply. (NRM24, Vic)

5.2.4. Involvement of third parties

While collaborative approaches were generally linked to constructive relationships (see above), two NRM groups indicated that constructive outcomes can occur in top-down decisions, where *parties accept a top-down decision* from a chosen third-party. NRM28 described how two conflicting parties had recourse to a magistrate to make recommendations as to a resolution. These were accepted, although their acceptability may have been influenced by the give-and-take nature of the recommendations:

The tone of the recommendations was one of partnership, and not one of either party will rule, or either party will take the lead on the matter. So I guess the recommendations had concessions on both sides, and it... promoted the spirit of cooperation.... Now it's all hunky dory! (NRM28, SA)

NRM04 saw its own organisation as fulfilling the role of a neutral third party, echoing NRM44 in using the phrase, 'honest broker':

I think it's our role to call the bullshit when we see it – and that's on both sides. That's part of our honest broker role. Where we see consultation that hasn't been genuine, we call them to account. If necessary, we empower the community to say, look, if you're not feeling like this is real, then these are your options outside of these process: you could go talk to your local politician, you could go to the local council and get them to put pressure on the company to do

this in a real and meaningful way. And similarly, when we see the community extending or stretching the truth... we probably do that in a lot more quiet way and talk to them individually and say, we really need to stick to the main issue here. (NRM04, WA)

NRM44 (Qld) described how disputes among NRM groups are subject to the top-down decisions of a voluntary governing body: ‘the first step would be to reach some form of compromise; the second one would be win/loss – it’d effectively be cease and desist’. NRM44 suggested that such orders are not destructive, because all NRM groups had already accepted that the governing body’s decision would bind them.

5.3. Discussion: Set 1 interviews

Themes described in the previous sections were derived from the interview data, as an exercise of grounded theory. It is not suggested that each theme is necessarily constructive or destructive. The themes broadly represent components of a stakeholder relationship; it is the actions of stakeholders that steer the relationship towards constructive and destructive modes. For example, ‘communication’ is neither inherently constructive nor destructive, but the manner in which communication is made may influence a relationship one way or another. Table 5-4 synthesises the constructive and destructive manifestations of each theme, by compiling and refining the italicised coding labels above.

Table 5-4 also maps each theme to the attributes of constructive and destructive relationships, as identified in Chapter 2. Texts with especial pertinence to a particular theme are cited. To remind the reader of these attributes, Figures 5-1 and 5-2 reproduce the two synthesis diagrams in Chapter 2.

Mapping the results to the literature is argumentatively important because the chief purpose of the research is to show, using empirical evidence, how concepts of constructive and destructive relationships manifest in the Australian NRM context (whereas much of the literature cited is not specifically related to NRM, in Australia or elsewhere). Such mapping can also direct further research, particularly where evidence deviates from theory.

Table 5–4 Constructive and destructive influences identified in Set 1 interviews

Influence theme	Constructive influences in NRM		Destructive influences in NRM	
	<i>Detected in the interview data</i>	<i>Link to literature</i>	<i>Detected in interview data</i>	<i>Link to literature</i>
Dialogue & communication	<p>Improved trust and willingness to cooperate where:</p> <ul style="list-style-type: none"> Stakeholders <u>feel understood</u>, having had an opportunity to air grievances freely. Managers accept due <u>share of responsibility</u> for damage caused by environmental hazards. Managers communicate with a <u>respectful attitude</u>. Communication is <u>genuine, authentic and honest</u>. Communication seeks to <u>understand a person as a whole</u>, beyond their professional identities. Often communication is <u>face-to-face</u>. 	<p>Dialogue is defined by Yankelovich (2001: 14–15) as occurring when people ‘listen and respond to one another with an authenticity that forges a bond between’ them. This can ‘transform conflict into cooperation’.</p> <p>Wondolleck & Yaffee (2000: 89–90) suggest that ‘communication, communication, communication’ is essential to resolving disagreements; and that creating opportunities for meaningful interaction is a prerequisite to collaboration in NRM.</p> <p>Deutsch (1973) and Kriesberg and Dayton (2012) argue that communication leads to a breaking-down of self/other boundaries, which facilitates conflict de-escalation.</p>	<p>An erosion of trust occurs where:</p> <ul style="list-style-type: none"> One stakeholder <u>wields authority over others</u> (e.g. a government agency, or a private organisation acting under a permit granted by government). Authorities <u>fail to give reasons</u> for their decisions. Communication is undertaken with <u>ulterior motives</u> (e.g. to obtain information to use later in negotiations) – calculating and selfish communication. A <u>‘bullish’ attitude</u> is adopted. 	<p>Yankelovich (2001: 39–40) contrasts ‘dialogue’ with ‘debate’; the former is undertaken with an intention to understand others, while the latter is undertaken in order to win a point.</p> <p>Deutsch (1973: 353) states that an outcome of ‘competitive processes’ (which lead to destructive outcomes) is ‘unreliable and impoverished’ communication, characterised by low confidence in the information given directly from others, and by ‘espionage and other circuitous means of obtaining information’. A ‘suspicious, hostile attitude’ further ‘increases the sensitivity to differences and threats while minimizing the awareness of similarities’.</p> <p>Consensus-building (<i>sensu</i> Susskind et al., 1999) is likely to fail unless there is ‘a dialogue where all are heard and respected and equally able to participate’ (Innes, 2004).</p>

Influence theme	Constructive influences in NRM		Destructive influences in NRM	
	<i>Detected in the interview data</i>	<i>Link to literature</i>	<i>Detected in interview data</i>	<i>Link to literature</i>
Partisan politics and the media	<p>Constructive outcomes where:</p> <ul style="list-style-type: none"> Parties <u>keep disagreements</u> (critiques of each other) <u>private</u>, with statements to media emphasising cooperative efforts. Decision-makers <u>refuse to take sides</u>, but oversee cooperative processes where stakeholders work through incompatibilities together. Decision-makers provide <u>no alternatives to cooperation</u>, and communicate as much. 	<p>Constructive outcomes more likely where parties do not ‘feel threatened’ or ‘under pressure’ – where they have ‘the freedom or courage to express himself without fear of censure’ (Deutsch, 1973: 361).</p> <p>Refusing to provide alternatives to cooperation appears similar to making the Best Alternative to Negotiated Agreement (BATNA) <i>worse</i> than the likely outcome of negotiated agreement (Fisher & Ury, 2012). On this same point, Innes (2004: 9) states, ‘Players come to the table only because they know their interests are not being served well by going it alone.’</p> <p>NOTE: while other scholars discuss the <i>damaging</i> effect of media involvement in politicised conflict, no literature was found examining a positive link between constructive outcomes and a refusal to engage media to criticise others.</p>	<p>Destructive effect where:</p> <ul style="list-style-type: none"> Representatives of <u>government take substantive positions</u> (whether in personal or professional capacity) – encouraging other stakeholders to seek political victories. Political victories driven by <u>electoral tactics</u>. Along with associated <u>media coverage</u>, issues become simplified and polarised. Groups exist that have an <u>interest in creating and maintaining conflict</u>. 	<p>Nie (2003: 324) describes how ‘wedge’ politics, designed to demonstrate what values and interests a political actor represents, is ‘a sort of political showmanship that has the effect of deepening conflict’.</p> <p>This showmanship depends on media attention, which in turn requires simplified views: ‘extremism becomes a ticket for admission to the public sphere’ (Karlberg, 1997: 25; also Nie, 2003: 327).</p> <p>When issues are simplified, parties tend to coalesce into ‘us’ and ‘them’ alliances, shifting their focus from the <i>issues</i> to the <i>persons</i> involved (Deutsch, 1973; Coleman, 2011).</p> <p>Organisations whose <i>raison d’etre</i> is to fight for a particular outcome is known as a ‘conflict industry’; they actively seek to prolong conflict (Daniels & Walker, 2003; Nie, 2003).</p>

Influence theme	Constructive influences in NRM		Destructive influences in NRM	
	<i>Detected in the interview data</i>	<i>Link to literature</i>	<i>Detected in interview data</i>	<i>Link to literature</i>
Use of evidence	<p>Constructive outcomes encouraged where:</p> <ul style="list-style-type: none"> • Scientific <u>evidence is used in a transparent and unbiased way</u> to persuade others of a conclusion. • <u>Data provided to support others' decisions</u> (without persuasive agenda). • Data is represented in a way that is <u>comprehensible</u> to decision-makers. 	<p>Data transparency emphasised as crucial to collaborative planning (see e.g. Jackson, Tan & Nolan, 2012).</p> <p>Baldwin et al. (2012) describe how collaboratively developing decision-making tools enable better understanding of the basis of decisions (and, by extension, better chances of accepting such decisions). Raschmayer & Wittmer (2006) make similar conclusions specifically in the context of environmental conflict.</p> <p>Consensus-building relies on 'information that is accessible and fully shared among participants' (Innes, 2004).</p>	<p>Difficulty in resolving conflict where:</p> <ul style="list-style-type: none"> • Basis of decision-making not understood: modelling algorithms <u>not comprehensible</u> to stakeholders. 	<p>Nie (2003: 320) distinguishes between policy <i>disagreements</i> and policy <i>controversies</i>. The former can be resolved by examining facts and data, while the latter involve a 'selective attention', whereby parties 'differ in what they consider to be facts relevant to the dispute', or differ in their interpretation of the facts (citing Schön & Rein, 1994).</p> <p>NOTE: no literature found <i>specifically</i> discussing how a stakeholder relationship was worsened due to the incomprehensibility of data – Nie (2003) focuses on <i>selectively relying on data</i>, but not its incomprehensibility.</p>

Influence theme	Constructive influences in NRM		Destructive influences in NRM	
	<i>Detected in the interview data</i>	<i>Link to literature</i>	<i>Detected in interview data</i>	<i>Link to literature</i>
Involvement of third parties	<p>Constructive outcomes where:</p> <ul style="list-style-type: none"> Parties agree to accept the <u>decision of a third-party</u> (prior to the decision being made). The third party is neutral: an <u>'honest broker'</u>. 	<p>Fisher & Ury (2012) advocate 'principled negotiation', where the manner in which the negotiation will be conducted is decided first, prior to substantive negotiation of parties' interests. O'Leary (1995) and Blackburn & Bruce (1995) similar.</p> <p>Waldron (1999) suggests a similar concept: although, in a democracy, there is 'disagreement all the way down', at least there is acceptance of the <i>system</i> of decision-making.</p>	<p>No stories specifically related to a situation where disagreement on what makes a fair and impartial forum for addressing disputes led to a destructive outcome.</p>	<p>Innes (2004) states that a consensus-building approach is likely to fail unless parties 'set their own ground rules for behavior, agenda-setting, [and] making decisions'.</p> <p>See references generally in 'constructive influences'.</p>

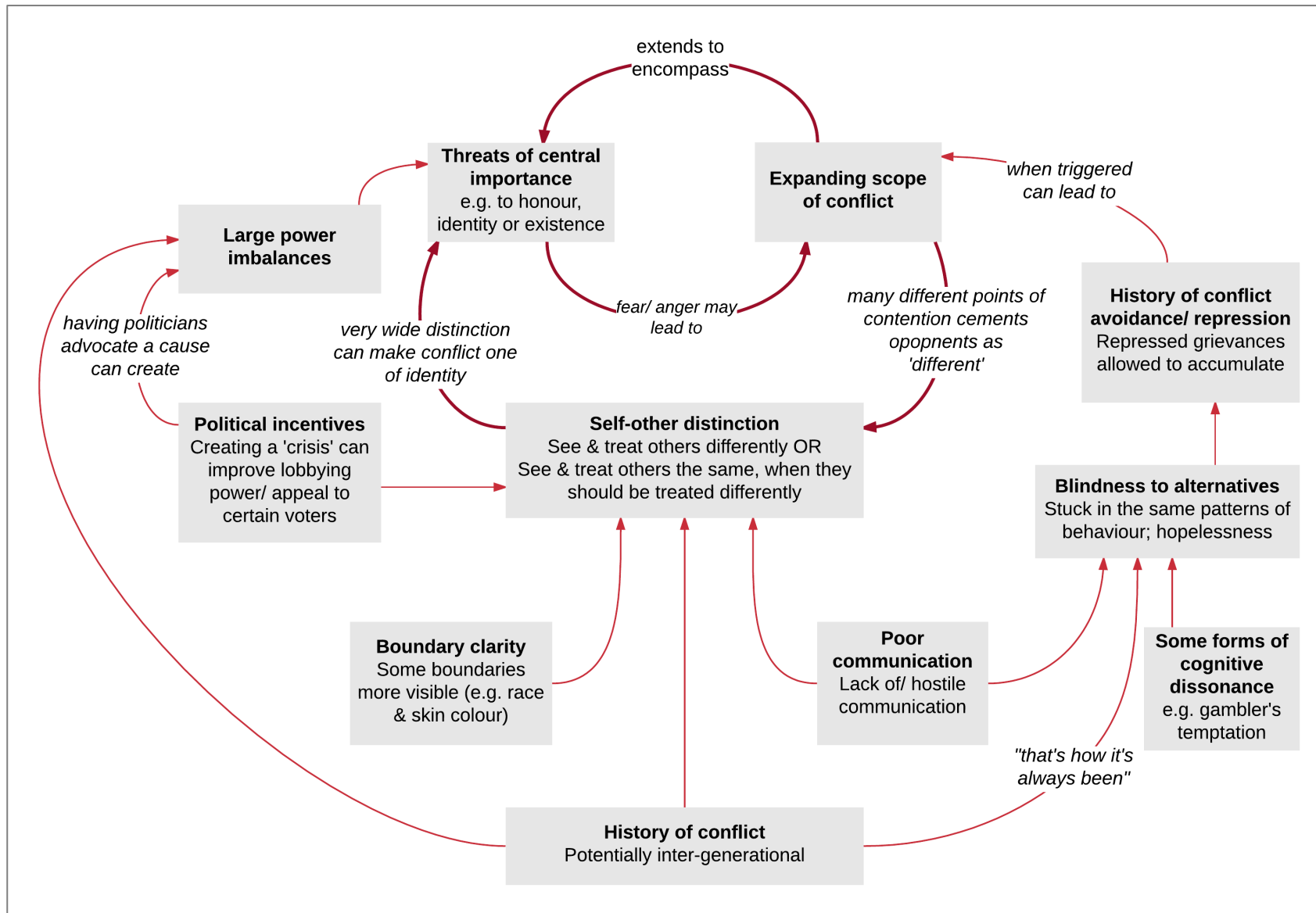


Figure 5–1 Factors leading to destructive conflict. (Reprinted from Figure2-2)

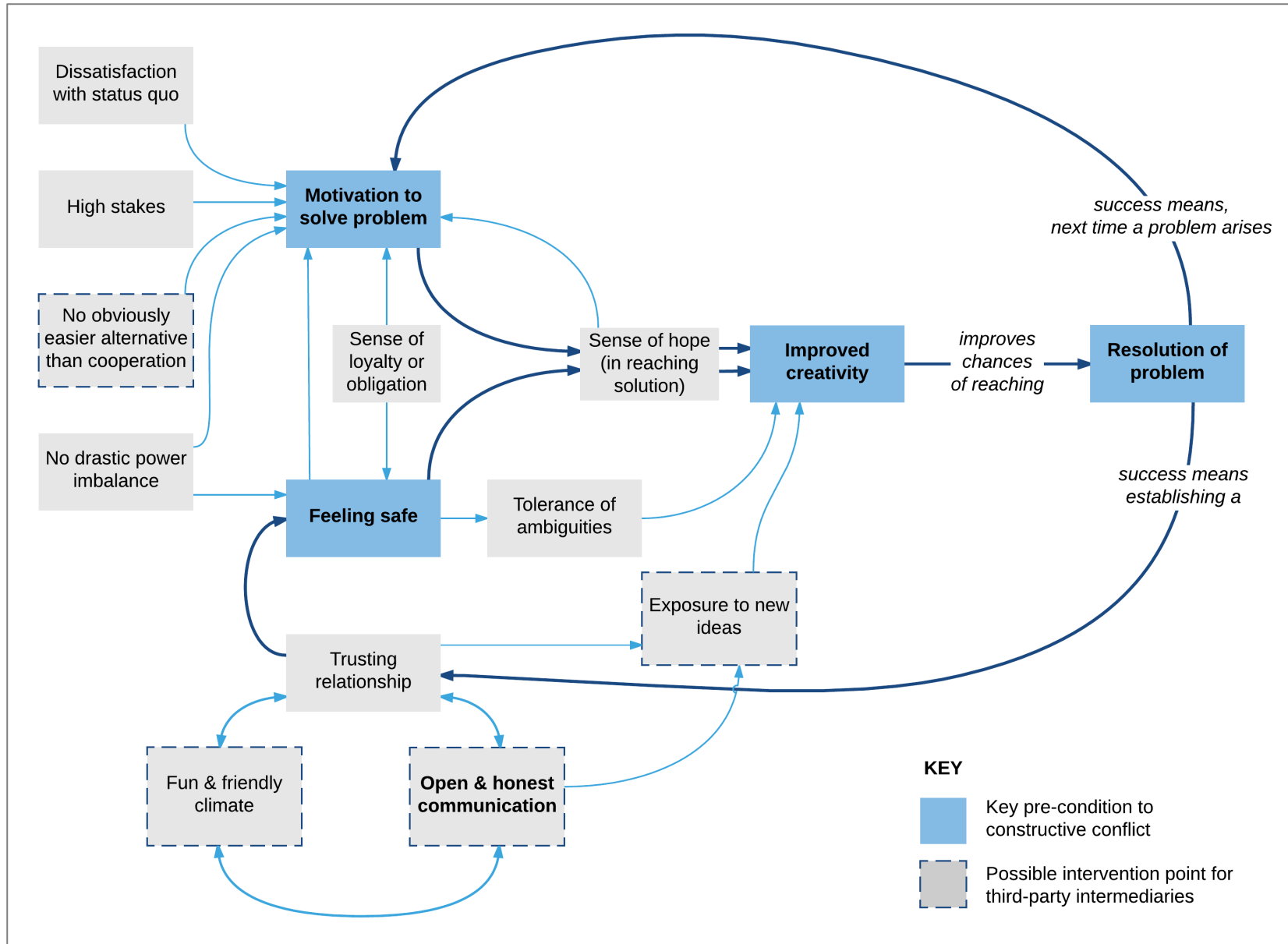


Figure 5-2 Factors leading to constructive conflict. (Reprinted from Figure 2-3)

Overall, it can be seen that the research results are broadly consistent with the literature. With two exceptions, all results are reported in the conflict and collaboration literature. As noted in the table, the exceptions are (with citations appearing in Table 5-4):

- **Constructive media attention?** While the tendency of media attention to polarise conflict is well documented, the literature does not appear to showcase examples where managing media attention led to constructive outcomes. Wolfsfeld (2004) is the only source found that specifically considers the media's role in peace-building (indeed, the premise of this book is that there is a paucity of scholarship on this point). However, that work relates mostly to armed political conflict, the dynamics of which are not necessarily applicable to civil environmental contexts, as is the case here. Naturally, the literature review for this thesis is not exhaustive, but the fact that no such 'success stories' were found may indicate an underdeveloped area of scholarship. Consequently, the stories related by NRM53 and NRM56 may be worth further exploration, particularly to identify *how* media attention may be so managed.
- **Incomprehensibility of data leading to destructive relationships?** No cases were found in the literature that positively examines the link between destructive outcomes and parties not understanding data provided. The converse is well documented – i.e. that the comprehensible, unbiased and transparent use of data leads to constructive outcomes (see citations under 'Use of Evidence' in the table above) – but establishing the converse does not positively prove the initial statement, even if it follows intuitively. Destructive outcomes *have* been linked to using data selectively, or keeping information from other parties, but not to mere difficulty in comprehending data provided. This distinction appears to be a fine one, but it is pointed out here because of its later relevance: a key feature of report cards is that they present scientific monitoring data in comprehensible ways; the extent to which doing so discourages destructiveness should be further explored.

In addition, while most of the attributes of constructive and destructive relationships are represented in the results (refer to Figures 5-1 and 5-2), some are not. In particular, there were no stories of unsatisfactory conflict avoidance – i.e. where one or more stakeholders had acquiesced to an undesired status quo, due to a perceived inability to make meaningful changes. Such conflict avoidance is considered destructive (see Deutsch, 1973) – despite the absence of overt conflict, the dissatisfaction can fester and manifest later. The absence of such stories is not surprising: as managers, NRM groups generally do not have a substantive interest in any particular issue (cf. landowners, business operators, Indigenous peoples, etc.), so conflict avoidance may, sometimes, register as silence to them. For this reason, the Set 2 interviews (with non-managers) were undertaken.

There were also no stories clearly showcasing ‘improved creativity’ – one of the central attributes of constructive relationships (see Figure 5-2 above), where stakeholders worked together to devise solutions to a shared problem not envisaged by any stakeholder at the beginning of the interaction. Such examples must exist in Australian NRM (see e.g. Wondolleck & Yaffee, 2000, for a number of case studies outside of Australia). The absence of these stories may be a result of having initially framed the research as one of conflict, directing interviewees’ minds away from this type of story.

5.4. Results & discussion: Set 2 interviews (Mount Sylvania case only)

Set 2 interviews were conducted to obtain perspectives from people other than NRM staff. The analytical purpose of doing so was to triangulate and refine the findings in Set 1 interviews – particularly to reveal observations not usually perceptible to NRM staff. The results are organised along three questions, with the purposes *sensu* Blaikie (2009):

- What happened? (a descriptive purpose)
- Was the outcome constructive or destructive? (an evaluative purpose)
- Why did the outcome become constructive or destructive? (an explanatory purpose)

Information for all three questions was drawn from a mix of interview and documentary evidence.

5.4.1. What happened? General background

This case relates to the rebuilding of a road and creek, following their destruction by flood. Between 10 and 12 January 2011, intense and heavy rain fell in the State of Queensland, on the eastern coast of Australia. Already following a wet period, this rain event led to the worst flooding since 1974, with 33 confirmed deaths, over 70 communities and 200,000 people affected (equivalent to 78 percent of the State), 300 roads closed, 29,000 homes and businesses inundated, and over \$5bn in damage (QFCI, 2012). The Queensland Flood Inquiry Commission has published a detailed account of the flood (QFCI, 2012).

The case study is located in the Lockyer Valley, in southeast Queensland, which was the worst hit area. Some parts of the Lockyer experienced 1-in-2000 year flood levels (Thompson & Croke, 2013), and casualties reached 16 people (QFCI, 2012). Specifically, this case relates to Blackfellow Creek, a waterway that flooded in December 2010 and January 2011. The January flood damaged infrastructure on Mt Sylvania road, which intersects Blackfellow Creek. Floodwaters cut off access to residential areas (see Alluvium, 2012), and emergency road repairs were carried by the Department of Transport and Main Roads (TMR) out to restore access (TMR, 2012). These repairs included paving over certain sections of the creek bed as well as removing vegetation. Broadly, the issue of contention was the wisdom of this method of repair.

Among those opposed were:

- SEQ Catchments, an NRM group (NRM56).
- Queensland Conservation Council, an environmental advocacy group (MS01).
- Some members of the local community (MS02).

The basis of their opposition was that the repairs would increase the velocity of streamflow, leading to worse flood damage in future. There was also a loss of vegetation, as well as increased erosion that would lead to sedimentation in Moreton Bay (a coastal bay over 100 km away). Each described the problem thus:

It looked as though the Department of Main Roads had been through once and done the work, essentially just gone into the creek and just removed all the debris from the creek after the floods and had... basically created an open drain from a creek. This really concerned us. (MS01, environmental)

[T]here's a huge amount of ignorance about hydrology and the landscape people think that the best thing to do is, to get everything out of the creek: have it as a drain without any concern for the cascading effects of water. That might work on a property-by-property basis, but you're passing the buck downstream and there's a huge vested interest out here to clear as much as possible and keep it that way. (MS02, community)

They reshaped the creek with the wrong material, and the wrong shape. We've got a creek with a highly powered system. By simplifying it, you actually increase the power of the water: you've got higher velocity, higher destructive forces. So instead of solving the problem, you're aggravating it. And what they were using were these rocks - they were pounding them all in. That sort of material doesn't take long to get mobilised, and once mobilised, it'll act like a battering ram. It'll destroy everything in its path. We're talking about boulders the size of your head. They become part of the destructive force... [Also] this is where the sediment from Moreton Bay comes from. (NRM56)

Some media outlets reported that some community members supported clearing the creek, believing that doing so would result in *less* erosion (Dalton, 2011). The local mayor was also reported as supporting the clearing conducted by TMR (Gatton Star, 2011). Unfortunately, none of these supporters could be reached for comment.

5.4.2. What happened next? Initial actions taken

The interviewees gave slightly differing accounts about who took what actions. It seems clear that there was concurrent action on behalf of all three. MS02 (community) witnessed the works and began writing letters to decision-makers:

[We] began to write to the council and then anyone else that [we] could think of... anybody concerned: the council, the state government... [we] even went as far as the federal government and various environmental groups. We got nowhere... [This was] about April [2011]. (MS02)

It is unclear whether MS02 reached NRM56 and MS01 (environmental); however, both appeared to have been alerted to the issue by residents. NRM56 appeared to have been involved at the start of the works, while MS01 after the works had started.

We had actually heard that this activity was going on over there. They were starting to do this work to get access back, to get in or out. I had a look at the place, and sent one of my geomorphologists out there. (NRM56)

[S]ome time after the floods, we received a message from one of our small member organizations to say that they're really concerned about the rehabilitation work that had occurred at Mt Sylvania. (MS01)

Both organisations contacted the Queensland Department of Environment, Resources and Mines (DERM, as it was then called).

We did some assessments and contacted the Director of DERM ... and said, 'hey, we got a problem here, and this is ongoing. You guys need to have a response to it, because Main Roads is not just providing access, they are... reshaping the stream altogether.' (NRM56)

The first thing we did, in terms of wanting to raise the profile of this, was to use the story and the photographs that had been taken to illustrate what happened and express our views on that. That created a bit of controversy. It opened the door for us to go into DERM, who essentially set up a meeting of some of the key stakeholders around this particular issue. (MS01)

It is unclear at what point DERM became active – as noted above, MS02 'got nowhere' in their letter-writing. The 'controversy' cited in MS01 may have been linked to media articles, which criticised TMR's approach: 'It wasn't until it [this issue] started appearing in the Courier Mail that [TMR responded]' (NRM56). MS01 credited itself with generating public attention that facilitated intra-governmental interaction:

As an environment department, [DERM is] often either ignored or they don't have the influence across other portfolios. Us intervening gave them actually a lot more authority to say, hang on, many of our stakeholders are complaining about the way that these things have been done and they need to change. It was actually very, very positive intervention on our part. (MS01)

Prior to that point, TMR had, according to NRM56, been unreceptive to criticism – possibly because its mandate extended only to restoring road access, and possibly because its funding was limited only to that end.

Main Roads said, “Not our bag, not our problem. We were responding to an emergency, and we've done what we think is the right thing... They said, we have \$11M to spend on this, and we have to spend every cent on engineering.” We respected that. (NRM56)

There was also possibly pressure to be seen to be doing something:

Remember, this was off the back of one of the worst floods... Decisions were being made off emotion, rather than with any particular environmental outcome [in mind]. A lot of people were very scared of their streams. They knew people killed. It was a very emotionally charged atmosphere. Getting in there with a bulldozer and knocking down some trees and saying, 'we're doing something' is an easy response. (NRM56)

In summary, the initial actions appeared to be efforts by some community members (MS02) and NRM56 to talk directly with TMR, who were initially unreceptive, possibly focused solely on providing road access to the communities. Negative media attention, brought about by MS01 (and possibly others) led to greater receptiveness to new ideas by TMR. The next section details actions taken after this point.

5.4.3. Outcomes

According to NRM56, TMR sought advice from NRM56 following media attention:

Finally, the government [TMR] came back to us after it got in the paper. A lot of green groups got upset. The government came to us and said, “You know these people; you clearly know the situation. What do you suggest?” (NRM56)

By this stage, MS01 was no longer involved: ‘We are a very small advocacy organization, so...[once NRM56 was] involved, we could step away and leave it’. The relationship between TMR and NRM56 improved, in NRM56’s assessment:

There were some very tense moments at the beginning... We had an initial meeting after the article with the Courier Mail, and we did a couple of site visits. They [TMR staff] weren't always nice and agreeable, but at least we understood each other's position. Now, since, they've invited us to talk to their design engineers. We've continued the engagement, and they've been good enough to participate in that engagement as well. I think that's gone well. They were involved in a steering committee for a small amount of money to put in place some other actions. (NRM56)

As noted in Section 5.2.2 above, NRM56 attributed the improved relationship to keeping disagreements private:

We purposefully avoided circumstances where we were having arguments in front of landholders. We purposefully avoided circumstances where they were criticised in a, if you like, a semi-public forum. That wasn't our intent. Our intent was to get through to them that something had happened that was wrong. And then use efforts of engagement and coordination to keep them engaged with people who were pointing the finger at them. Our role was to step back, and to let our engagement people and our technical people have a constructive relationship with them. (NRM56)

Subsequently, NRM56 commissioned a technical report investigating the hydrological effect of the road repairs (Alluvium, 2012). This report confirmed the concerns that the repairs would likely exacerbate future floods. It also presented to landholders several options for further works, which NRM56 represented as being well received:

The landholders were very happy with it, that they had options. What you don't do is go to them and say, "This is the answer; you must follow this." It's a matter of understanding what their aspirations for this landscape was. And there was a desire for the stream to be stable, and they understood how important the environment was to them. (NRM56)

In addition, landholder relationships felt respected because their local knowledge was used meaningfully, over a period of 6 months:

[W]e did a social history of the river. And they [landholders] provided a lot of information that was useful to the scientists. They got to write their own report, which was a history of the stream, and the people's interaction with the stream. (NRM56)

In this way, TMR, NRM56, and the local community appeared to achieve a constructive relationship (although MS02 did not comment on this point). In April 2012, TMR released a statement saying that the road works immediately following the flood were emergency repairs, and that they were 'examining the long-term reconstruction needs to be delivered over the next three years' (TMR, 2012).

5.4.4. Analysis of the Mount Sylvia case

In analysing this case, key limitations must be reiterated. Firstly, there were no interviews with TMR, which may present very different views on the course of the relationship, as well as the rationales for the actions taken. To this extent, the interview data is taken somewhat at face value. Secondly, this case study is limited in scope only to a narrative account of the central relationships between the landowners interviewed, the NRM group, and TMR. The interview data also suggested

other relationships that, due to time constraints, could not be explored here (e.g. NRM56 and MS02 mentioned that the mayor's support of clearing works created controversy elsewhere). Further research is required to tease out the nuances of this case study.

Even within these limitations, this case is interesting for several reasons. First, while this story was earlier noted as an instance where keeping disagreements private (away from media scrutiny) led to constructive outcomes, MS01 and MS02 suggest that it was media scrutiny that triggered TMR's receptiveness to new ideas in the first place.

Why did the initial media criticism *not* lead to destructiveness in this case? The interview data provides no clear answer. Some explanations may be formulated:

- **Lack of electoral politics?** Unlike the other cases of destructive politicisation, the government stakeholders in this case were *departments* – not elected. Possibly, this insulated the issue from the 'wedge politics' (Nie, 2003) associated with elections.
- **Use of evidence?** NRM56 had, by the time of the initial media criticism, already undertaken preliminary geomorphology and hydrologic assessments. It may have been difficult for TMR to maintain opposition.
- **Low stakes involved?** The community's stakes in the issue were extremely high: flood protection was a matter of life and death. TMR's interest was relatively small, given that it was merely implementing works as directed by others up the bureaucratic chain of command.
- **Convinced by others within 'group'?** As a fellow government department, DERM's involvement may have been instrumental to TMR's internal decision-making – i.e. DERM may have been seen as an 'us', rather than 'them'; opinions set by others within a perceived group have a normative effect on behaviour (Louis et al., 2005; Fielding et al., 2008).
- **Intrinsic motivation?** TMR may have wanted to ensure its works achieved good outcomes. There was some indication that *individual* TMR officers understood the issues, but their superiors did not (MS01: 'You've often got to make a distinction between what's happening at a departmental, big picture level and what's happening at an officer level... Quite often, a lot of those people get it straight away, but their bosses are telling them what to do'). Potentially, there were some internal dynamics that prevented a destructive, defensive reaction.

Further conclusions would require more research. This case does seem to support the proposition that politicised and negative media attention *can* trigger a constructive response, provided that such attention is subsequently controlled.

This case is also interesting because the role of NRM56 is difficult to characterise. NRM56 had a clear interest in opposing TMR's works ('our position [was] that something not right was being done, and that we had to fix that'). This makes it similar to MS01 and MS02, which had advocacy roles. However, NRM56 was, according to its own recollection, chosen for advice on the basis that it was somewhat *separate* from those advocating change (NRM56 paraphrasing TMR's request for advice: 'You know these people; you clearly know the situation. What do you suggest?'). This suggests that NRM had a certain *bridging role* – that some stakeholders, while not 'a professionally trained neutral', can nonetheless 'act neutral in their facilitation role' (Innes, 2004: 8). Thus, this case shows how a stakeholder can have the *effect* of a neutral third party. The distinctive aspects of this case add to and refine the observations drawn from Set 1 interviews.

5.5. Conclusion

The purpose of this chapter was to generate an understanding of what influences destructive and constructive relationships, specifically within the context of natural resource management. In turn, this understanding is to be applied to assessing IAN's report card practice, in Chapters 7–9. Moreover, Chapter 10 will make recommendations for a report card process that encourages constructive relationships, using the findings of this chapter as an evaluative framework.

All of the influences identified are summarised in Table 5-5 below. Although some of the content in this table overlaps with Table 5-4 above, this table brings together findings from both sets of interviews. It is provided for readers' convenience, so that references to these influences in subsequent chapters can be connected more easily with the results from this chapter.

The influences identified matched many of the general attributes of constructive/ destructive conflict, although some gaps remained. The Set 2 case study (Mount Sylvania) was conducted to obtain non-manager perspectives. Although limited in the number of interviews conducted, the case study did nonetheless add new insight – it is a case where media attention can trigger a constructive outcome, even though it appeared initially destructive. This is itself an exciting insight, and would suggest that this case is worth exploring further. Further research would focus on parties that might disagree with the proposition that this relationship is now constructive. TMR, other community members, and the mayor would make good starting points. Even without these additional interviews, five plausible explanations were suggested as to why the media did *not* result in a destructive relationship. These explanations were derived from the Set 1 results, demonstrating that this study has indeed been useful for making sense of stakeholder relationships – the primary purpose of the chapter.

Table 5–5 Summary: constructive & destructive influences, Australian NRM study

Influence theme	Constructive influences	Destructive influences
Dialogue & communication	<ul style="list-style-type: none"> • Stakeholders feel understood, having had an opportunity to air grievances freely. • Managers accept due share of responsibility for damage caused by environmental hazards. • Managers communicate with a respectful attitude. • Communication is genuine, authentic and honest. • Communication seeks to understand a person as a whole, beyond their professional identities. • Often communication is face-to-face. 	<ul style="list-style-type: none"> • One stakeholder wields authority over others (e.g. a government agency, or a private organisation acting under a permit granted by government). • Authorities fail to give reasons for their decisions. • Communication is undertaken with ulterior motives (e.g. to obtain information to use later in negotiations) – calculating and selfish communication. • A ‘bullish’ attitude is adopted.
Partisan politics & the media	<ul style="list-style-type: none"> • Parties keep disagreements (critiques of each other) private, with statements to media emphasising cooperative efforts. • Decision-makers refuse to take sides, but oversee cooperative processes where stakeholders work through incompatibilities together. • Decision-makers provide no alternatives to cooperation, and communicate as much. • From Set 2: Media criticism can <i>spark</i> constructiveness, provided that subsequent media attention carefully controlled by the parties. 	<ul style="list-style-type: none"> • Representatives of government take substantive positions (whether in personal or professional capacity) – encouraging other stakeholders to seek political victories. • Political victories are driven by electoral tactics. Along with associated media coverage, issues become simplified and polarised. • Groups exist that have an interest in creating and maintaining conflict.
Use of evidence	<ul style="list-style-type: none"> • Scientific evidence is used in a transparent and unbiased way to persuade others of a conclusion. • Data provided to support others’ decisions (without persuasive agenda). • Data is represented in a way that is comprehensible to decision-makers. 	<ul style="list-style-type: none"> • The bases of decision-making is not understood; e.g. where modelling algorithms not comprehensible to stakeholders.
Involvement of third parties	<ul style="list-style-type: none"> • Parties agree to accept the decision of a third-party (prior to the decision being made). • The third party is neutral: an ‘honest broker’. • From Set 2: A stakeholder can sometimes function as a neutral third party, despite having an interest. 	(none)

Overall, both the NRM group interviews and the Mt Sylvia case need further work in order to make them rounded contributions to knowledge. But this chapter demonstrates its research value – it has linked the constructive/ destructive attributes to NRM stakeholder relationships; it has discovered something new about them; and within the context of this thesis it has created a set of concepts useful for assessing IAN's report cards. The influences revealed in this chapter, however, remain largely a variance model – and their rearrangement as a landscape, process model is the subject of the next chapter.

Chapter 6. A three-dimensional ‘landscape’ model of stakeholder relationships

The previous chapter reported influences on the constructiveness and destructiveness of NRM relationships. While these findings are novel and useful (as the previous chapter justified, with qualifications), they were presented as a list of influences which tend to lead to a constructive or destructive relationship. Such a list constitutes a *variance model*, the limitations of which were discussed in Chapter 2, and at the conclusion of Chapter 5. The main point from those discussions is that, unlike variance models, *process models* account for change over time – and since relationships between stakeholders are dynamic in time, process models are adopted in this thesis.

This chapter represents a restructuring of some of the NRM narratives into a process-based model. As Chapter 2 foreshadowed, this restructuring is based on a two-dimensional ‘basins of attraction’ model of intractable conflict, presented in Coleman (2011), Vallacher et al., (2011, 2013), Pruitt and Nowak (2014), Vallacher and Nowak (1997), Coleman et al. (2015), and many other related publications. The purpose of adopting (and extending) this model is to spur further insights into the nature of stakeholder relationships, and to develop a way of making sense of the effect of IAN’s report card practice on stakeholder relationships.⁶ An additional purpose is to provide *useful* ways for people in NRM stakeholder relationships to think about and communicate how they see the relationship. A new chapter is dedicated to this exploration because it presents a distinct contribution from the previous chapter. Chapter 5 contributed to knowledge on NRM stakeholder relationships; this chapter contributes to the constructs that help us make sense of that knowledge.

The two-dimensional model, developed largely by social psychologists, is labelled in shorthand here as the ‘2D basins model’. In this chapter, I begin by providing an overview of the 2D basins model, before exploring its theoretical underpinnings. Then, I argue that the 2D basins model does not fit some of the NRM narratives collected in this research, and I outline a three-dimensional version of the basin of attraction model, which I call a *3D landscape model of stakeholder relationships*, abbreviated herein as the ‘3D landscape model’ or equivalently the ‘3D basin model’. Selected examples from the NRM narratives collected for the previous chapter appear throughout. Overall, the 3D landscape model is a mental model which will help to assess whether and how IAN’s report card practice can be adapted to managing NRM stakeholder relationships. However, it is not until Chapter 10 (which synthesises the IAN research into a tool for encouraging constructive relationships) that the 3D model is used.

⁶ This purpose is similar to the Soft Systems Methodology discussed in Section 3.4.1, in which models are constructed to make sense of a situation, and the model is then used to challenge perceptions of the situation (Berg & Pooley, 2013).

6.1. Overview of the 2D basins of attraction model in conflict studies

The purpose of this overview is to describe how the 2D basins model has been applied to intractable conflict. This overview is written as doctrine – that is, it is a mere recounting of what the model has been presented to be. Its theoretical underpinnings and a critical review make up the remainder of this chapter. The ideas reported in this section are drawn mostly from Coleman (2011), which as a monograph most fully encapsulates the body of work represented by the above-cited publications on the 2D basins model. (The later paper by Pruitt and Nowak, 2014, is a comparison of the 2D basins model with another conflict model, the S-shaped reaction function model; this latter model does not substantially develop the 2D basins model further and is not discussed.)

The 2D basins model is an extension of Deutsch's (1973) observations on constructive and destructive conflict. (Coleman was a student of Deutsch's: Coleman & Deutsch, 2015.) As discussed in Chapter 2, Deutsch observed that constructive relationships tend to stay constructive, and destructive relationships tend to stay destructive (Deutsch, 1973: 365, 367). The persistence of conflict led Coleman and colleagues to depict conflicts as a ball within a basin, as reproduced in Figure 6-1. Here, Basin A represents a constructive relationship, while Basin B represents a destructive one. The ball represents the present state of the relationship. The natural tendency of the relationship is to slide back into the basin in which it finds itself – in this case, a destructive relationship. Consequently, the basins are termed *attractors* or *attractor states* (hence, 'basins of attraction'). An attractor is defined as 'a subset of potential states or patterns of change to which a system's behavior converges over time' (Vallacher et al., 2011: 69).

The depth of the basin (and therefore the slope of its sides) represents the difficulty of pushing the ball (the relationship) into a different kind relationship: here, Basin B is steep, suggesting that it would take great effort and perhaps some luck to shift the relationship into Basin A, a constructive relationship. In other words, the deeper a basin is, the stronger its attractor and equivalently the more resistant the relationship will be to shift from destructive to constructive, or vice versa.

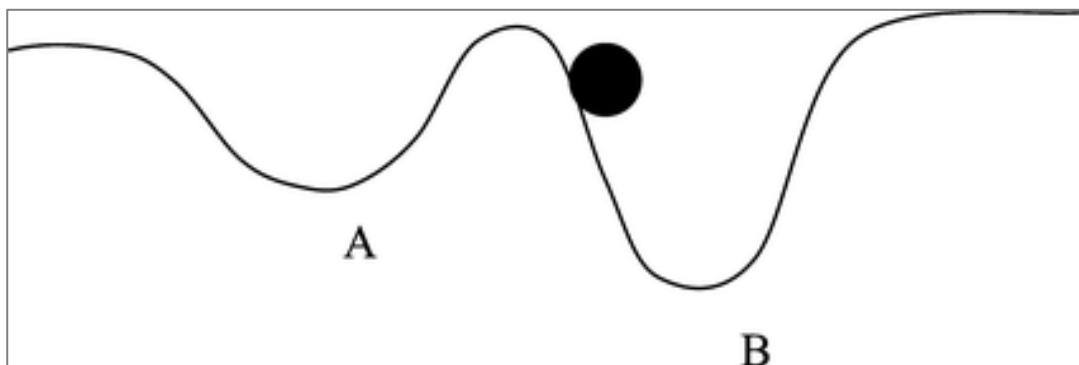


Figure 6–1 Two-dimensional landscape model of conflict

Source: Vallacher et al. (2011). Original caption states: 'A dynamical system with two attractors corresponding to constructive relations (A) and destructive relations (B).'

According to proponents of the 2D basins model, the width of the basin represents the range of circumstances that the basin will ‘attract’. A wide basin absorbs a correspondingly wide range of information and events, so that even circumstances inconsistent with the basin will gravitate towards the attractor state. For example, conciliatory overtures are inconsistent with a destructive relationship, but a wide destructive basin will absorb such overtures (e.g. the overtures are viewed with suspicion); the relationship will probably remain destructive. This model is acknowledged to be ‘a useful but incomplete metaphor’ (Pruitt & Nowak, 2014: 391).

The 2D model can represent many of the Australian NRM narratives collected for the previous chapter. Figures 6-2 to 6-5 illustrate the application of a 2D model to several narratives. Figure 6-2 illustrates a story of NRM45. In that story, the NRM group constructed a levee during a period of high flood risk. One of the landholders in the area objected to the design and placement of the levee. The NRM group responded by stating that it had legislative approval for the levee, and that the landholder’s concerns were secondary to the need to prepare for floods. The landholder maintained its objection, and while mediation was attempted, there was no resolution. The interview data does not indicate whether the original objection was couched in aggressive or more conciliatory terms. It seems that the NRM group’s response began a descent into a destructive basin, from which attempts at shifting the relationship to a constructive basin were unsuccessful. The interviewee conceded that an earlier attempt to establish an interpersonal relationship might well have changed the outcome of mediation. Such an attempt may have limited the destructive basin to a sufficiently shallow depth for mediation to succeed.

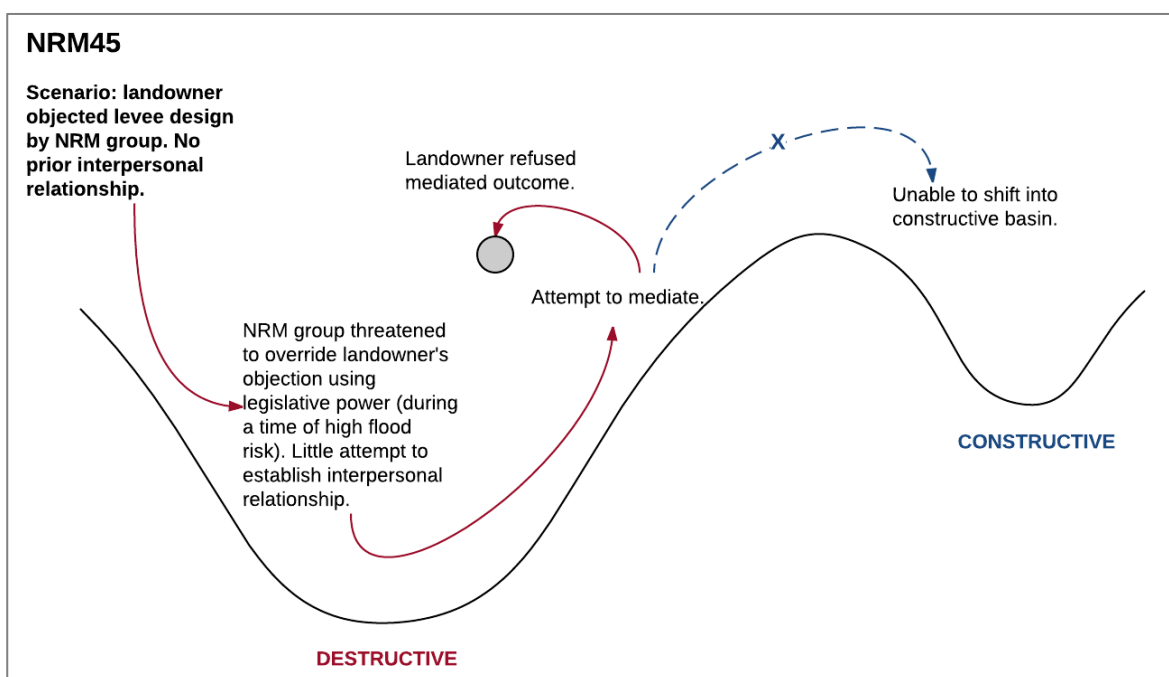


Figure 6–2 Destructive NRM relationship that stayed destructive
Interpretation: early destructiveness made later constructiveness ineffective.

Figure 6-3 illustrates a story told by NRM18. In this story, two conflicts relating to the cotton industry in Queensland (one about pesticide spraying and the other about water allocations) merged to join one super-heated conflict, involving physical violence and high-profile media attention. This concatenation of conflicts is consistent with Coleman’s (2011: 31) observation that conflict elements often ‘support and reinforce’ each other. However, a concerted government effort to initiate collaborative (joint decision-making) arrangements was successful in shifting those relationships into a constructive basin. The government department in charge of the collaboration declared that decisions were to arise from the collaboration and through no other avenue – which the interviewee considered important because it precluded any tactical advantage in competitive avenues (e.g. further lobbying).

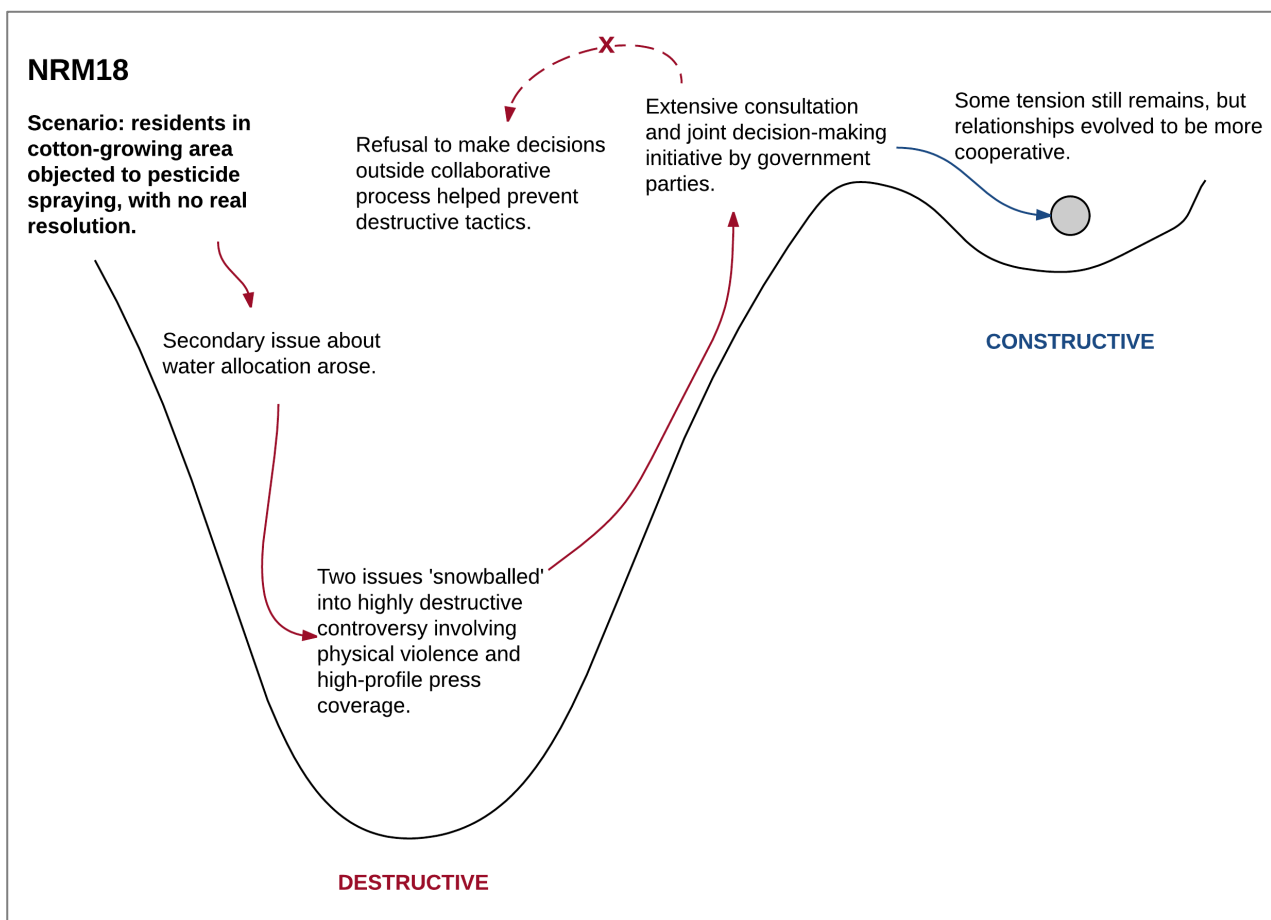


Figure 6–3 Destructive NRM relationship shifting to constructive

Interpretation: example showing deeply destructive basin which, due to concerted efforts, led to shallowly constructive set of relationships.

Figures 6-4 and 6-5 shows two 2D basins, drawn from NRM13, NRM53, and NRM56. The divisive effects of media and partisan politics were common to all three. In NRM13, political opponents manifested their opposition by taking different sides on a debate over the logging of river red gum forests. Media attention on this debate entrenched each to their positions, leading to a destructive cycle. Alternatively, NRM53 and NRM56 both involved deliberate attempts by the NRM groups to

control divisive media exposure. In NRM53, a dispute about who would win a funding to build a barrier crossing was deliberately withheld from media attention to prevent a political decision ‘on a whim’. In NRM56, a dispute between two government agencies over the rebuilding of a creek following a devastating flood was not kept out of the media – but messages to the public emphasised a spirit of collaboration despite differences. Both cases reported a constructive outcome.

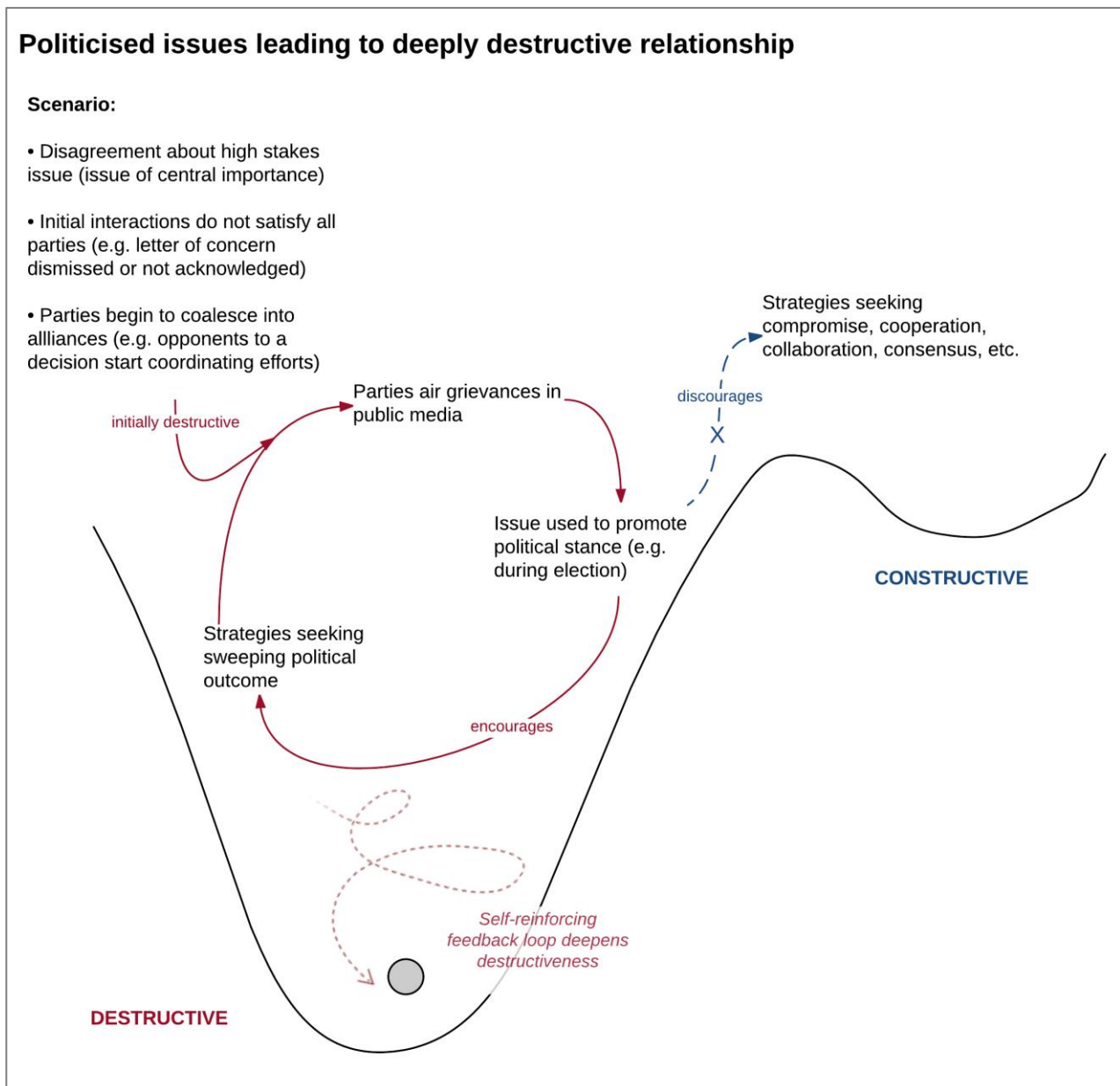


Figure 6–4 Destructive basin from politicised issues and media attention
Based on NRM13.

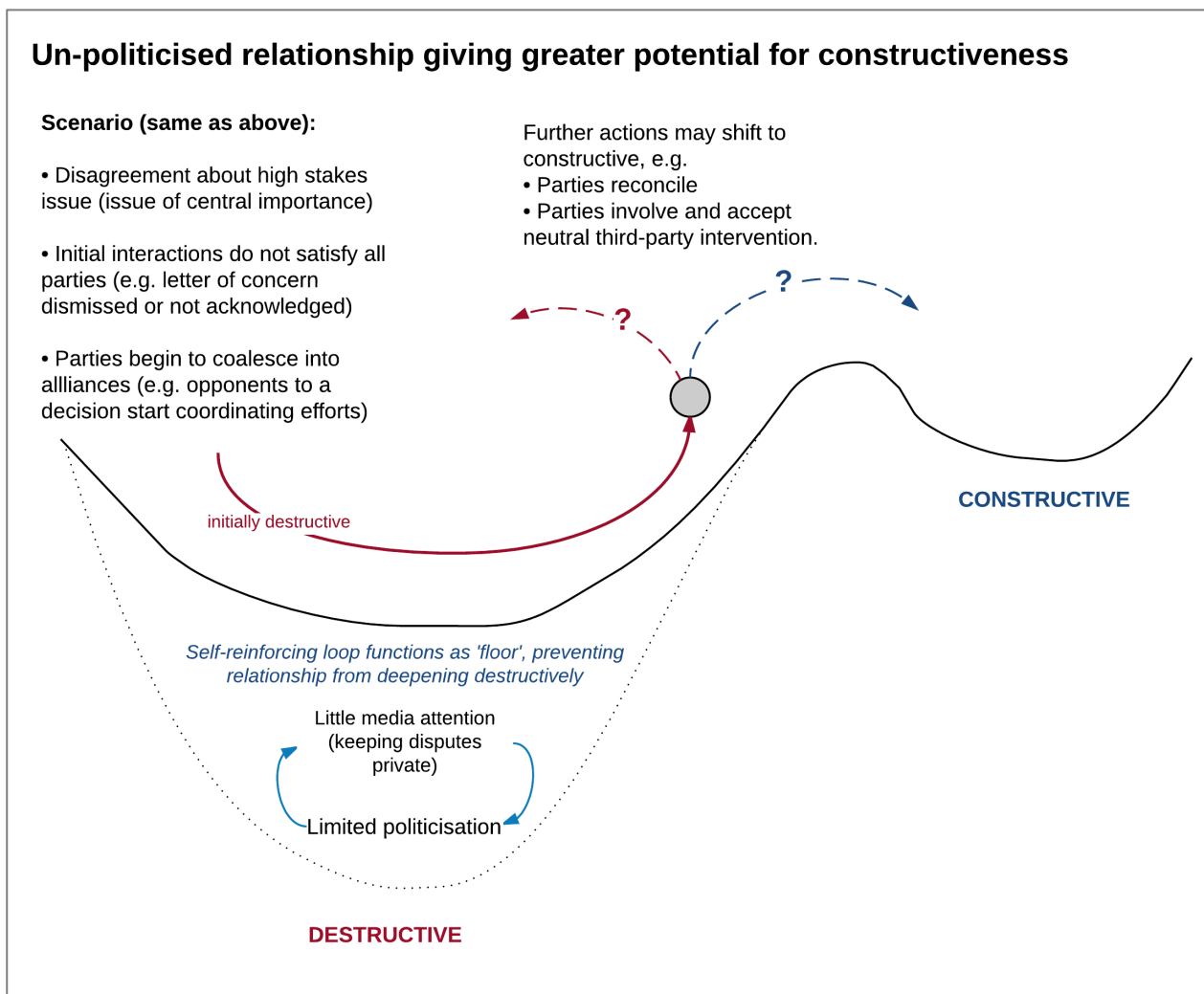


Figure 6–5 Shift to constructive basin associated with refusal to politicise issues
Based on NRM53 and NRM56.

6.2. Theoretical principles of the basins of attraction models

This chapter now explores two sets of theories underpinning this model. First, why a model can be incomplete yet useful is discussed through the frames of mental models and heuristics. Second, the dynamic systems heritage of the 2D basins model is set out, as a precursor to a critique of the 2D model as it applies to stakeholder relationships.

6.2.1. Mental models with a heuristic purpose

The basins of attraction models (both the extant two-dimensional version and the three-dimensional one proposed in this chapter) belong to the broader subset of mental models, which are linked to heuristic processes (see Gauffroy & Barrouillet, 2009). Mental models and heuristics are explored here to express the purposes for which the 3D landscape model is intended to achieve.

(a) Mental models

Broadly, a model is ‘an abstraction of reality’, which ‘represents a complex reality in the simplest way that is adequate for the purpose of the modelling’ (Wainwright & Mulligan, 2004: 8). By necessity, all modelling (conceptual, numerical, descriptive, predictive, etc.) requires simplification. The purpose of the modelling determines how much simplification should take place; the models generally aim to incorporate no more complexity than necessary to achieve the purpose modelling – an ideal known as the ‘principle of parsimony’ (*ibid*).

The term ‘mental model’ refers to the way people make sense of the world. Craik (1943: 61) suggested that people (and other animals) carry in their minds a ‘small-scale model of external reality’ which helps them understand, filter, store, and use information (Jones et al., 2011). The study of mental models, as a cognitive mechanism, is a vigorous and growing field in psychology (see Johnson-Laird, 2010; Khemlani et al, 2014; Gangemi et al, 2013). Beyond individual cognition, sharing mental models has been considered a mechanism for communicating, understanding, and learning from different experiences (Osborne & Cosgrove, 1983; Vosniaudou & Brewer, 1992; Hall et al., 1994; Swan & Newell, 1998; Hodgkinson et al., 2004; Lowe & Lorenzoni, 2007).

Specifically within NRM, there has been increasing attention on techniques to elicit stakeholders’ mental models of how natural resources function, as a precursor to other management actions (Jones et al., 2011, 2014; Pahl-Wostl & Hare, 2004; Abel et al., 1998; Ozesmi & Ozesmi, 2004). Simplified ways of understanding different perspectives are attractive, compared to more complex modelling – as Blalock (1989) demonstrated in his study of conflict, formulating precise and accurate models of human interaction becomes unnavigably dense with only simple parameters. NRM stakeholders may not have the capacity, resources, or desire to engage in more complex models. Thus, the landscape model may have a role not only in helping stakeholders *conceptualise* their relationships, but also *communicate* them to others.

(b) Heuristics

Mental models are linked to heuristics, because they both relate to simplified ways of making sense of information. The term ‘heuristic’ comes from Greek, ‘serving to find out or discover’, and may be defined more formally as ‘strategies that ignore information to make decisions faster, more frugally, and/or more accurately than more complex methods’ (Gigerenzer & Gaissmaier, 2011: 454). It has also been described, with parallels to the principle of parsimony, as a

rough-and-ready procedure or rule of thumb for making a decision, forming a judgement, or solving a problem without the application of an algorithm or an exhaustive comparison of all

available options, and hence without any guarantee of obtaining a correct or optimal result (Colman, 2015: 339).

The exploration of heuristics has gained greatest traction through social cognition scholarship, driven by the seminal work of Tversky and Kahneman (1974), who demonstrate that people use a ‘limited number of heuristic principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations’ – a useful practice that sometimes ‘lead to severe and systematic errors’ (p.1124). One example of a heuristic is the ‘availability heuristic’, in which people estimate the probability of an event based on the number of similar examples that can easily be brought to mind; thus the probability of death by airplane crash is overestimated compared to the probability of death by heart attack, due to the relatively high public coverage of the former (*ibid*: 1127).

The use of heuristics involves a ‘classical assumption that heuristic trades off some accuracy for less effort’ (Gigerenzer & Gaissmaier, 2011: 455). However, numerous studies have suggested that heuristics can lead to *more* accurate predictions than logical or statistical models, despite being simpler and less onerous (Gigerenzer & Gaissmaier, 2011; Wübben & Wangenheim, 2008; McCammon & Hägeli, 2007). In particular, using heuristics is central to how people make sense of themselves, others, and the society in which they live (Kunda, 1999), and moreover critically reflecting on heuristics that people use can raise novel questions and insights (Ippoliti, 2015; Gigerenzer & Gaissmaier, 2011).

While many psychological studies of heuristics takes a descriptive approach (what heuristics do people use to make decisions), heuristics can also be *constructed* in order to help people make decisions without resort to complex models. The study of heuristics is rooted in the work of Simon (1956), whose work in problem-solving process led him to coin the term ‘satisfice’, which means a solution that ‘satisfies and suffices’ for a purpose, but not necessarily the optimal solution (see also Brown, 2004). For example, Wübben and Wangenheim (2008) describe a heuristic that takes the time elapsed since the last purchase by a customer to be a proxy for whether the customer is an active member of a vendor’s community. This heuristic ignores the historical frequency of each customer’s purchases, but is sufficient to guide the vendor’s marketing efforts. Thus, deliberately constructed heuristics can form sound shortcuts for making decisions – provided that the accuracy of such a shortcut is supported by evidence (Gigerenzer & Gaissmaier, 2011). While the fact of a heuristic being constructed is no guarantee of its accuracy, the deliberateness of a constructed heuristic at least suggests that the user is aware of the potential for inaccuracy, and can therefore test and refine it. The 3D landscape model presented here is one step in an iterative process of constructing a heuristic to make sense of stakeholder dynamics.

(c) Summary: 3D landscape model is a mental model and heuristic

The 3D landscape model is intended to be an evidence-based mental model of NRM stakeholder relationships, which can be used, by those within or observing a stakeholder relationship, as a heuristic to understand and make decisions about how to navigate such relationships. The evidence comes from the narratives of Australian NRM stakeholder relationships introduced in the previous chapter. Table 6-1 sets out these aims more clearly, mapping them against the characteristics of mental models and heuristics described in this section. It is hoped that this mental model will create shared ways for NRM stakeholders to think *and* talk about their perspectives on their relationships, thereby enabling them to cooperate in constructive rather than destructive ways.

Table 6–1 Mental models, heuristics & 3D landscape model

How characteristics of mental models/ heuristics guided development of the 3D landscape model

Characteristic of mental models/ heuristics	Relevance to the thesis and the 3D landscape model of stakeholder relationships
Makes sense of the external world (Craik, 1943; Johnson-Laird, 2010), of social situations (Kunda, 1999), and of natural resource processes (Jones et al., 2011).	Change in NRM relationships over time, with respect to their constructiveness or destructiveness, is the focus of this thesis. A model is required to make sense of the narratives of Australian NRM relationships collected in this research.
Rough-and-ready procedure – quick and easy to use (Colman, 2016; Gigerenzer & Gaissmaier, 2011; cf. Blalock, 1989), and sufficiently and satisfactorily accurate (Simon, 1956).	This thesis aims to be <i>useful</i> , specifically to NRM stakeholders who navigate stakeholder relationships on a daily basis. Accepting that human relationships are in flux and never precisely predictable, it is not necessary for the 3D landscape model to capture every observed nuance.
Sometimes prone to systemic errors (Tversky & Kahneman, 1974), but sometimes even more accurate than complex models (Gigerenzer & Gaissmaier, 2011; Wübben & Wangenheim, 2008, etc.).	Because the 3D landscape model is constructed from an evidence base and established research methods, it is less likely to lead to systemic errors than heuristics and mental models based on individual experience.

6.2.2. Dynamic systems

The previous section described the general concept of the basins model; this section sets out its theoretical foundations. The purpose of doing so is to spark a critical discussion of the 2D basins model in the subsequent section.

The extant, two-dimensional basins model is explicitly based on dynamic systems theory (e.g. Vallacher et al., 2011). A dynamic system is one whose state (and variables) evolves over time, according to a rule that governs its evolution (Rickles et al., 2007). An example is crowding at a

train station: the state of crowding changes over time, and depends on the space available within the station, the rate at which people leave the station, and the rate at which people enter the station (either from the street or on trains; the arrival of trains also evolve with time). *Complex* systems are dynamic systems with particular characteristics. What is complexity is difficult to define sharply, as discussed in the review paper by Ladyman et al., 2013 (see also Holland, 2014). However, complex systems exhibit common characteristics; here I rely on the synthesised discussions in Holland (2014) and Ladyman et al., (2013).

- **Non-linearity and emergence.** Holland (2014: 4) defines emergence as ‘interactions where the aggregate exhibits properties *not* attained by summation’, which is expressed as ‘non-linearity’ in mathematical terms. As an example of an emergent quality, Holland nominates the wetness of water – no single water molecule can be described as ‘wet’, so the mere summation of the properties of many water molecules cannot give wetness. Wetness is a property that is only exhibited in the aggregate. Similarly, a market crash cannot be explained by aggregating the individual behaviours of actors participating in the market; a crash is an emergent property of the interactions between many actors. Note: Ladyman et al. (2013) treat non-linearity and emergence as separate characteristics, but acknowledge that emergence is a philosophically murky concept that may overlap with other characteristics.
- **Chaotic behaviour and lack of central control.** The term ‘chaos’ refers to dynamic systems which, despite evolving according to defined rules, exhibit extreme sensitivity to initial conditions (see Gleick, 2008; Eglash & Garvey, 2014). The archetypical example is a flap of a butterfly’s wings causing a hurricane halfway across the globe. Another is the scattering of pool balls when first broken out of formation – small differences in the strike of the cue ball results in large differences to where the other balls end up (Borwein & Rose, 2012). Holland (2014) describes both complex *adaptive* systems and complex *physical* systems. In complex adaptive systems, chaotic behaviour tends to originate from conscious ‘agents’ (like traders in a market).
- **Self-organisation, spontaneous order, and robustness.** Despite chaotic behaviour of the elements within a complex system, identifiable and patterns emerge at the system level. An example is the stabilisation of a market price despite unpredictable choices at an individual level (Holland, 2014: 24), or birds forming an identifiable flock despite unpredictable flight paths of individual birds (Ladyman et al., 2013: 38). An archetypical example is a double pendulum: the lower arm swings unpredictably, but its aggregated path is literally a basin: see Figure 6-6 and generally Gitterman (2010). Robustness refers to the maintenance of such patterns despite changes in the elements making up the system (e.g. the addition or removal of a single bird does not impact the grouping of birds as a flock). The idea of steady states has

gained great influence as the concept of ‘resilience’ in the study of social and ecological systems (Holling, 1973; Walker et al., 2006).

- **Adaptive interaction, co-evolution, and feedback.** Individual elements of a complex system tend to change in response to system-level evolution and/or changes in other elements. Feedbacks are the mechanisms by which such changes are telegraphed. Thus, birds adjust their flight paths in response to the paths of its neighbours (Ladyman et al., 2013). Co-evolution refers to the mutual interaction between two or more parts of a system. Holland (2014: 54) provides the example of an ‘arms race’ between a plant and a specialist plant predator, whereby a plant evolves a poison to deter predators, while the specialist evolves immunity to the poison, leading to the plant to evolve a different poison, and so on. Ison (2010: 13) illustrates co-evolution using the example of mutual adaptation between shoes and feet – shoes adjust to the feet wearing them, and feet also adjust to the shoes that they wear. Adaptation can be planned or unplanned, proactive or reactive (see Godden & Kung, 2011: 4053).

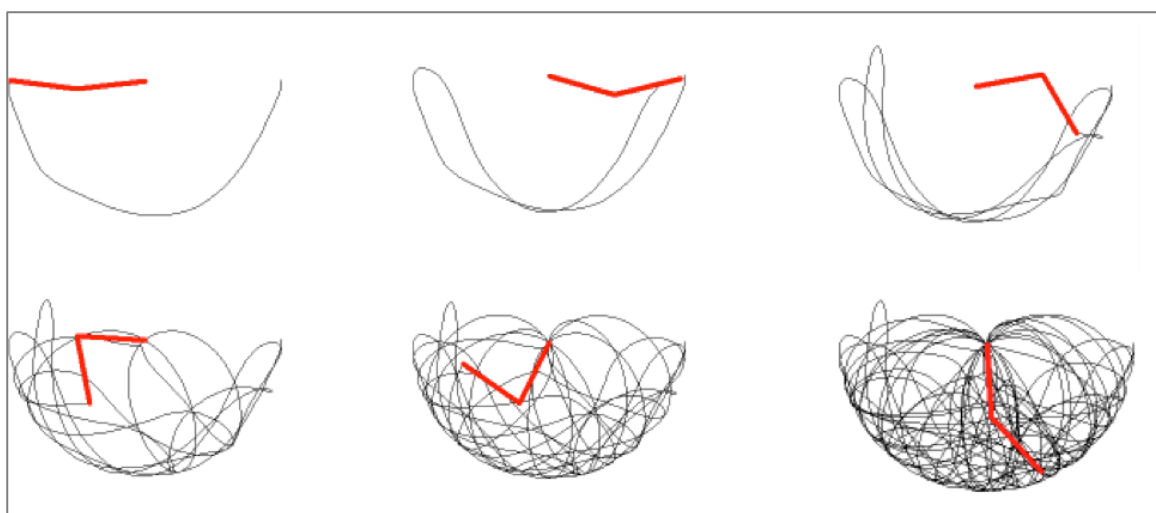


Figure 6–6 Double pendulums swing chaotically, but with an emergent pattern
The black line traces the path of the end of the lower arm. (These images are stills from an animation licensed for re-use: <https://upload.wikimedia.org/wikipedia/commons/4/45/Double-compound-pendulum.gif>.)

This summary of complex systems is not intended to be comprehensive, but it suffices to indicate the theoretical heritage to which the basins model belongs. It can be seen that conflicts and human relationships are complex adaptive systems, which tend to fall into constructive and destructive patterns despite potentially unpredictable actions of the people in those relationships. It can also be seen that constructiveness and destructiveness is a property that emerges from the fact of people being in a relationship – that is, it is a relational property rather than a property arising out of any single individual in the relationship. This theoretical background raises some questions of critique, which will be explored in the following section.

6.3. Some critiques of the 2D basins model, and the beginnings of the 3D landscape model

The 2D basins model is accepted as a heuristic (Vallacher & Nowak, 1997) and therefore an ‘incomplete metaphor’ (Pruitt & Nowak, 2014). This critique does not criticise the model for its incompleteness *per se*. Rather, it interrogates the heuristic to raise novel questions and insights about the nature of constructive and destructive NRM stakeholder relationships. The 3D landscape model is my attempt to capture these new insights. Five interrelated questions are explored here:

1. What is the basin?
2. What is the ball and what moves it?
3. What is the relationship between basin depth and width?
4. Can there be more than two basins?
5. What happens when someone else enters or leaves the relationship?

Within each question, pieces of the 3D landscape model are proposed, to be brought together at the end of this section.

6.3.1. What is the basin?

The 2D basin model does not completely describe what makes up the basin or landscape. Coleman (2011: 80) indicates that they ‘come from our past and our current experiences’ and ‘are made up of many different factors that come together to help establish the patterns we tend to fall into when we get into a conflict’. He emphasises that attractor basins are made up of many ‘coherent’ elements – that is, elements that ‘support and reinforce’ each other (*ibid*: 73, 35) to create a stable state in which the conflict exists.

How these elements make up a basin is not articulated. My interpretation is that the basins are a result of plotting the path of the relationship along a number of dimensions (discussed below). In other words, the state of every relationship (the ball) can be plotted according to a set of coordinates. The relationship changes over time – and accordingly, the ball moves from point to point. If the path of the ball is traced over time, basins appear. This interpretation is similar to the double-pendulum example illustrated above, in Figure 6-6, where the basin describes the pattern emerging from aggregated random changes.

A space-based example illustrates this interpretation further. Any phenomenon existing in three-dimensional space can be defined using three coordinates. Location coordinates are an example:

point on earth can be defined by latitude, longitude, and elevation (x, y, z) coordinates. Many points can be joined to create a *landscape*, as Figure 6-7 illustrates.

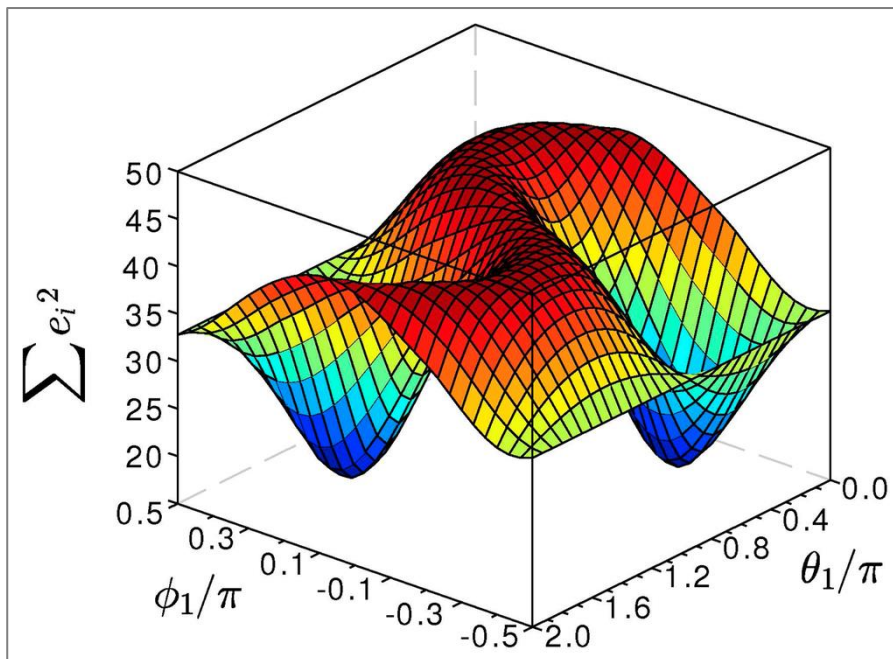


Figure 6–7 Example of landscape formed by plotting points within 3D space

Note: this figure was taken from Seel et al. (2014) which relates to modelling human movement; it is not substantively relevant to this thesis. The axis labels are not relevant here.

Along what dimensions can human relationships be plotted? What coordinates would be needed to define a human relationship precisely? The answer is probably many – too many to be practicable. As a starting point, Coleman (2011) identified 57 ‘essences’ of intractable conflict, some of which are similar to the attributes of constructive and destructive relationships in Figures 2-2 and 2-3; the influencing factors from Chapter 5 also provide potential ways of defining NRM stakeholder relationships. Blalock (1989) demonstrated the difficulty in modelling the pathway of even a very simplified conflict. It is probably not possible to plot the vast variables within human interactions, and in any event it is difficult to imagine and construct models with more than three dimensions. Clearly, the basins model (whether 2D or 3D) really is only metaphorical and heuristic, being limited to far fewer dimensions of conflict and relationship than can be represented. Such a limitation is not fatal to the purpose of a heuristic model, because it nonetheless encourages stakeholders to reflect on how their relationships with other stakeholders are defined, highlighting particular dimensions of constructive/ destructive relationships for consideration.

My interpretation differs from Coleman’s, who visualised the basin as a climber in a valley, ‘constantly compelled to slide down the mountain and come to rest at the bottom of the valley’

(Coleman, 2011: 79).⁷ Under my interpretation, the ball (relationship) is not being *pulled* into a basin; rather, the movement of the ball (that is, the constant shifting of a relationship) tends to create basin shapes, representing persistent constructiveness or destructiveness. Metaphorically, tracing the pathway of a moth around a candle would better represent my interpretation, rather than a climber battling a slope.⁸ This interpretation more closely aligns with dynamic systems theory.

Why does this distinction matter? All metaphors are simplifications, after all. But adjusting the metaphor can adjust our mental model of stakeholder relationships. There may be an empowering effect: Coleman's climber does not invent gravity, nor shape the valley, but actors *can* and *do* influence the pathway of their relationships with others, and therefore have a part to play in influencing its constructiveness or destructiveness. The fact that this model is only a loose metaphor contributes to the empowering effect – the basin of a double pendulum is predictable and fixed, because it is constrained by the length of the pendulum's arms, but people – who exercise will and agency – are not so constrained and can shape their own basins. And since, in my interpretation, the landscape only takes shape as the relationship evolves,⁹ there is an infinity of uncharted territory (so to speak) representing possibilities of new basins and new types of relationships that can exist alongside the extant ones. The mental model can therefore open up the possibilities of many different kinds of relationships, and can help prompt discussions among stakeholders about what sort of basin they *want* their relationships to gravitate around.

6.3.2. What is the ball and what moves it?

The previous section has largely addressed this question, but a response is summarised here to offer a direct answer to the question. The ball represents the current state of the relationship, its position metaphorically represented in two-dimensional or three-dimensional space, although in reality defined by an indefinite number of variables making up human relationships. The ball moves when

⁷ Cf. Vallacher et al. (2011: 69), who imply that an attractor is an abstract concept representing convergence of system behavior, rather than a tangible source of some sort of pulling force. That is, the convergence to a set of states comes from interactions between system elements, rather than an unspecified 'attractor' external to the system. This is consistent with dynamic systems theory as outlined above.

⁸ Although I reject Coleman's climber metaphor, I acknowledge that it is more intuitive than my moth metaphor—and therefore a better metaphor when speaking with the general public. Those caught in intractable conflict (Coleman's area of study) probably *feel* as though they are constantly sliding down a mountain, so the climber metaphor is at least emotionally apt. In practice, one might still use the climber metaphor to communicate with others.

⁹ An alternative view might be that all possible basins exist already, and that actors, by their choices, move their relationships into and out of certain basins. However, this interpretation is less powerful if one is to keep the metaphor within three-dimensional space, since that would require explaining how the many, many possible future basins are adjacent to the present one (or else prescribe a way of making those many future basins can be reached). (It might be easier to do so with more than three-dimensions, but that would sacrifice the intuitiveness of the 3D model, making it less useful.) Moreover, the idea that actors are *shaping* their relationships better emphasises a message of empowerment, which is desirable if using this model to encourage people to work together.

the relationship changes with respect to one or more variables, much like the position on a map changes when one or more coordinates are altered. The purpose of the ball is to indicate a position on the landscape – it does not have to be a ball (recall Coleman’s climber), but a ball does help to visualise the idea of ‘rolling’ around a basin.

Internal, relational, and contextual variables all influence the position of the ball (the state of the relationship).

- An *internal* variable is one that operates within the mind of individual actors (e.g. someone changes her mind about someone else’s behaviour).
- A *relational* variable is one that operates between two or more actors (e.g. two people have a conversation – this may also result in internal changes, such as increased trust, but the fact of having had the conversation is also, in my interpretation, part of the landscape of the relationship).
- A *contextual* variable relates to changes in the social environment in which the relationship is situated (e.g. the winding up of a grant scheme changes the relationship between organisations previously competing for the grant).

I conceptualise the ball as constantly moving, because time elapsed is a variable of a relationship, and affects actors’ attitudes to the relationship. Phrases like ‘We had been working together for over 10 years’ (hypothetical quote) suggest that, even where an actor considers the relationship to have changed little, the perceived longevity of that relationship partially defines its state.

6.3.3. What is the relationship between basin depth and width?

As noted above, the 2D basins model seems to consider the basin’s depth to correlate to the strength of the attractor, and the width to represent the range of circumstances that the attractor operates on. But what is the difference? One thought experiment is to imagine a wide but shallow basin, and contrast it against a deep but narrow basin.

Consider the wide but shallow basin. Its width represents a relationship that remains stable in many circumstances. Its shallowness suggests that it is not very resistant to change. Those two statements appear inconsistent: if a relationship gravitates to a particular state despite many changes, is it not resistant to change? If a basin is wide, is it not necessarily deep?

I found no specific explanation in the literature. My interpretation is that a wide, shallow basin, while ‘capturing’ many circumstances, may be shifted easily by a new, powerfully attractive circumstance that dominates the relationship. This interpretation might be framed in terms of degree of interdependence between the actors. (Recall the discussion in Section 2.4.1, where

interdependence was identified as an essential element of conflict.) I suggest that a wide, shallow basin may exist where actors have low interdependence. For example, NRM28 described how it and another NRM group have adjacent but clearly defined areas of operation. They do not depend on each other for their operations, but they do have a civil, professional, and arm's-length relationship that is generally constructive, and over the years has remained so despite many changes in circumstances (such as changes in personnel, and funding and legislative arrangements). This scenario describes a wide, constructive basin. NRM28 described an emerging issue of contention relating to buffel grass, considered by graziers to be a resilient pasture crop and by ecologists as an invasive species (see Friedel et al., 2006; Staight, 2015). NRM28 was hoping to reduce buffel grass coverage, but its counterpart (in whose jurisdiction operated a lot of graziers) wanted to increase it. This issue was still unfolding at time of interview (and was therefore not explored in depth), but it is imaginable that the constructiveness of the relationship between the two NRM groups might not be tightly held: some one-off action, like a criticism made by one group about the other in the press, might be enough to move the relationship into a destructive basin. This example seems to be a plausible instance of a wide but shallow basin.

A deep but narrow basin also appears to have some internal inconsistency. It would be simultaneously highly resistant to change (deep), but would be a different basin with only a few changes in circumstances (narrow). This is an apparent inconsistency, because one would expect high resistance to change to imply resistance in the face of a wide range of circumstances. My interpretation is that deep and narrow basins occur when one or two circumstances dominate the character of the relationship. NRM28, for example, also recounted a story where an NRM group's relationship with an Indigenous organisation was persistently sour while a 'bullish' CEO led the former. This relationship was difficult to change from destructive to constructive (deep), and it also did not change very much during the tenure of this CEO (narrow). But once the dominant destructive influence was removed (CEO resigned), the relationship was quickly repaired (constructive), and was able to encompass a range of new initiatives and circumstances (wide), even though there was some lingering wariness of the organisation (shallow).

The distinction between depth and width is important, because these illustrations show that they are different variables characterising qualitatively different types of relationships. Practically, it is important because, in attempting to characterise a particular relationship (as wide and shallow, wide and deep, narrow and shallow, or narrow and deep), aspects of that relationship may be brought forward for further thought and discussion – such as what makes the relationship strong, what makes it vulnerable, and what might be done to improve it.

6.3.4. Can there be more than two basins?

In the context of intractable conflict, the 2D basins model appears usually in a constructive/ destructive binary, because the model is constructed in order to show this binary: as noted in Section 6.1, the starting point of the 2D basins model was Deutsch's (1973) observation that destructive relationships tend to stay destructive, and vice versa. There is no theoretical barrier to the formation of many basins, given that the basin, in my interpretation at least, consists of the traced pathways of that relationship over time.

A given relationship may have multiple constructive basins, for instance, where each the attractor state is defined by different coordinates so as to distinguish them. A simple example might be the constructive relationship between two members of different environmental advocacy groups. Suppose one starts work at a company that is ideologically opposed to other's group – the duo's professional relationship may remain constructive, but it is arguably a different relationship from the original because it gravitates towards a different attractor state due to their now-differing professional identities.

Recognising the potential for multiple basins reinforces that the terms 'constructive' and 'destructive' are descriptors applied to characterise a particular relationship; the quality of being constructive or destructive is not evident from the basin shape itself but assigned by examining the qualities of the relationship.

6.3.5. What happens when someone else enters or leaves the relationship?

Issues of scale are not explicitly addressed in the 2D basins literature. Coleman (2011: 2, 206) describes intractable conflict within friendship groups of six members, as well as the ongoing Israeli–Palestinian conflict. How differences in the scale of these two conflicts are represented in the basins model is not explored. How the model represents the addition or departure of a person in a relationship is not well explored either.

Accounting for scale and for additions and departures are linked. I suggest that the addition of another person (or group) will, in some cases, automatically move the relationship out of its existing basin into a different space, where a new basin may begin to emerge. In dynamic systems terms, the addition of a new 'player' changes the coordinates defining the relationship drastically. However, this occurs only where the new addition really does change the identity of the relationship – this is likely an issue of scale (the addition of a single person to an international conflict does not change much, but the addition of an entire nation state does). The same reasoning applies to departures.

The implication that the ball (relationship) is transported into a new space is significant, because it is an exception to the proposition that it is difficult to shift the ball out of the basin. The ball is *automatically* moved into a new space. That does not mean an entirely fresh start, of course – elements of the pre-addition relationship remain operative. However, it does imply that adding someone or taking someone away may create opportunities to redirect the state of the relationship. A clear example is a mediator, whose addition to the relationship jolts the relationship to someplace new, enabling potential conversion from destructive to constructive. When the mediator leaves the relationship, the ball may zoom to a new space which will become a new, hopefully constructive basin with only the original parties to the relationship (i.e. mediation has changed the relationship because it now gravitates around a different state). Or, the ball may return to the basin pre-existing the mediator’s involvement (i.e. mediation has not fundamentally changed the relationship). In this way, the mediator is a conduit for parties to move from a destructive relationship to a constructive one, where the sides of destructive basin may have been otherwise insurmountable. Figure 6-8 shows this circumvention.

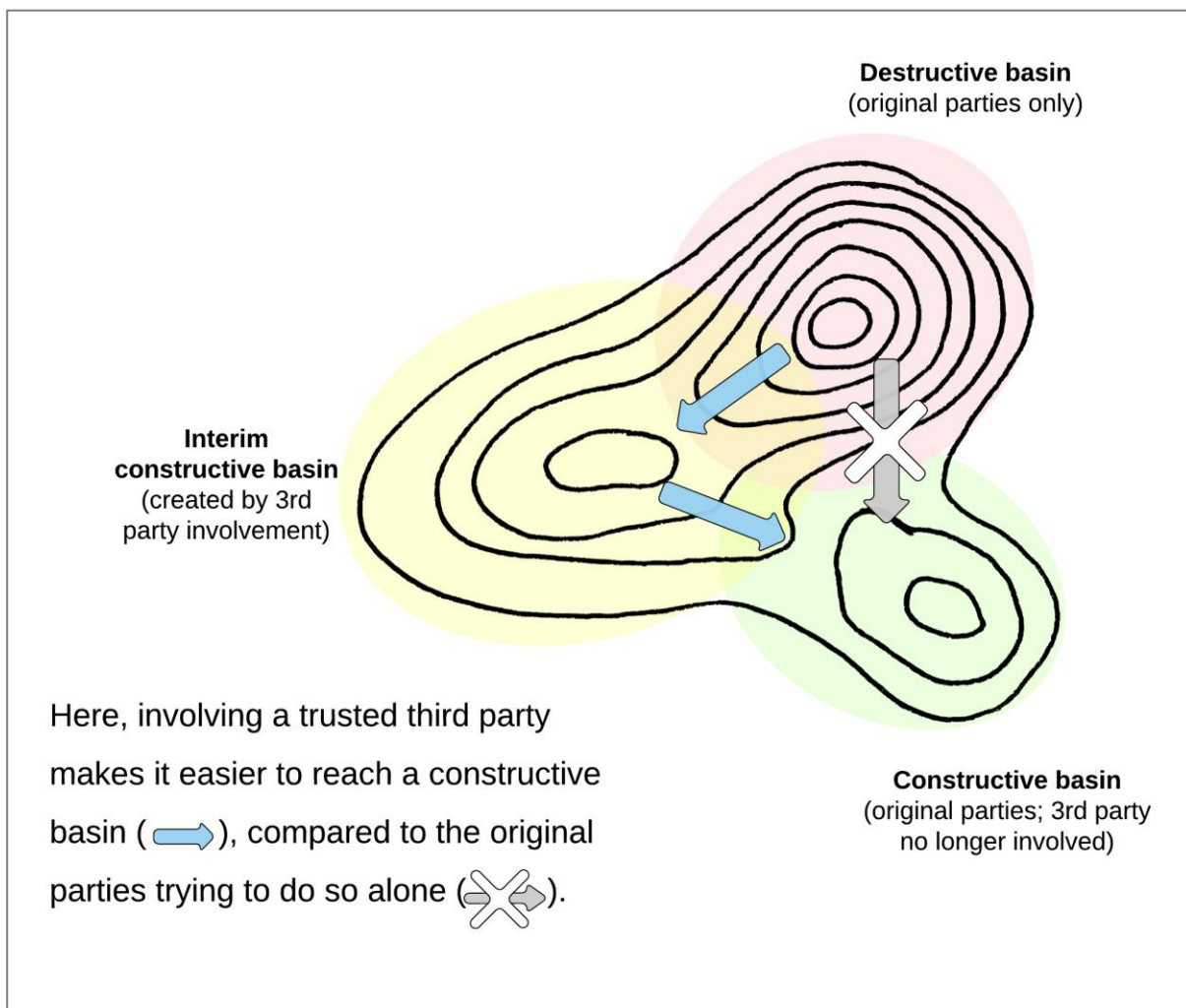


Figure 6–8 Effect of third party mediator on destructive relationship

Interpretation: Trusted intermediary allows parties to find alternative, easier pathways from a destructive basin to a constructive one.

6.4. Conclusion

In this chapter, I outlined the 2D model and accepted Vallacher and Nowak's (1997) assessment that it can only be an 'incomplete metaphor' for stakeholder relationships. However, I justified its *usefulness* with recourse to literatures relating to heuristics and mental models. That is, both the 2D and 3D basin models are not intended to be complete, and indeed they are likely to be *more* useful to stakeholders as incomplete – but navigable – mental models. Indeed, developing this model served two purposes: first, to enable further exploration of the findings of Chapter 5 (a conceptual, exploratory purpose); and second, to create a useful way of helping people in NRM relationships think and talk about their perspectives on those relationships (a practical, communicative purpose).

In this chapter, while the theoretical underpinnings of the extant 2D model were affirmed, it is clear that it does not adequately account for the possibility of three or more basins, and the effect of parties entering and leaving relationships. A 3D model was therefore justified. The 2D model could only show a set of stakeholders stuck in a destructive basin, as well as a prospective constructive basin where one or more stakeholders may aspire to create (or move back to). The 2D model does not neatly show how third parties offer a way to move indirectly (and potentially with greater ease) from destructive to constructive – particularly in circumstances where multiple basins are involved.

The ideas presented in the chapter contribute to knowledge because they challenge and extend the currently documented basins-of-attraction model. Further research is required to explore this 3D model in greater detail, and to test whether it is a practical mental model to introduce to NRM stakeholders – potentially, it could be useful in participatory diagramming (e.g. participants write down destructive and constructive factors relating to their particular relationship, in order to collaboratively construct a basins diagram of the relationship; recall Section 3.4.2). Within the thesis as a whole, the role of this chapter has been to substantiate the perspective from which NRM stakeholder relationships are conceptualised. Subsequent chapters (Chapter 10) will use this mental model to make sense of the effect that IAN's report card practice has on stakeholder relationships.

Chapter 7. Characterising IAN's report card product

This chapter is the first of three investigating IAN's report card practice. All relate to Research Question 2, 'what defines IAN's report card practice?'. As explained in Chapter 1, the term 'practice' includes both *process* and *product*. While the thesis is generally more interested in *process*, this chapter focuses on IAN's report card *product*. The rationale of undertaking this analysis is that the process is intended to create the product; an understanding of the process can only be developed with the intended product in mind. Therefore, the aims of this research are:

- To define and substantiate the term, 'IAN report card product'; and
- To establish terminology and concepts that facilitate later analysis of IAN's report card process (in Chapters 8 and 9).

Accordingly, the research questions are:

- Can (and how can) IAN's report card products be sorted into types?
- What design components typically appear in each type of IAN's report card?
- What is the rationale for including these design components?

The purpose is *not* to critique the report card document from a design perspective. Broader principles of visual design are not discussed except in passing (though recall Section 3.4.1c, Infographics). This chapter presents only descriptive and explanatory observations, chiefly to help the reader understand later chapters, wherein interviewees refer to components of report cards (e.g. 'cover photo' or 'conceptual diagrams'). This chapter is considered only a shallow analysis (see Section 4.3.3c).

This chapter begins with a literature review, identifying the gap in knowledge. Research methods are stated, with results and discussion following.

7.1. Literature review: no extant work characterises IAN report cards

There is little published literature characterising IAN's report card products. No peer-reviewed literature was found. In the grey literature, IAN has published a handbook on ecosystem assessment and another on science communication. While both are relevant and referenced within this chapter, neither focuses specifically on IAN's report card products.

The books are:

- *Integrating and Applying Science: A handbook for effective coastal ecosystem assessment* (Longstaff et al., 2010). This book focuses on delivering ecosystem assessment programs, and

while it discusses report cards and science communication principles, it tends to set out general principles rather than break down IAN's own report cards.

- *Communicating Science Effectively: A Practical Handbook for Integrating Visual Elements* (Thomas et al., 2006). This book focuses on the visual presentation of scientific information. Its contents reveal the rationale behind the report card elements identified in this research. Indeed, it predates all of IAN's report cards. As such, it can be taken as a sort of manifesto of principles from which report cards were conceived. It is highly relevant to this research, but it cannot constitute an empirical account of what characterises IAN's report card product.

In 2012, OpinionWorks (a communications consultancy) undertook a focus-group study of seven report cards of Chesapeake Bay tributaries (Raabe, 2012). This study found that focus-group participants were in favour of a number of design elements:

- Clear visual representation of monitoring grades;
- Trends in monitoring results over time;
- No jargon or technical terms;
- Clean and uncluttered appearance;
- Photographs (especially of people), and maps (though not too many); and
- Limited use of charts and graphs.

Raabe (2012) was useful for this chapter, because it is empirical research that highlights the design of report card products. However, IAN did not produce those report cards directly. They were produced by local environmental groups within the Chesapeake Bay. While some organisations had received training from IAN, or may have based their report card design on IAN's earlier report cards in the Chesapeake Bay (Chapter 9 will discuss this further), they are not IAN products. Therefore, the report by Raabe (2012) is not sufficient to characterise IAN's report cards.

7.2. Methods

The research methods were introduced in Section 4.5.1, and given further detail here. IAN's website (ian.umces.edu) provides a list of 81 report cards, published between April 2007 and May 2016. It was assumed that all IAN report cards were listed. All were downloaded for examination.

Broadly, the research design was to divide the report cards into types, and analyse a sample of each type to show commonly occurring features. The report card types were generated from the ground up. It transpired that IAN directly produced 43 of the 81 report cards – the remainder was produced by organisations that IAN supported (e.g. through training) but did not produce (Chapter 9 gives

further detail on the nature of this support). Only report cards directly produced by IAN were assessed, in order to ensure that *IAN's* product was being characterised. All report cards are listed in Appendix A, which assigns each report card a code (which will be used to reference specific report cards), and lists the monitoring region, date of publication, and producer (IAN/other).

An initial, detailed coding was undertaken of two report cards (RC186 and RC464). These were selected to represent early practice (2008) and recent practice (2015), and chosen from different report card programs (i.e. different client and monitoring region), so as to avoid a particular client's specifications from creating false commonalities. The purpose of the initial coding was to sensitise the researcher to the dimensions along which further coding would occur. By comparing these two cards, the initial coding showed that the presentation of the front cover, the presence of photos, and the language and content of the prose could function as basic discriminants for categorising report cards. (The length of the report card was later added as another discriminant.) Using these discriminants, the remaining IAN-produced cards were coded. Five categories emerged:

- Historical– technical
- Contemporary
- Historical/ legacy
- Technical
- Extended report

The following section describes the characteristics of each category, as well as their frequency of occurrence. Annotated (coded) excerpts from each category are provided to illustrate these characteristics.

Two limitations are noted. First, aside from initial coding, the remaining 41 report cards were coded rapidly. Fine details and variations within the group were recorded, but not systematically checked beyond a second iteration. This means that there are exceptions to some categories – but the categories were adjusted only once to reflect these exceptions. Exceptions are noted in the results. The rationale for not undertaking more detailed coding is that the purpose of the study is to show the reader how IAN report cards are put together, to support later analysis. A rapid and shallow analysis serves that purpose. As a result, the categories are not hard-and-fast, but a convenient way to show differences in report cards generally.

Second, for the same reason, the design rationale was not investigated. That is, reasons for the different designs were not sought. Further research (e.g. interviewing IAN staff in charge of each report card) would reveal why each report card was laid out as published. Such detailed analysis of

the product is beyond the scope of the thesis, which focuses on the report card process. Although product design might reveal insights about process (e.g. including a particular photo or narrative to appease a particular stakeholder), time constraints prevented this inquiry from being conducted for all 43 report cards. Rather, Chapters 8 and 9 incorporate product considerations into a process-based discussion, as relevant to the case studies investigated.

7.3. Results & Discussion

These results describe the main characteristics of each report card type. Table 7-1 overleaf summarises the key characteristics. As Figure 7-1 shows, the ‘contemporary’ and ‘historical/legacy’ types comprise the majority. A complete and coded Contemporary report card is provided – it is given more attention because it is the largest category, and because it appears to have become the standard design (it best exemplifies current IAN report cards). Excerpts from the other types are reported. While the table overleaf does detail exceptions, the subsequent discussion does not, because the focus is on presenting archetypes.

Table 7–1 Key characteristics of report card types

Type	Cover	Pages	Visual components	Content	Remarks
Contemporary	<p>Photo / collage of photos.</p> <p>Overall grade usually (but not universally) displayed.</p>	5–8, 16	<p>Diagrams and photos, on every page. Often a prominent conceptual diagram of the system being monitored.</p> <p>At least one map of monitoring area (computer-aided design).</p> <p>Few charts (e.g. column graphs) – rarely more than 3 per report.</p> <p>Icons used frequently throughout report (symbol language).</p>	<p>Language mostly non-technical, as though written for laypersons.</p> <p>Usually includes plain-English explanation of report card process, and what citizens can do to improve environmental health.</p>	<p>First appeared in 2011 (RC311); appears standard IAN format since then. Taken to represent current IAN practice.</p> <p>Note that RC460 is an unusually long report (16 pages). In this respect, it is more like a technical report. However, it is included here because of its visual richness and non-technical language.</p>
Historical/ legacy	<p>Map of monitoring area.</p> <p>Overall grade displayed.</p> <p>Note: RC225 an outlier – cover describes region in prose with maps & conceptual diagrams.</p>	4–5	<p>Compared to Contemporary:</p> <ul style="list-style-type: none"> • Denser prose, and smaller and fewer photos. • Conceptual diagrams either omitted, or a small component only (taking up a small part of the page). • Few charts (rarely more than 3 per report). • Icons used, but limited to one section of the report. 	<p>Language mostly non-technical, as though written for laypersons. However, includes more technical language compared to Contemporary – such as names of chemicals (e.g. chlorophyll-a, phosphorous) and numerical figures (e.g. concentrations, percentages).</p> <p>Usually includes plain-English explanation of report card process, and what citizens can do to improve environmental health.</p>	<p>Historical because, aside from the first two report cards ever produced by IAN (RC164, RC186), this design appeared to be standard until 2010, when the contemporary design took over.</p> <p>However, the label ‘legacy’ is applied, because one report card program (Maryland Coastal Bays) continues to use this design: first report card in June 2009 (RC228) and last published in December 2015 (RC492).</p>

Type	Cover	Pages	Visual components	Content	Remarks
Technical	Substantive front cover – charts, tables, conceptual diagrams, and text reporting on results.	2–4	Compared to Contemporary: <ul style="list-style-type: none"> • Frequent charts (4–5 per report). • Some small maps (3–6). • One conceptual diagram. • Some small photos (3–5 per report). 	Language accessible, but technical language used frequently (e.g. chemical names, numerical figures, scientific species names, etc.)	RC331 (Great Barrier Reef) is an outlier, possibly because it was written for a government rather than a community-level organisation. It is longer (12 pages), but it is included here because it comprises 6 x 2-page reports on discrete subregions (i.e. similar length when disaggregated). It is included here due to its technical language and content.
Historical–technical	Title only. No grade. Faint outline map (functioning as graphic design rather than map).	6	No photos – charts and maps only. Symbols used, but only in one part of the report.	As for technical.	The only two are RC164 and RC186 – the very first two IAN report cards (hence ‘historic’). The lack of photos and the technical language used places these in this separate though hybrid category.
Extended report	Photo(s) and title	16, 36	Includes photos, charts, maps, conceptual diagrams and symbol language – approximately 2 per page.	Detailed prose, in accessible but technical language – as for technical but more detailed.	A long-form report incorporating similar elements to report cards, but much longer. Only two: RC202 and RC304 – potentially a result of client specification. Not considered typical IAN report card.

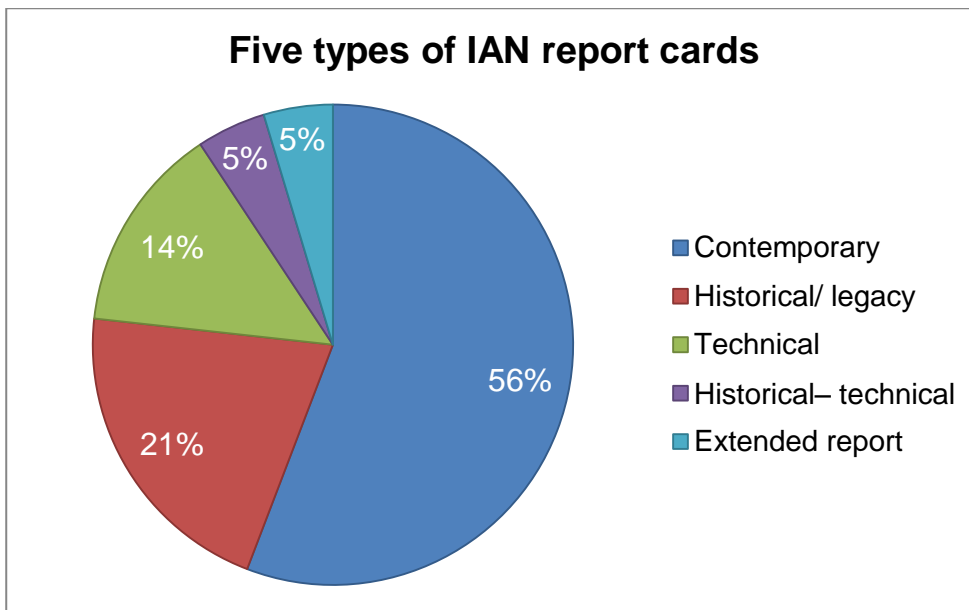


Figure 7-1 Types of IAN report cards

7.3.1. Contemporary report cards

Contemporary report cards are graphically rich documents, written in non-technical language and usually between 5–8 pages long. Generally, they are recognisable because they have large colour photographs for a front cover (usually of humans interacting with the environment). The first contemporary report card was RC311 (Chesapeake Bay report card, 2010, published in April 2011), and it appears to have become a standard format since.

Contemporary report cards always explain how the grading was calculated, and display the results on a colour-coded map. They always cite practical actions that citizens can take to improve ecosystem health. They usually describe system interactions within the ecosystem, accompanied by a conceptual diagram. They usually describe the history or ecological context of the reporting region, and often cite the work of others. Always, on the last page, partners and contributors are acknowledged. Often, workshop participants are shown in a photo.

Figures 7-2 to 7-7 shows each page of RC464 (Norwalk Harbor report card, published June 2015), with key features annotated as coding.

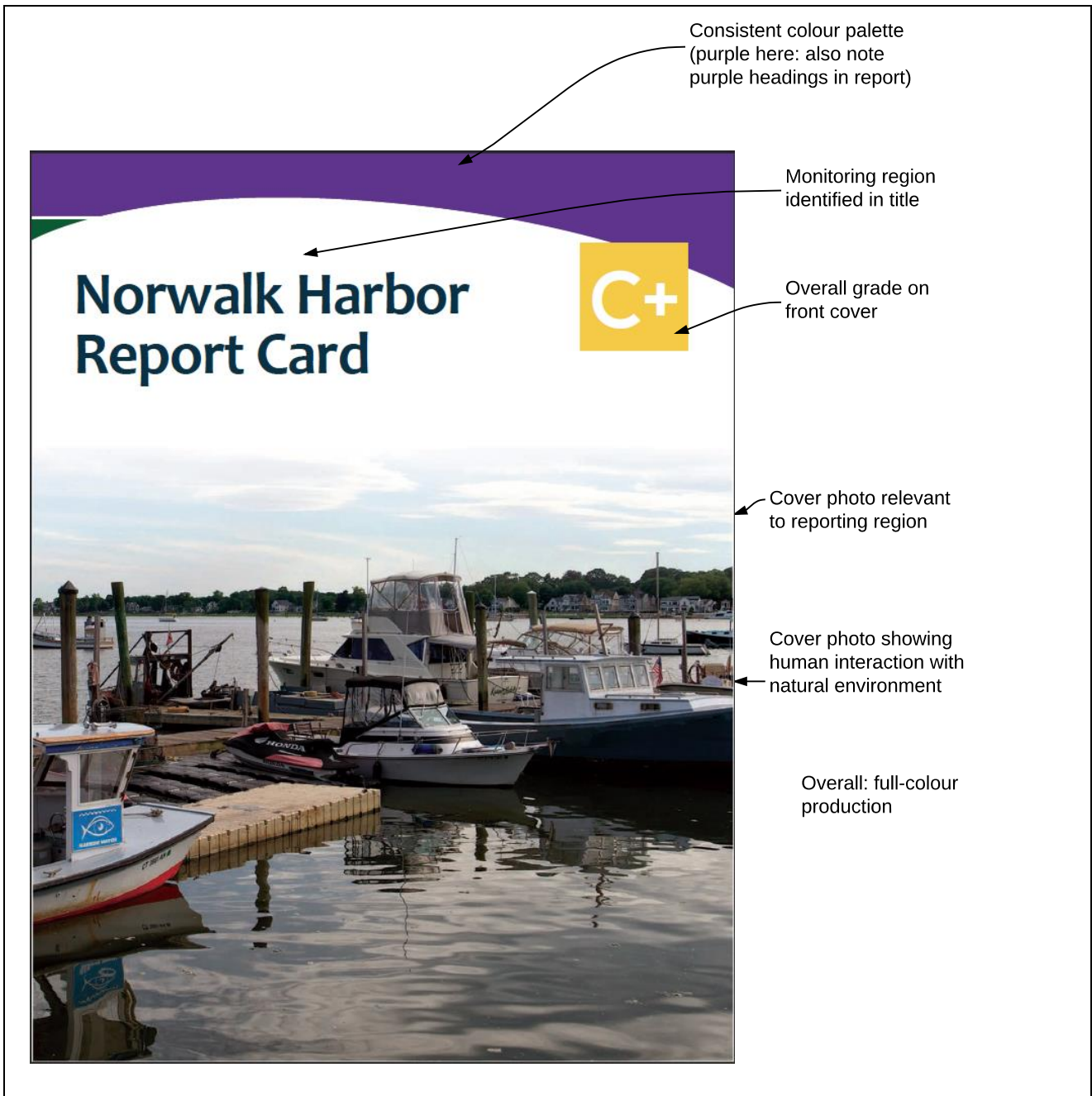


Figure 7-2 An example of a Contemporary report card (1/6)

Narrative: how the physical system works

Following the water's trail from your house, into the river, and to the Harbor

The way land is used in a watershed has a significant effect on water quality. In areas where there are more impervious surfaces, such as parking lots, streets, and roofs, water from storms and even light rain can flow quickly and directly into a storm drain system. This water flow, called runoff, transports a wide variety of pollutants (such as sediments, excess nutrients, bacteria, and toxic man-made chemicals) into nearby streams, rivers, and the Harbor.

This type of pollution, often difficult to control, is called Nonpoint Source Pollution (NSP). NSP can cause the destruction of fish and macroinvertebrate habitats, promote the growth of excessive and unwanted algal blooms that contribute to hypoxia (low dissolved oxygen) events in Long Island Sound, and introduce dangerous chemicals into local waterways. These pollutants that run off the land threaten the biological integrity of the Sound and the recreational and commercial value of this important resource. In addition to the harmful effects on the overall Sound, negative impacts can be seen locally in Norwalk River and Harbor.

Harmful practices

Beneficial practices

Conceptual diagram - cross-sectional view

Conceptual diagram: symbol language and digital graphics custom-designed for report card

Conceptual diagram: narrative summary of diagram

<p>Infrastructure</p> <ul style="list-style-type: none"> Storm water pipe Sewer pipe Storm drain Rain garden 	<p>Pollution Sources</p> <ul style="list-style-type: none"> Oil Pet waste Illegal hookup Broken and leaking sewers 	<p>Inputs</p> <ul style="list-style-type: none"> Bacteria Nutrients Toxicants
---	---	---

Nonpoint source pollution can enter Norwalk Harbor from pet waste, illegal hookups, broken pipes, and car oil spills. When proper sewer and car maintenance practices and rain gardens are used, pollution is prevented.

Your actions can help improve the Harbor!

Compost yard waste, like leaves and grass into valuable soil for lawns and gardens, maintain vegetative buffers along stream banks to prevent erosion, and be mindful of the use of fertilizers and chemicals. Photo: Earthplace.

Be a considerate pet owner. Never throw pet waste into storm drains or into rivers, streams, or coastal waters. Pet waste contains bacteria that can cause diseases and threaten the safety of those who come in contact with the water. Photo: Michael Sean Terretta.

Participate in river and coastal clean-up events. By removing discarded trash and debris from our waterways, you will help protect water quality and the aesthetics of the environment. Photo: Earthplace.

Be a responsible boater. Never dump trash or debris overboard. Recycle plastics and glass containers and keep them out of our waterways. Photo: Jay K. Schwartz.

Practical actions readers can take

Photos break up text

Figure 7-3 An example of a Contemporary report card (2/6)

Norwalk River and its watershed

Covering approximately 40,000 acres (64.1 square miles), the Norwalk River Watershed lies in portions of six municipalities in Fairfield County, Connecticut (Norwalk, Ridgefield, Wilton, Redding, New Canaan, and Weston), and one town in Westchester County, New York (Lewisboro). The headwaters of the river are located in the Great Swamp near Ridgefield, Connecticut. The River first flows north, makes a 180-degree turn, and then flows to the south for 20 miles along the US Route 7 corridor, where it enters the Norwalk Harbor and Long Island Sound.

The watershed has two public reservoirs within its borders and several public recreational spots for swimming and fishing. Recreational uses of the Harbor include bird watching, shellfishing, rowing, and kayaking. The Harbor also serves as a hub for a large and financially important commercial shellfish harvesting industry.



*Aerial view of Norwalk Harbor in June 1987.
Photo: US Army Corps of Engineers.*

Basic description of monitoring region

Pollution a continuing concern for Harbor



Locations of storm sewer outfalls in Norwalk River and Harbor.



*Storm drain outfall at Moody Lane.
Photo: Earthplace.*

Nonpoint Source Pollution comes from many sources, and often enters waterways as a result of rainfall and snowmelt. Underground storm drain piping can carry rainwater great distances to outfalls that discharge it into rivers, streams, or coastal waters. Impervious surfaces in urban areas, such as parking lots and buildings, prevent rainwater from infiltrating the soil. When rainwater soaks into the ground, the earth filters out pollutants and the water recharges the groundwater sources. When water carrying pollution from the land flows into rivers and streams, the pollution ends up in the Harbor and can cause algal blooms and fish kills.

There are four wastewater treatment plants within the Norwalk River Watershed that release treated wastewater into the Norwalk River. The largest is the Norwalk Municipal Treatment Facility, which has a capacity to treat 18 million gallons of wastewater per day. These plants produce Point Source Pollution, which is pollution from a single source. Wastewater treatment plants are regulated and operate under a permit from the Connecticut Department of Energy and Environmental Protection. Most of the plants have been upgraded with advanced treatment methods that produce water which is less damaging to the receiving waters. Advanced treatment plants remove excess nutrients like nitrogen and phosphorus, and bacteria and other microorganisms that can harm humans. Unfortunately, they cannot remove other dangerous man-made chemicals, like heavy metals and pharmaceuticals.

Narrative: key issues facing region

Maps and photos break up text

Figure 7-4 An example of a Contemporary report card (3/6)

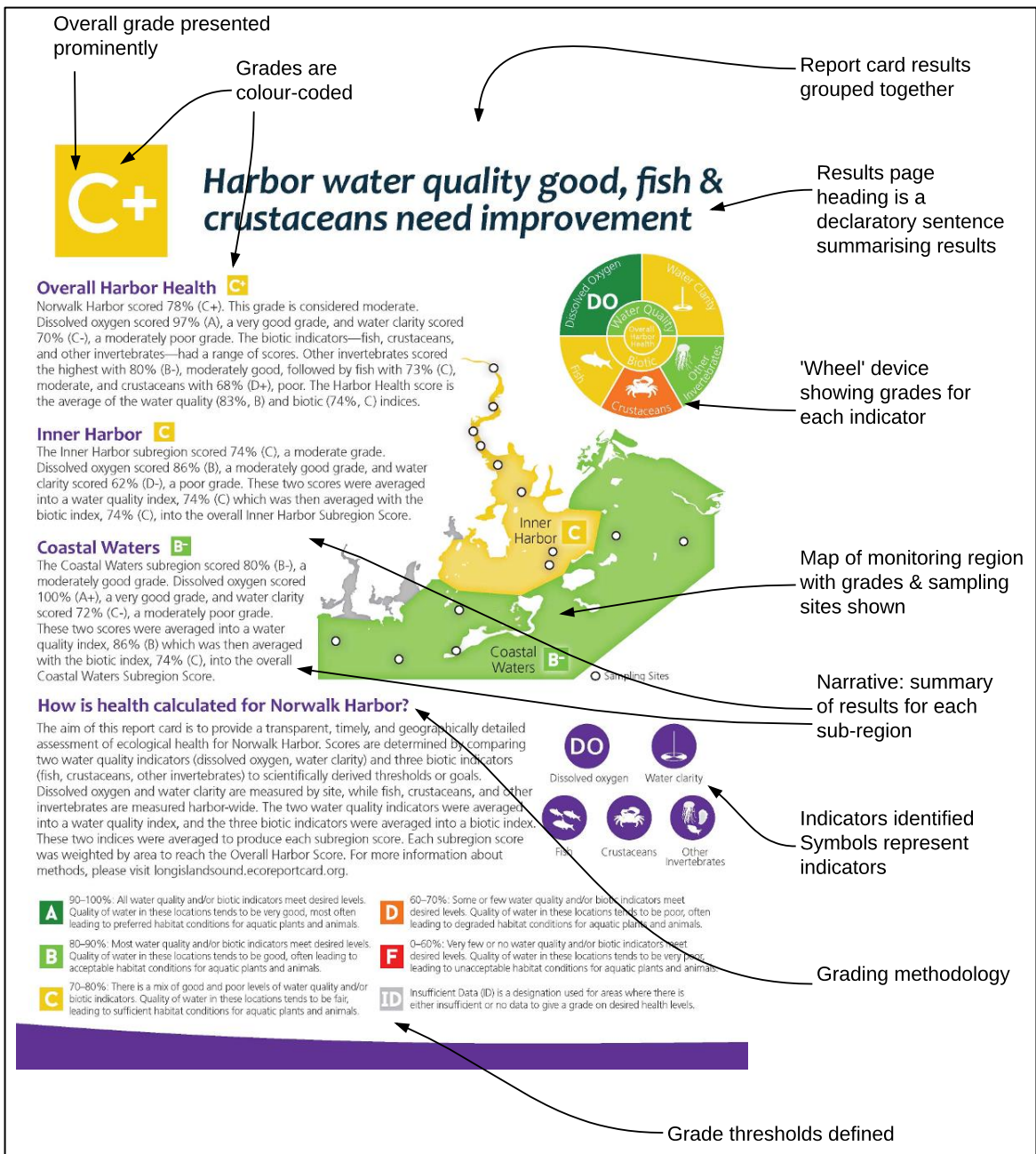


Figure 7–5 An example of a Contemporary report card (4/6)

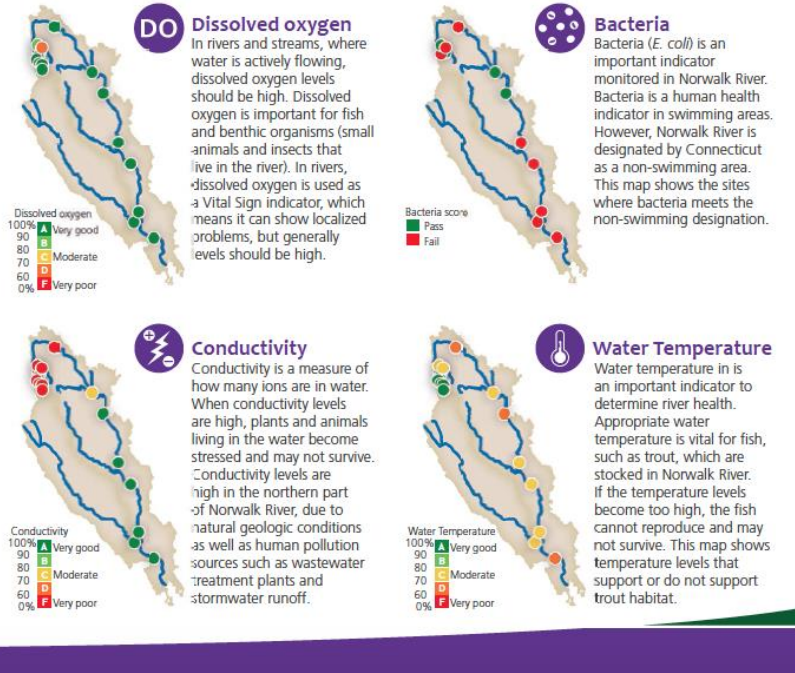
Water quality monitoring in Norwalk River

Harbor Watch was established in 1986 to restore the biological integrity of Long Island Sound and its watershed through credible water quality research. In 1993, it became incorporated as a program of Earthplace, and the water quality monitoring program has greatly expanded in Norwalk Harbor and Norwalk River. While this report card only includes an analysis for Norwalk Harbor, as additional indicators are added in the River, a River report card will be created in the future. Key indicators of nutrients and turbidity are not yet being measured, which are necessary to create a River report card. While some indicators are missing, there is currently sampling of dissolved oxygen, conductivity, bacteria, and water temperature. Each of these indicators are valuable to help understand water quality in Norwalk River.



A stream in Norwalk River. Photo: Earthplace.

Narrative: existing monitoring and conservation efforts



Monitoring results disaggregated by sample site and indicator

Note: not the same indicators as on previous page. Unclear why these results are disaggregated - possibly because these are stream rather than harbour measurements.

Figure 7-6 An example of a Contemporary report card (5/6)

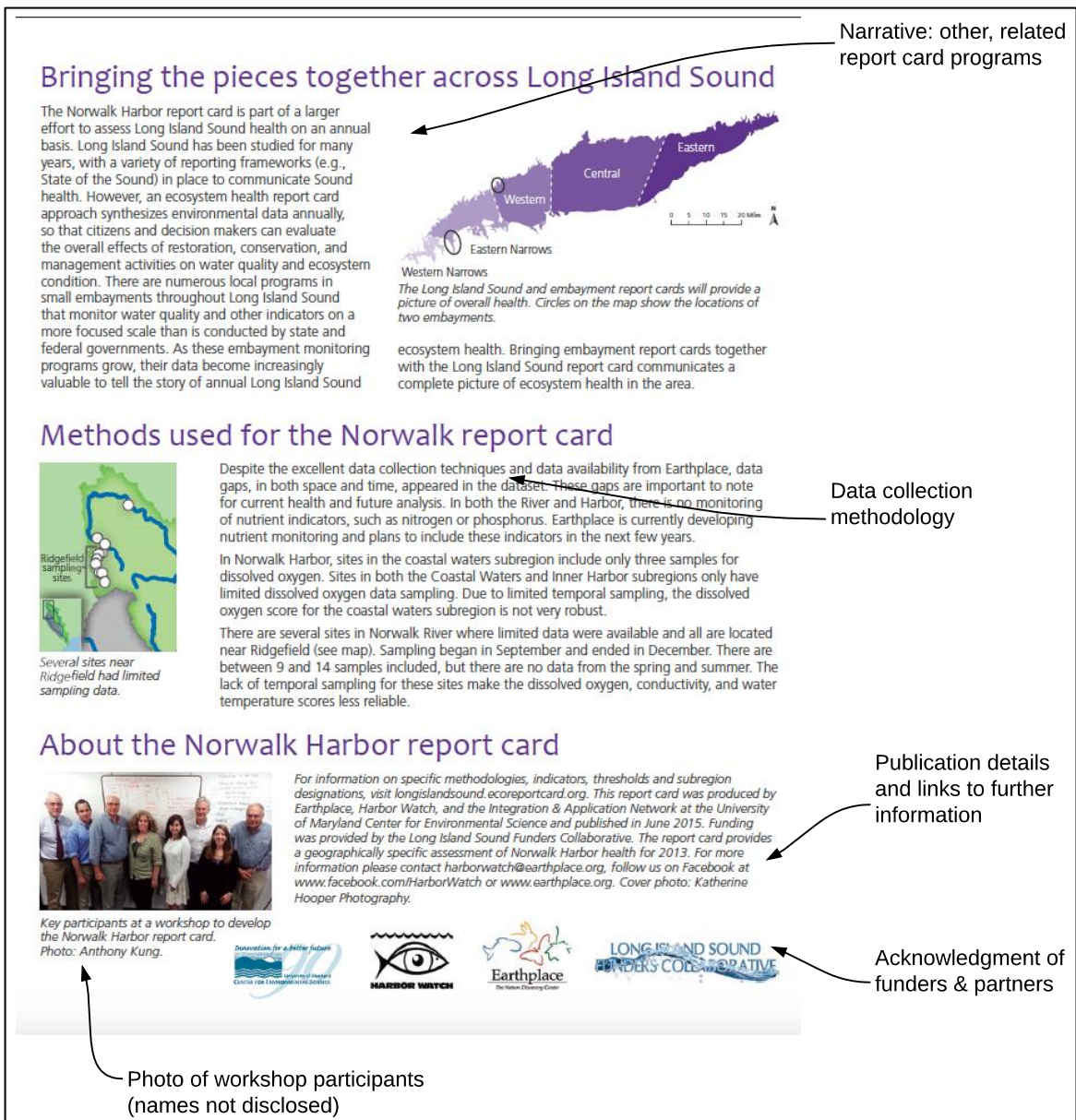


Figure 7-7 An example of a Contemporary report card (6/6)

7.3.2. Historical/ legacy report cards

Compared to Contemporary report cards, Historical/ legacy report cards are less visually rich. They tend to be identifiable because of their front covers, which show a map and a grade, but do not include a photo (Figure 7-8). Photos are used, but fewer than in Contemporary report cards (Figure 7-9). Like Contemporary report cards, there is also a section advising practical actions that citizens can take (also Figure 7-9). There is no photo of workshop participants, but acknowledgments appear on the last page. Results are reported similar to the Contemporary cards: a colour-coded map (Figure 7-10). Note how symbols are included, but not integrated into the substantive analysis (Figure 7-10 again; cf. Figure 7-5 above).

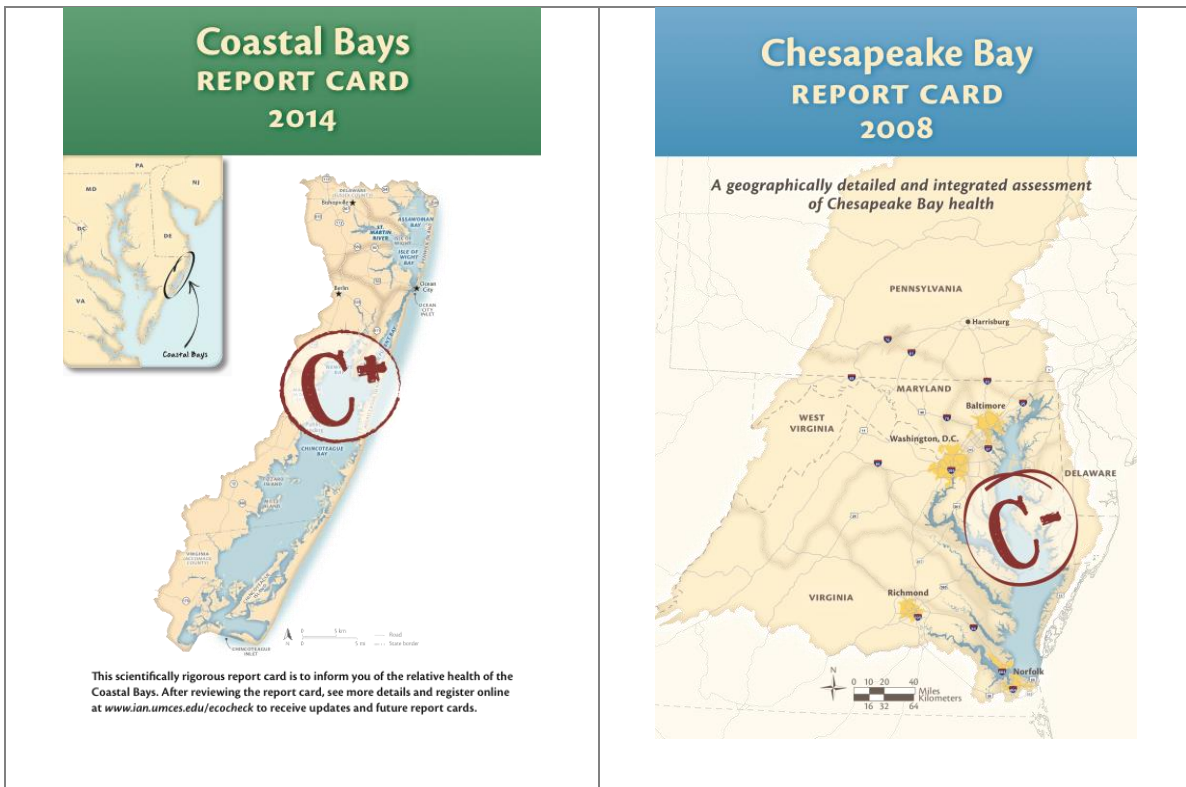


Figure 7–8 An example of a Historical/ legacy report card front cover (L-R: RC492, RC208)

2008 at a glance

Coastal Bays' health ranged from poor to good among reporting regions

Although the overall score for the Coastal Bays was a C+, there were distinct differences among reporting regions. For instance, western tributaries such as St. Martin River and Newport Bay had the lowest grades, whereas the northern regions had moderate grades. The southern regions, including Chincoteague Bay, had the highest grades.

Seagrass acreage up slightly

The abundance of underwater seagrasses in the Coastal Bays increased by 17% last year, from 9,319 acres in 2007 to 10,916 acres in 2008. While this increase is a good sign that the downward trend observed in recent years may have stopped, it is still one of the lowest acreages seen in over a decade and only 57% of the peak acreage observed in 2001.

Water quality indicators ranged from poor to very good among regions

Scores of individual water quality indicators showed distinct separation among the reporting regions and ranked similar to the final health index grades. Accordingly, the two mainland tributaries of St. Martin River and Newport Bay ranked the lowest of all regions, suggesting that the aquatic health of the Coastal Bays is strongly affected by nutrient loading from upland areas. Despite the moderate to good health scores in the other regions and an increase in seagrass area—which is likely due in part to lower than average rainfall in 2008—recent increasing trends in nutrient concentrations indicate that development in the watershed poses a serious threat to the health of this ecosystem.

Clam density in Isle of Wight Bay reaches 15-year high

Hard clam survey data from 2008 showed that clam recruitment in 2006 was extremely successful such that small clams (31–50 mm) made up 30–40% of the populations in Assawoman and Isle of Wight Bay, respectively. This boosted the total clam population in Isle of Wight Bay to the highest seen in the 15-year monitoring program. Populations in the other bays have remained stable.

Indicators used in the report card

The aim of this report card is to provide a transparent, timely, and geographically detailed assessment of 2008 Coastal Bays health. Coastal Bays health is defined as the progress of four water quality indicators (TN, TP, chl-a, DO) and two biotic indicators (seagrass, hard clams) toward scientifically derived ecological thresholds or goals. The six indicators are combined into one overarching Coastal Bays Health Index, which is presented as the report card score. Detailed methods available at www.eco-check.org/reportcard/mcb/2008.

TN Total nitrogen

TP Total phosphorus

Your homework: What you can do

- Plant a rain garden (www.co.worcester.md.us).
- Install a rain barrel (www.epa.gov).
- Use a programmable thermostat.
- Buy energy-efficient light bulbs.
- Plant a tree (www.trees.maryland.gov).
- Hold a neighborhood clean-up.
- Reuse, renew, recycle.
- Donate unwanted items.
- Use reusable cloth shopping bags instead of plastic bags when you shop.
- Become a Maryland Coastal Bays Program member (www.mdcoastalbays.org).



Students from Buckingham Elementary School in Berlin participate in planting trees at the school.

Our homework: What Maryland Coastal Bays Program is doing

Nutrient Reduction Action Strategy

- Septic system maintenance
- Agricultural Best Management Practices
- Stormwater upgrades
- Walkable, bikeable communities

Restoration

- Living shorelines
- Wetlands and forests

Fundraising

- Triathlon
- Golf tournament

Volunteer programs

- Horseshoe crab monitoring
- Water quality monitoring

Working with experts

- Coastal Fisheries Advisory Committee
- Scientific and Technical Advisory Committee

Grants

- Implementation Grants Program
- Community Stewardship Mini-Grants Program

Education

- Local nature and heritage classes
- Upward Bound

Outreach

- Weekly newspaper columns
- Public speaking engagements



Athletes from all over the region competed in the mcbp annual Osprey Triathlon in October 2008.



Isabel Emond was one of more than 60 children and adults who took part in the annual Herp Search May 16, 2009.

Figure 7–9 An example of a Historical/ legacy report card (1/2)
Two pages from RC228 – photos are used, but fewer than for Contemporary report cards.

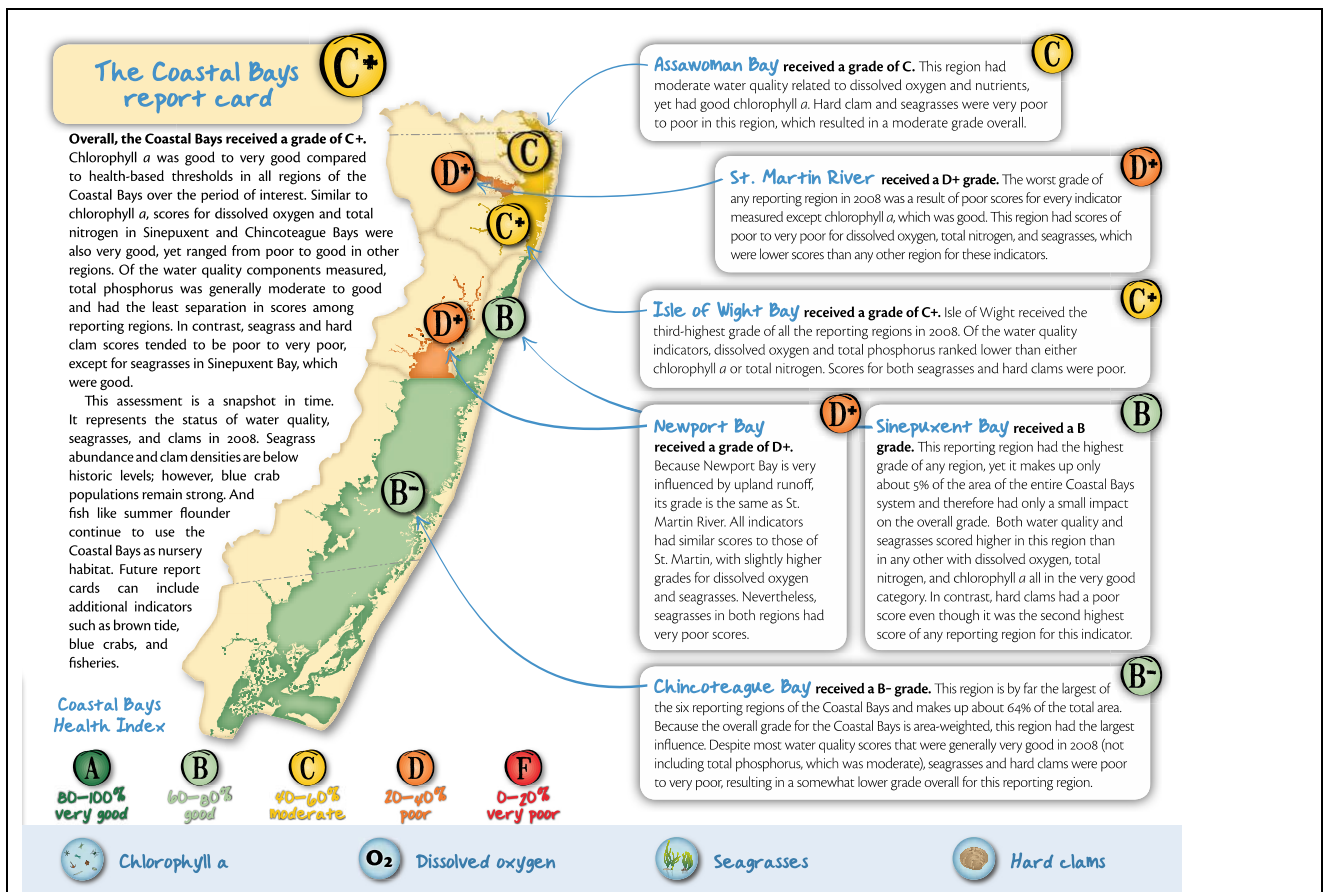


Figure 7–10 An example of a Historical/ legacy report card (2/2)

Like Contemporary report cards, results are reported with a colour-coded map. Note the inclusion of symbols as decoration, but not as part of the results reporting.

7.3.3. Technical report cards

Technical report cards are characterised by their use of technical language. Figure 7-11 shows two examples where chemical names and numerical details are included in reporting results. In contrast, recall Figure 7-6 – while some technical terms might be included (e.g. dissolved oxygen), Contemporary report cards report fewer technical details. Both examples in Figure 7-11 are first pages – note the lack of front cover.

While these report cards are distinguished by their greater technical content, the term ‘technical report card’ should not be taken as meaning ‘written for a scientific audience’. As Figure 7-11 shows, they are still written in accessible language, and include visual elements that make the report card appealing to a general audience. In general, technical report cards are either older (RC187, RC188 – both published in 2008), or written for a specific purpose (RC329 and RC331 were produced for the Queensland government; RC494 was prepared by science students as part of a curriculum).

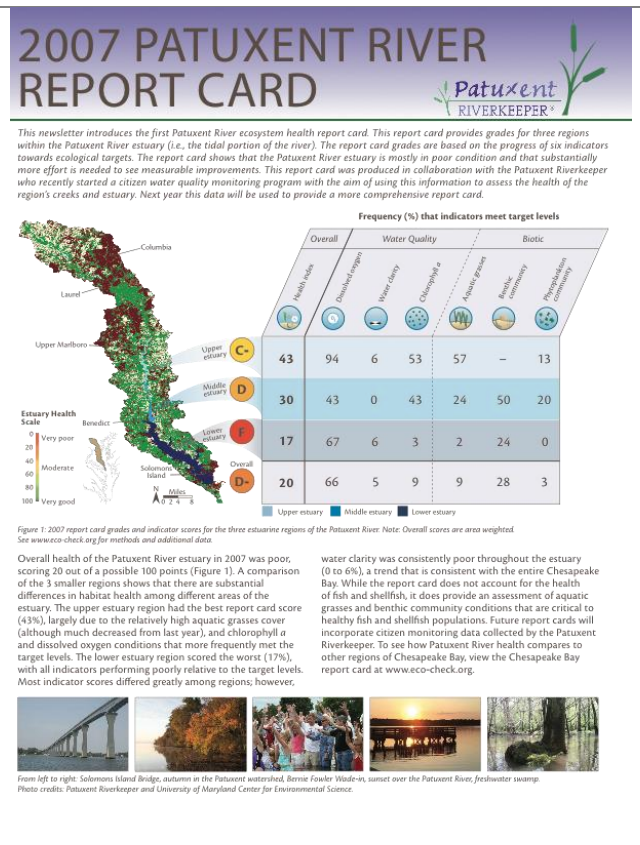
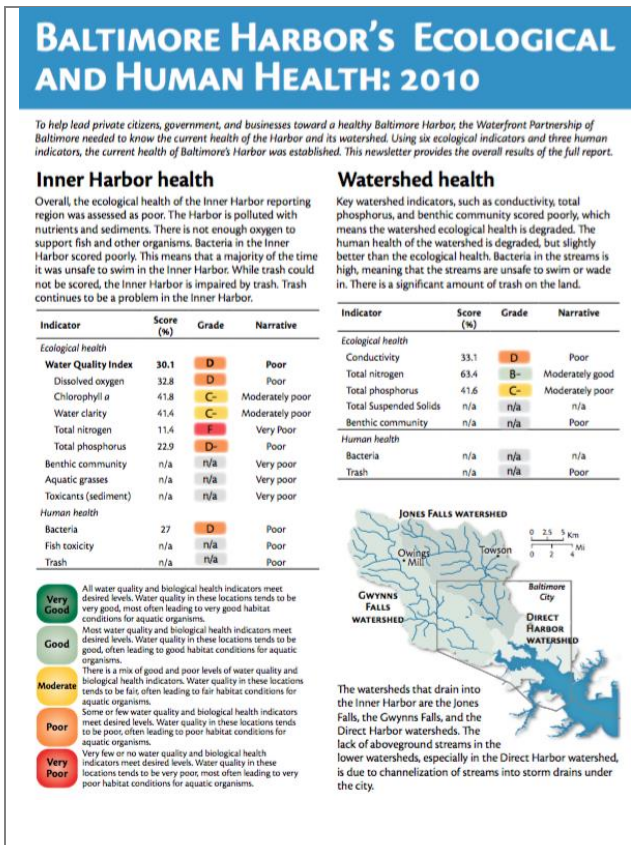


Figure 7–11 An example of a Technical report card
 Note the lack of front cover, and the inclusion of numerical and scientific information. However, despite such inclusion, they are also written to be generally accessible. (L–R: RC343, RC188)

7.3.4. Historical–technical report cards

Historical-technical report cards are like technical report cards, but include a front cover and are less visually rich (Figures 7-12 to 7-14). This is a hybrid category, straddling the line between technical and historical/ legacy report cards. The only two report cards in this category are RC164 and RC188, the very first report cards by IAN, and this category is taken to be experimental.

The full report card is reproduced, in order to highlight commonalities between the very first report card and the Contemporary one above. Features that are in both are taken to be strongly characteristic of IAN's report card practice. In particular, the colour-coded map looks very similar to the one in later report cards (e.g. Figure 7-10).

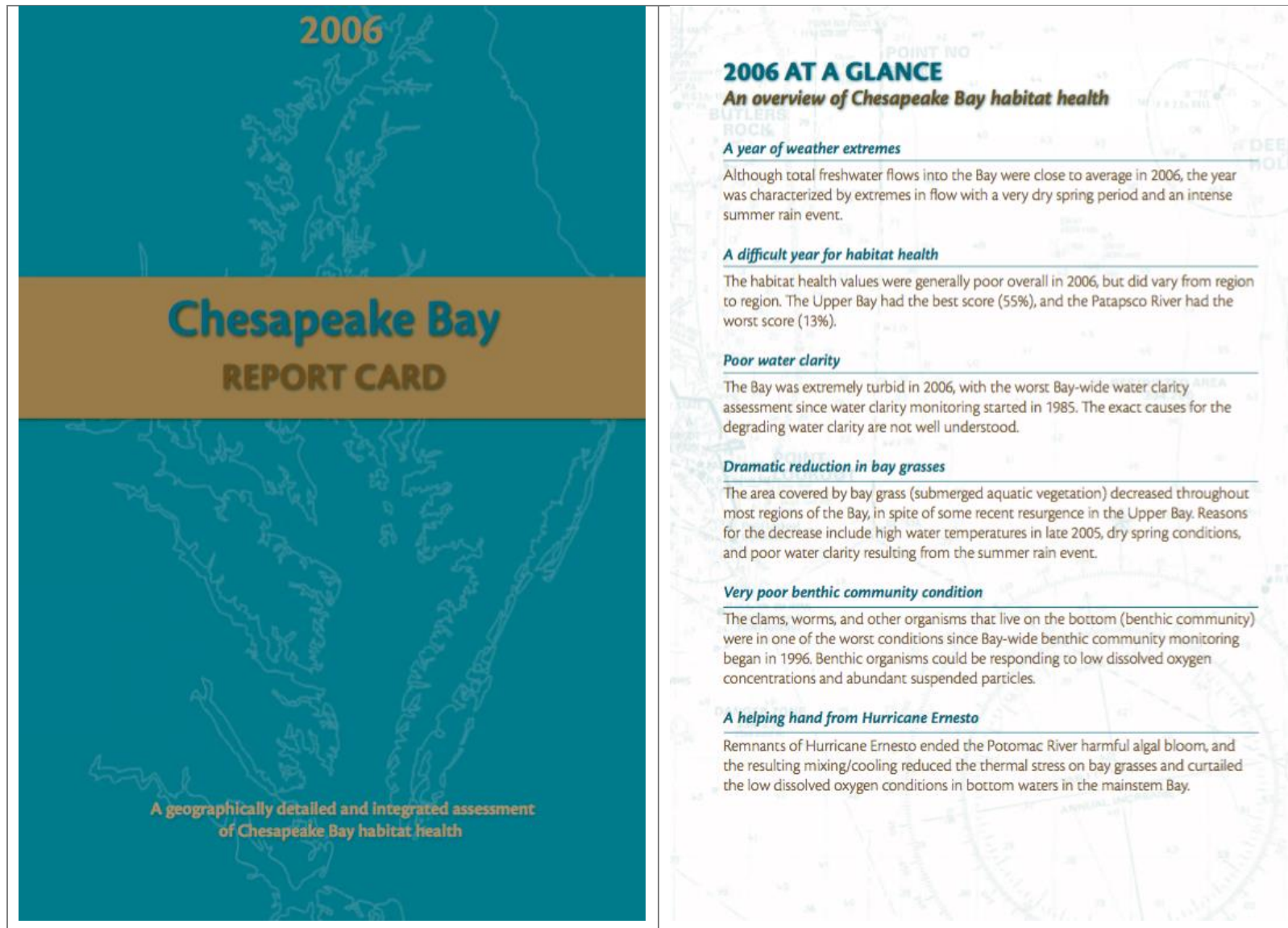


Figure 7–12 An example of a Historical–technical report card (1/3)

Pages 1 & 2, RC164. Note the plain front cover and lack of photos. The language remains accessible to a general readership.

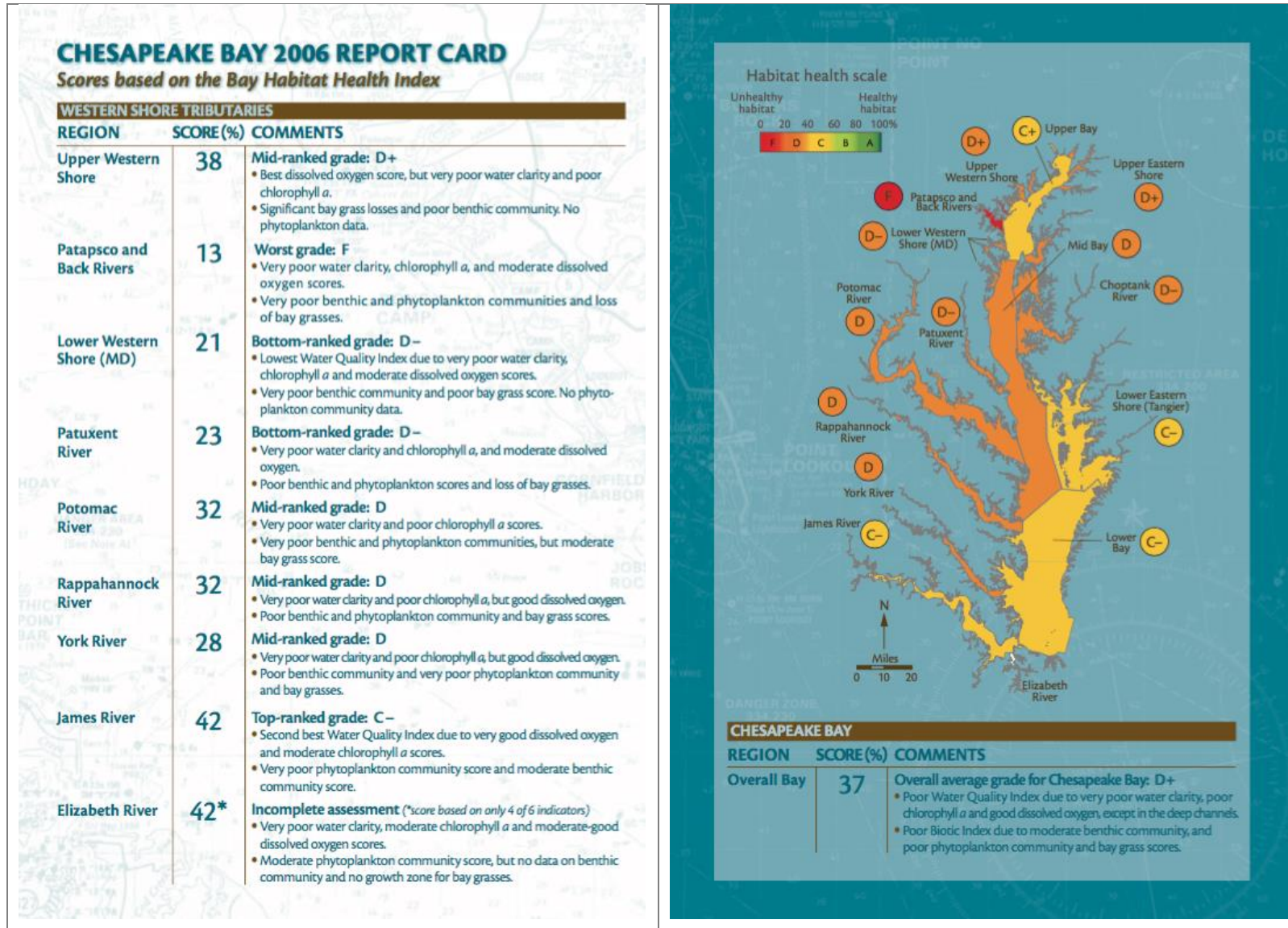


Figure 7-13 An example of a Historical-technical report card (2/3)

Pages 3 & 4, RC164. Note the prose-based results on page 3. However, the colour-coded map is a key feature that remains prominent in Contemporary report cards.

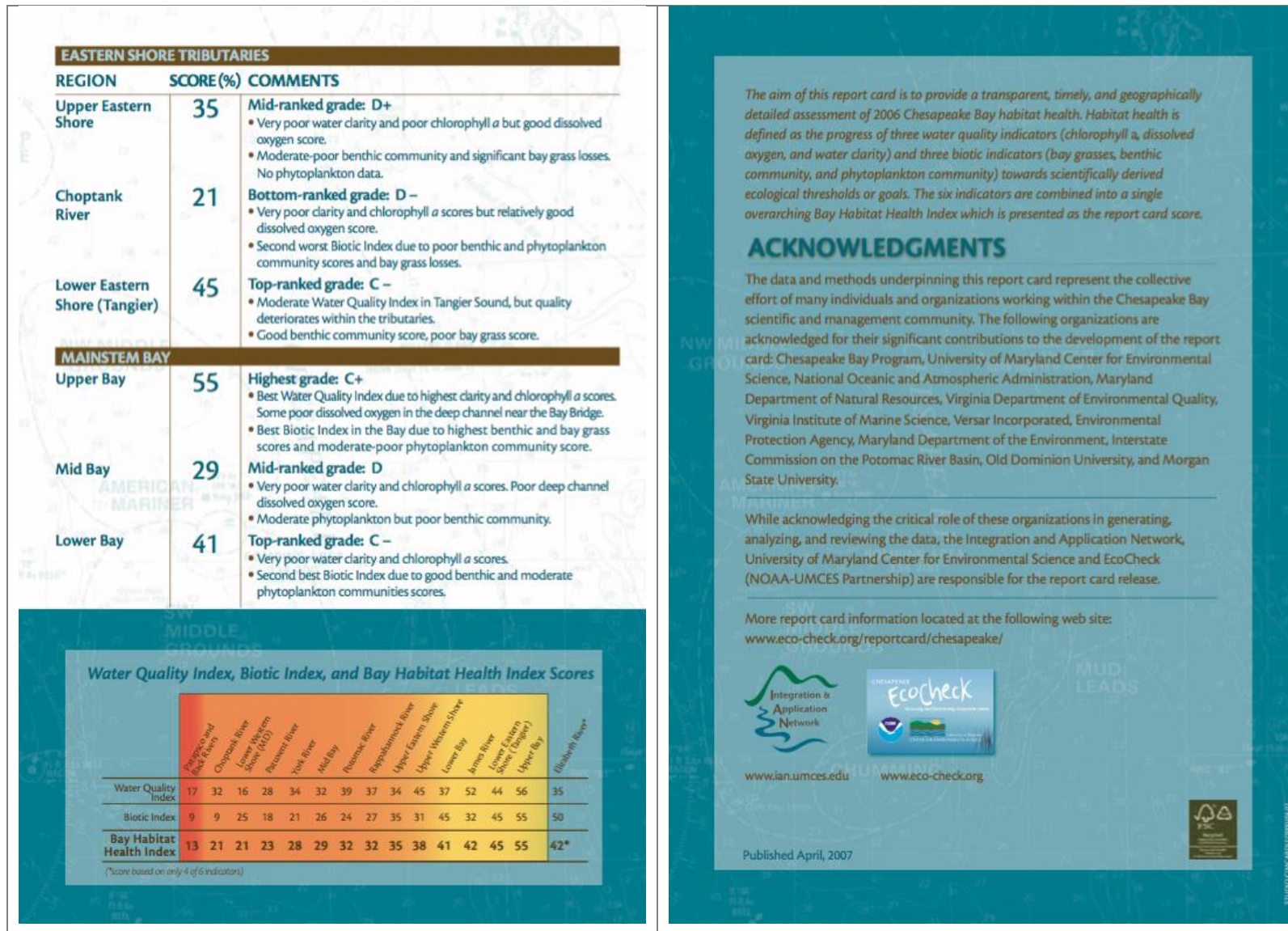


Figure 7–14 An example of a Historical–technical report card (3/3)
 Pages 5 & 6, RC164. Note the inclusion of numerical data and technical language (L). Acknowledgements (R) are similar to the Contemporary card.

7.3.5. Extended reports

Extended reports are characterised by the high number of pages (RC202 has 16 pages, while RC304 has 36). They are also as technical as Technical report cards (perhaps even more so), although their greater length enables longer explanations. Only two of the report cards are extended in this way; they are not representative of a typical IAN report card, and appear to be more like a visually rich scientific report on monitoring data.

7.3.6. Other noteworthy elements

Two elements recurring within report cards of different categories are set out here.

(a) Wheel device/ 'beer coaster' for recording results

Many Contemporary cards (e.g. RC464, 460, 457, 454) use a 'wheel' device to report grading for each indicator. Consider the example in Figure 7-15, which comprises three concentric circles:

- The centre circle shows that the overall grade is 'yellow' (a key elsewhere in the report shows this is a C grade).
- The next layer shows that the indicators are divided into two categories: water quality (green, a B grade) and biotic indicators (yellow, a C grade).
- The outermost circle shows individual indicators: dissolved oxygen (dark green, A grade) and water clarity (yellow, C grade) are water quality indicators. Fish (yellow, C grade), crustaceans (orange, D grade) and other invertebrates (green, B grade) comprise biotic indicators.

This wheel device (also called a 'beer coaster') is a neat way to show results for a monitoring region as a whole, or for a particular sampling site within the monitoring region. It is included here, because interviewees in Chapter 8 refer to it with approval.

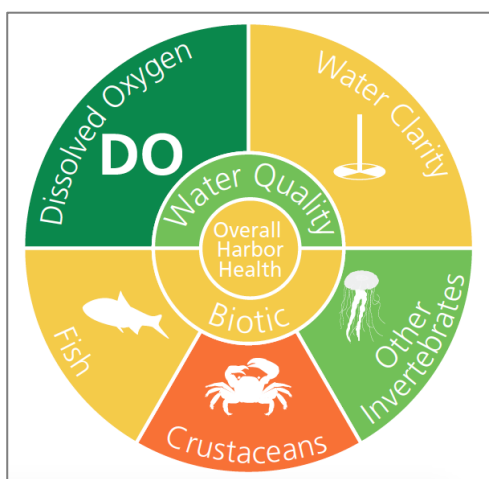


Figure 7–15 Wheel/ 'beer coaster' for displaying indicator grades

Note: the legend for the colours appears elsewhere on the same page. RC464, Contemporary.

(b) Conceptual diagrams

Conceptual diagrams feature heavily in IAN's self-published materials (Thomas et al., 2006: 51, and it appears that IAN conceives of their use as characteristic of IAN's practice (Dennison, 2014c; IAN, 2016c). While IAN broadly and literally defines the term 'conceptual diagram' as a 'thought drawing' (*ibid*), its usage in report cards suggests a more clearly defined visual device. Figures 7-16 to 7-18 show three examples. In particular, IAN's conceptual diagrams are characterised by three attributes:

- **Use of icons.** As noted above, specially designed symbols are the building blocks of IAN's conceptual diagrams. The legend is integrated within the diagram, so that the diagram as a whole becomes 'self-contained, with no need to read an accompanying explanation' (Thomas et al., 2006: 50).
- **Depiction of human and ecological processes.** While not necessarily representing a comprehensive systems diagram, most IAN conceptual diagrams show processes occurring within a system. Figure 7-16 illustrates, for example, how certain pollutants travel from their source into a waterway. Sometimes, desirable and undesirable situations are compared side-by-side, as in RC464. The combination of icons and systems interactions suggests a shared heritage between IAN's conceptual diagrams and rich pictures within the soft systems methodology (see Section 3.4.1a), although IAN's diagrams are kept for future display, rather than having the 'sad transience' of most rich pictures (Bell & Morse, 2013b: 336).
- **Spatial underlay:** IAN's diagrams always represent the system in its physical context. Thus, a conceptual diagram depicting climate drivers in Chesapeake Bay will represent the physical geography of Chesapeake Bay (Figure 7-18). This spatial component allows viewers to orientate themselves to the geographic context of the diagram. Sometimes this spatial element is given as a birds-eye view (Figure 7-18); others are cross-sections (Figure 7-17); others have elements of both (Figure 7-16).

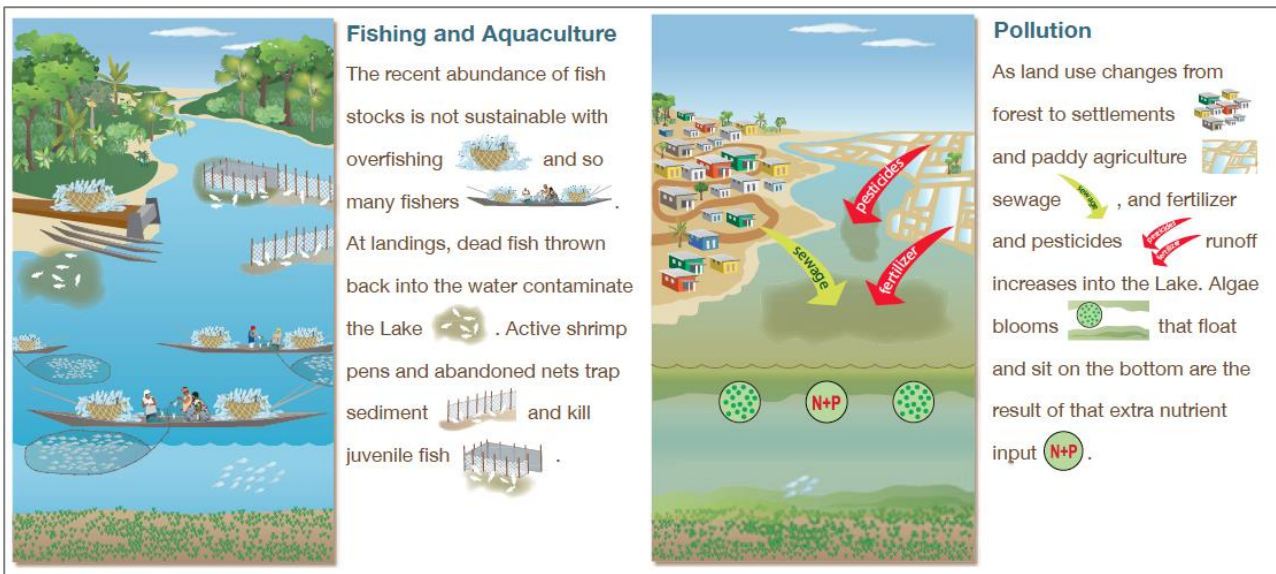


Figure 7-16 Example of conceptual diagram (1/3)

From RC425, Contemporary. This is a perspective diagram with a cross-sectional element. This report card is set in India: note how the symbols reflect local imagery. Note also how the symbols are integrated within the legend.

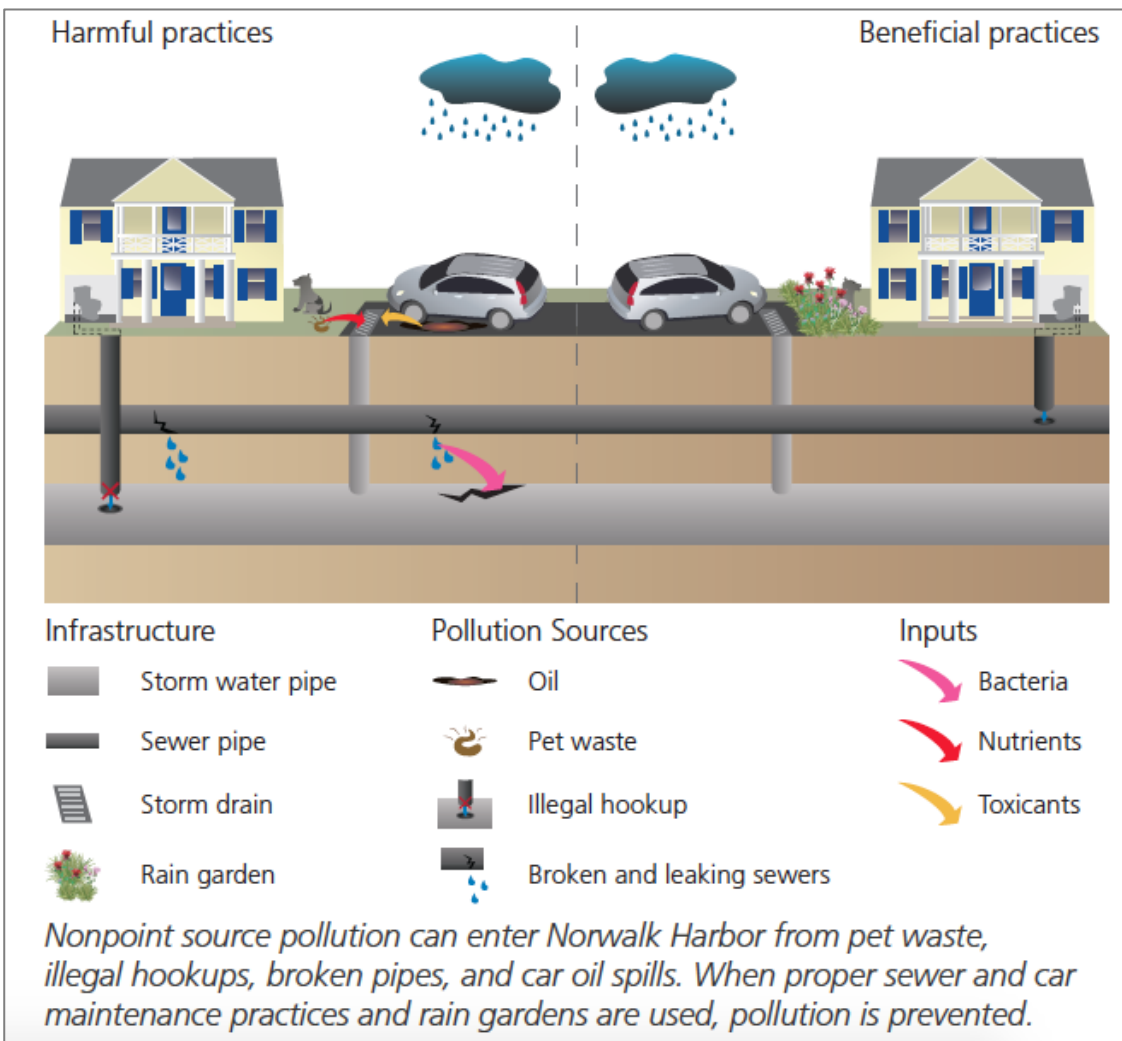


Figure 7-17 Example of conceptual diagram (2/3)

From RC464, Contemporary. This is a cross-sectional diagram, with 'harmful' and 'beneficial' practices compared side-by-side.

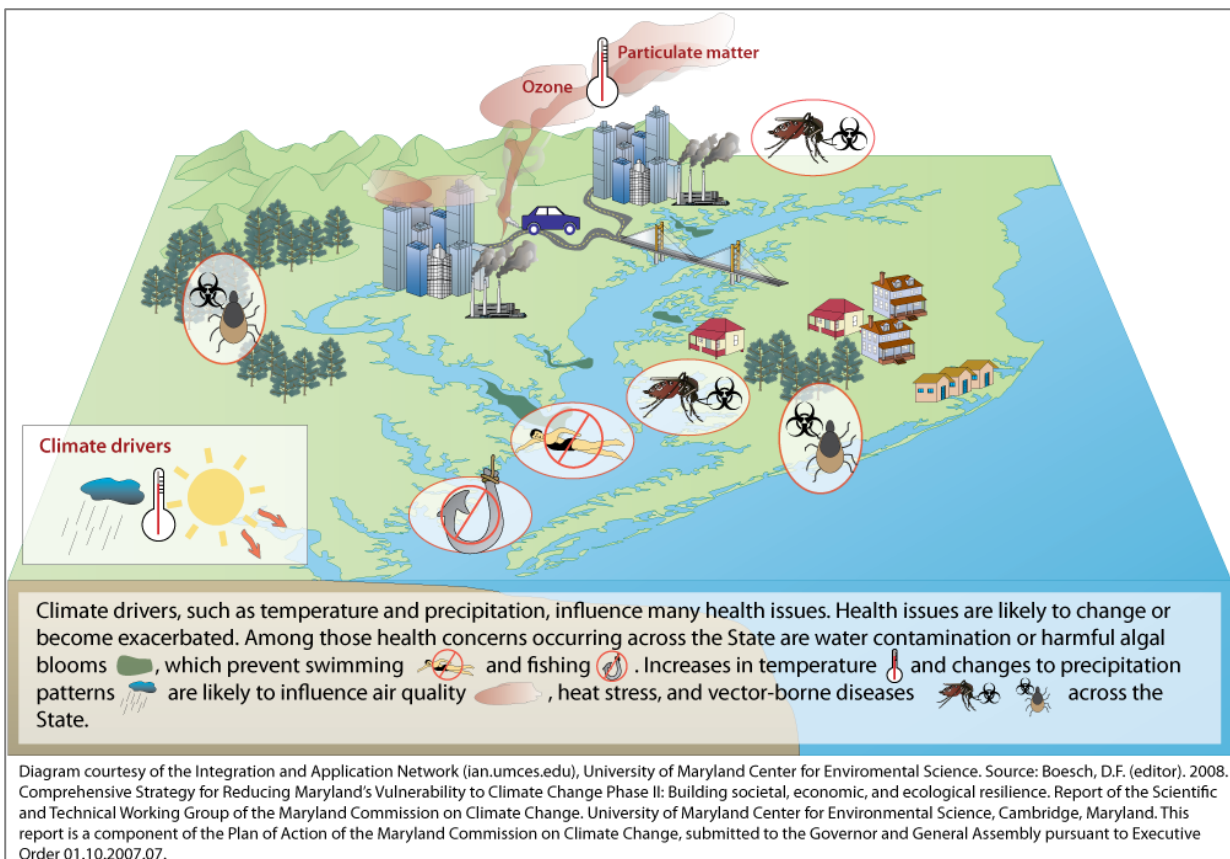


Figure 7–18 Example of conceptual diagram (3/3)

This is a birds-eye view conceptual diagram. Like the others, it uses icons to represent concepts, and embeds those icons in the legend. Note that this is not found in a report card, but in a report prepared by IAN for the Maryland Department of Natural Resources (Boicourt & Johnson, 2011).

7.4. Conclusion

This chapter aimed to characterise IAN’s report card product. The purpose of doing so was to give the reader an introduction to IAN’s report cards, thus inductively defining the term ‘IAN report card’. While IAN’s report card product varies (five types were identified), the type most likely to represent IAN’s report card product was the Contemporary type – because it is numerically predominant and because of its recency. In general, IAN’s report cards are characterised by:

- Brevity (usually 6-8 pages long).
- Richness in visual components, including photos, maps, and conceptual diagrams.
- Use of icons (symbols) that are especially designed to suit the local context.
- Explanation of grading method.
- Narratives within the body of the report card, including practical actions that citizens can take.
- Plain English writing accessible to lay readers.

- Acknowledgement of partners and contributors, sometimes with a photo of workshop participants.
- Often a large photo on the front cover, showing humans interacting with physical environment.

This was a shallow visual analysis only. The categories identified are not absolute, and this study did not inquire as to why observed variations exist (i.e. the design rationale was not part of this study). The purpose of showing what IAN's *process* is designed to achieve has been fulfilled. The characteristics shown in this chapter will resurface in subsequent chapters, in which IAN's process is characterised.

Chapter 8. Characterising IAN’s report card process

This chapter is the second of three investigating IAN’s report card practice. It relates to Research Question 2, ‘what defines IAN’s report card practice?’. While the previous chapter characterised IAN’s report card *product*, this chapter characterises IAN’s report card *process*. Because process models are the focus of this research, this chapter is more detailed and critical than the previous. The research in this chapter contributes to the thesis as a whole, because it is a step along the way to developing a process that encourages constructive NRM relationships.

The aim of this chapter is to define and assess IAN’s report card process. The specific objectives of this research are listed in Table 8-1 below, alongside corresponding research questions and purposes, and the relevant chapters.

Table 8–1 Research objectives, questions, & purposes for IAN report card studies

Research objectives	Research questions	Research purpose*	Chapter
Define how IAN’s report card process is carried out.	<i>What</i> is IAN’s report card process?	Describe	8 (Characterising IAN’s report card process); 9 (Post-publication process)
Assess whether (and to what extent) this process, as currently practiced, can help shift NRM stakeholder relationships from destructive to constructive.	<i>Does</i> IAN’s report card process encourage constructive NRM relationships, and if so, <i>how</i> and <i>why</i> ?	Explain	9 (Usefulness of report cards)
Recommend how this process can be adjusted to improve its ability to encourage constructive stakeholder relationships.	<i>How</i> can IAN’s report card process be improved to better encourage constructive NRM relationships?	Change	10 (A tool for encouraging constructive NRM relationships)

**Blaikie (2009: 58–61) describes types of research questions (what/ why/ how) corresponding to research purposes (description/ explanation/ change).*

This research is necessary because there is little published research on IAN’s report card process, and none from a social science perspective. There is also little existing literature examining any environmental report card initiatives as a social process (Chapter 3). Dennison et al. (2007),

published nearly a decade ago when IAN’s practice had just begun, does mention some social elements, as does IAN’s self-published literature (Longstaff et al., 2010; Dennison et al., 2009; Thomas et al., 2006), but none represents a concerted examination of IAN’s process from a social science perspective. IAN’s website contains an active blog with over 500 entries dating back to June 2009, (accessible at ian.umces.edu/blog), as well as a wealth of other web content (newsletters, reports, brochures, project descriptions). Together, IAN’s self-published grey literature demonstrates that IAN is aware of, and actively engages with, the socio-political contexts in which its report cards are created. However, these do not provide an external perspective (i.e. of someone other than IAN staff) which critically and independently characterises IAN’s report card process.

As discussed in Chapter 4, two principal case studies are examined, as listed in Table 8-2. A third workshop for a Great Barrier Reef climate change resilience index (February 2014, Queensland Australia) was observed but not systematically studied. Observations from this workshop are included briefly in the results.

Table 8–2 Principal case studies for this research

Report card program	Client	Report cards commissioned	Report cards studied for thesis/ approx. dates
Long Island Sound (LIS)	Long Island Sound Funders’ Collaborative (LISFC)	<ul style="list-style-type: none"> • Long Island Sound • Nowalk Harbor • Inner Hempstead Harbor 	All three (March 2014 –July 2015)
Mississippi River Basin report cards	America’s Watershed Initiative (AWI)	<ul style="list-style-type: none"> • Mississippi River Basin • Upper Mississippi River • Ohio & Tennessee Rivers • Lower Mississippi River • Arkansas & Red Rivers • Missouri River 	Arkansas & Red Rivers only* (May 2014)

** As noted in Section 4.5.2, the first choice of case study was cancelled by the client – by which time only the Arkansas & Red Rivers workshop could be observed.*

8.1. Method and case study contexts

In this section, the conceptual framework for the research is set out. The case studies (and the rationale for their selection) are introduced, before data gathering and analysis methods are discussed.

8.1.1. Conceptual framework for understanding IAN's report card process

IAN self-describes their report card process as having five steps, depicted in Figure 8-1. While these steps reflect actions within a scientific process, it is not apt for a social inquiry because it does not identify the social context of each action: for example, *whose* conception contributes to the conceptual framework; *who* chooses the indicators; *where* and *how* are thresholds defined, and so forth. Moreover, this sequence does not indicate the activities (e.g. meetings, workshops, drafting, etc.) that enable the steps to be completed. Instead of using IAN's five-steps for structuring the research, this chapter structures the analysis around these activities.

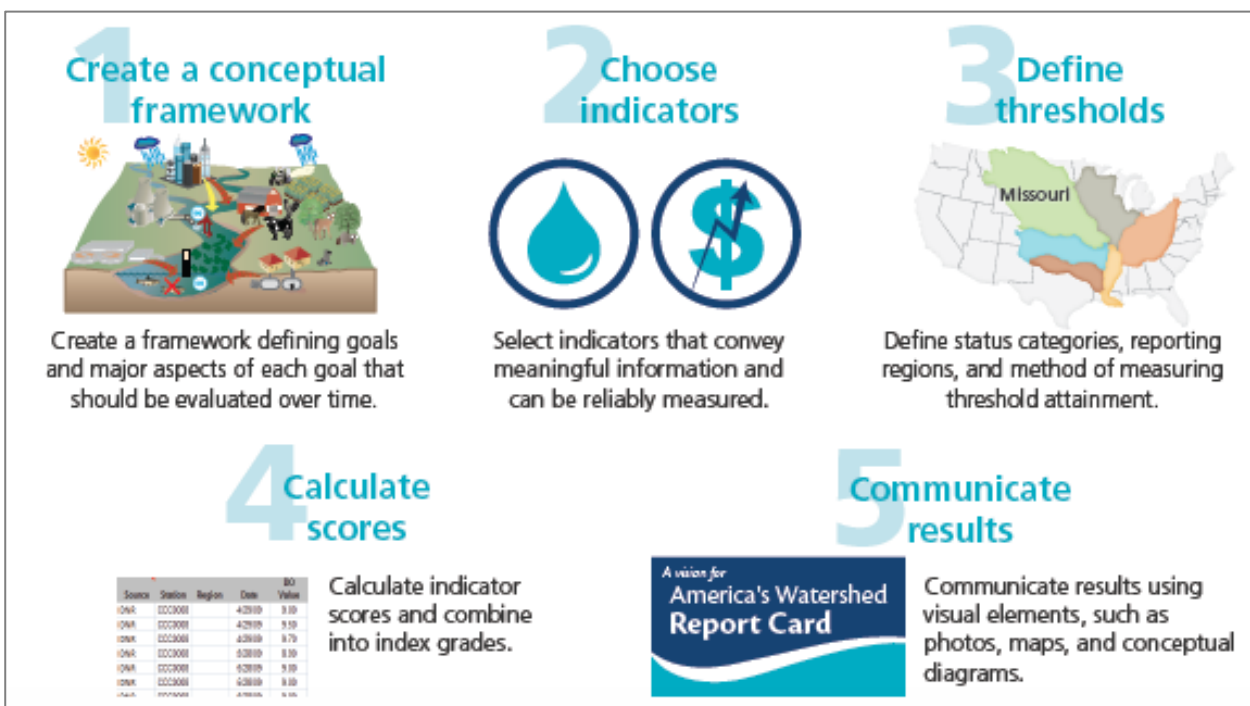


Figure 8–1 Five steps of a report card process, as self-described by IAN
These five steps are not used as the conceptual framework for this research. Source: Fries, 2014.

To elaborate, all of IAN's report card programs are undertaken at the request of and in partnership with a client (usually a government agency or non-profit/philanthropic organisation). The focal point of each program is one or more workshops held with the client and a range of stakeholders invited by the client and/or by IAN. Each workshop typically lasts 2 or 3 days. The goal of the workshops is to create a rough draft of the report card, which generally requires a shared conceptual understanding, agreement on key messages within the report card, and an indicative list of accessible data sets. Accordingly, the analysis is structured according to three phases:

- *Before* the workshop (from the moment of client initiation up to the workshop);
- *During* the workshop; and
- *After* the workshop (up to the publication of the report card).

Figure 8-2 illustrates these phases, as well as two additional phases that are noted but not extensively analysed here: any pre-existing relationship between IAN and the client (or other stakeholders) prior to the client initiating the project, and any continuing work done after the publication of the report card.

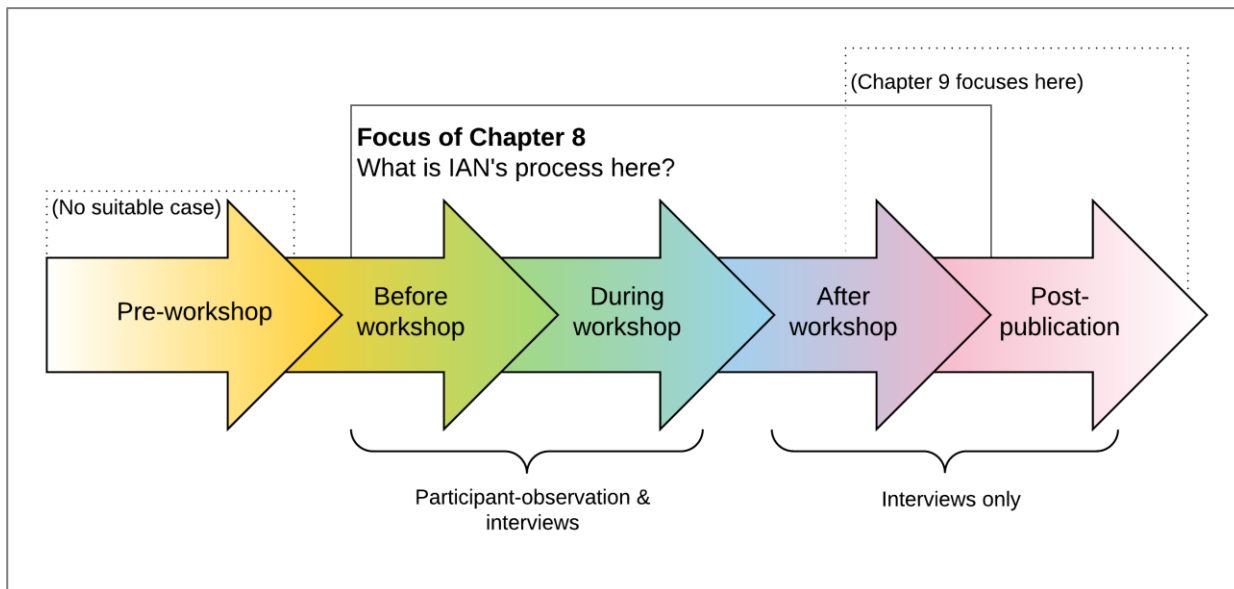


Figure 8–2 Conceptual framework for analysing IAN process in Ch 8
The before, during, and after phases are also used to structure this chapter.

8.1.2. Selection criteria for case studies

As discussed in Section 4.5.2, the two case studies were chosen because they satisfied a number of selection criteria. Table 8-3 below lists and discusses these criteria. It is noted here that each case had some unique characteristics. The Long Island Sound program was the first IAN project to incorporate a formal ‘listening tour’, while the AWI program was the first to seek to characterise the socioeconomic health of the report card region. Together, the two case studies show *different* aspects of IAN’s report card practice, allowing the two case studies to be triangulated to better highlight the defining characteristics of IAN’s report card process.

Such variability suggests that the cases *not* within this sample may reveal more parts to IAN’s process than recorded here. With only two cases to triangulate each other, another researcher may not quite replicate the same results with other cases. One might argue that data saturation has not been reached (Fusch & Ness, 2015). However, the results also report IAN staff as describing the rationale of certain parts of the process – knowing the principled decision behind a component helps to gauge how strongly an observation is likely to recur if another case study were selected. Finally, IAN itself may keep evolving its process, and such definitive saturation may never be reached; even so, the findings recorded herein are generalisable to produce *useful* lessons based on data. For these reasons, the research remains valuable.

Table 8–3 Basis for selecting each case study

Criterion	Long Island Sound case	Arkansas & Red Rivers case
Timing Opportunity to observe workshop(s) during period embedded within IAN’s offices as participant–observer (November 2013 to July 2014).	Yes – observed one workshop for each of the three report cards (i.e. 3 workshops observed).	Yes – observed one workshop (only one held). However, as discussed in Section 4.5.2, this case study was selected only after another (unrelated) case study was cancelled. Consequently, no other report card processes within this program could be studied within the timeframe.
Likelihood of conflict Ability to test IAN’s process as a tool for building stakeholder relationships.	Yes – the Sound has a range of interest groups, and also straddles the state boundary between New York and Connecticut.	Yes – the Arkansas & Red Rivers basins has a number of competing interest groups.
Case study size A mix of large (30+) and small (10 or fewer) participant numbers across case studies.	Small – catchment area approximately 3,000 km ² , with workshop sizes 6–10 people per workshop.	Large – catchment area approximately 605,000 km ² , with workshop size exceeding 50 people.
Physical proximity Geographically accessible (for logistical and budgetary considerations).	Moderate – located approximately 8 hours’ drive from IAN offices.	Far – but acceptable for one workshop.
Willingness of client Client must admit the researcher (a threshold requirement).	Yes.	Yes.

8.1.3. Case study contexts

(a) Long Island Sound case study

Long Island Sound (the Sound) is an estuary east of New York State, and south of Connecticut (Figure 8-1). Approximately 9 million people live in its watershed, with 4 million of those living in its coastal communities (LISS, 2012). The Sound hosts commercial and recreational fishing, boating, beach recreation, as well as various flora and fauna, some of which are rare or endangered (*ibid*; Weigold & Pilsbury, 2014). The Sound has experienced (and continues to experience) pollution, with consequences for ecological health, and for commercial and recreational activities (Varekamp et al., 2014; Tedesco et al., 2014). Management issues are exacerbated by the Sound’s unique hydrology: while the eastern end is subject to flushing from the Atlantic Ocean, the western end (which receives runoff from New York City) is closed off (see Varekamp et al., 2014). In 1985,

the US Environmental Protection Agency (EPA), and the states of New York and Connecticut, formed a partnership called the Long Island Sound Study (LISS), which endeavours to improve the health of the Sound (LISS, 2012).



Figure 8–3 Map showing location of Long Island Sound
Adapted from Nikater, 2008 (original shows tribal territories c. 1600).

The Long Island Sound Funders’ Collaborative (LISFC) was the client in this case. The LISFC is a group of 13 philanthropic organisations, whose explicit mission is to protect and restore the Sound (LISFC, 2015). The report card program was the first ‘official collaboration’ of the LISFC, the aim of which was to ‘inform interested parties about the state of the Sound at different points around the Sound and offer positive steps we can all take to improve the quality of the water in the watersheds, estuaries and the Sound itself’ (*ibid*). This statement captures a desire to publish report cards at different scales. The Norwalk Harbor (RC464) and Inner Hempstead Harbor (RC463) report cards represented local-scale report cards (on the Connecticut and New York sides of the Sound respectively), while the Long Island Sound report card (RC462) represented the Sound-wide scale. All three report cards were launched on 8 June 2015 (NFWF, 2015).

(b) Mississippi Basin report card program and Arkansas & Red Rivers case study

The Mississippi River Basin is the third largest in the world, covering over 3,225 million square kilometres, and covers 31 US States and 2 Canadian Provinces (GRP, 2012). Accordingly, it has a vast human and ecological history, and it is deeply interwoven with the cultures of the people that depend on it, particularly within the USA. Being contextual to this thesis, these histories are not set out here, but Ostendorf (2011) and Zeisler-Vralsted (2015) provide further reading.

In this case, America's Watershed Initiative (AWI) was the client. AWI is a collaboration among 135 stakeholders within the Mississippi Basin (AWI, 2014). The origins date back at least to America's Inner Coast Summit (June 2010), held in St. Louis, Missouri. This summit was attended by representatives of 76 organisations across a broad range of sectors, with the aim of developing recommendations for the sustainable management of the Mississippi River at a catchment scale (Walsh & Mulcahy, 2010). One specific outcome was to task The Nature Conservancy (a major non-profit environmental group) and the US Army Corps of Engineers to formally convene what was then called America's Great Watershed Initiative. This initiative was launched at the subsequent summit in September 2012 (AGWI, 2012). Plans for the Mississippi report card program were reviewed at this Summit, at which Dr Heath Kelsey (IAN) was an invited speaker (*ibid*). IAN's work on the Mississippi River Basin report cards began shortly thereafter. The deadline for launching draft report cards was September 2014, in time for the third summit in Louisville, Kentucky (AWI, 2014).

As noted, only the Arkansas and Red Rivers report card was studied. Unlike the Long Island Sound case study (for which a series of meetings was observed), the focal point of this case study was a single, 2-day workshop held in Tulsa, Oklahoma, in May 2014. Moreover, by the time of this workshop, the client had already decided that the report card would assess the health of the Arkansas and Red Rivers with respect to six goals (Figure 8-4). While earlier workshops led to some adjustments in these goals, by the Arkansas and Red Rivers workshop, they had largely been pre-determined (cf. Long Island Sound case).

Goals measured in the America's Watershed Initiative report card

America's Watershed Initiative worked with a variety of river users and stakeholders to identify six broad goals for the Mississippi River watershed. The goals were shared and refined at the America's Watershed Initiative Summit in 2012, and are the key foundation for the report card. Indicators were identified using feedback from stakeholders at the basin workshops. These indicators are listed below each of the goals.



Transportation: Serve as the nation's most valuable river transportation corridor.

- Stoppages
- Tonnage
- Condition
- Maintenance



Water supply: Maintain supply of abundant, clean water.

- Designated use
- Health based violations
- Water supply stress index



Flood control: Provide reliable flood control and risk reduction.

- People at risk
- Levee inspection
- Community preparedness



Economy: Support local, state, and national economies.

- Employment
- Income
- Production



Ecosystems: Support and enhance healthy and productive ecosystems.

- Nutrient yield
- Nitrogen
- Phosphorus
- Benthic
- Fish
- Riparian
- Woody wetlands
- Extent of hypoxia



Recreation: Provide world-class recreational opportunities.

- Participation
- Licenses
- Access

Figure 8–4 Six goals of the Mississippi River Basin report cards

These goals were pre-determined before the Arkansas and Red Rivers workshop.

Source: RC454.

8.1.4. Data gathering

The primary data gathering method was participant–observation of workshops conducted for each case study. Observations were triangulated with interviews. Field notes and interviews were then analysed using a grounded theory approach (recall Section 4.3.4). Words and opinions attributable to IAN staff members are listed anonymously, identified by the codes below Table 8-4.

Table 8–4 Codes for IAN staff members recorded in conversation and/or emails

Position	Description*	Code
Administrator	Senior-most, responsible for managing IAN as an organisation.	IAN01, IAN02, IAN03
Science Integrator	PhD-level scientist, responsible for analysing data received, e.g. for report cards.	IAN04
Science Communicator	Bachelor-level scientist with graphic design training, responsible for creating science communication products, e.g. report cards.	IAN05, IAN06, IAN07, IAN08

*Confirmed by IAN01.

(a) Data for the Long Island Sound case study

For the Long Island Sound case, three sets of meetings were observed, as listed in Table 8-5. The listening tour and the report card workshops were IAN-run meetings. IAN was not involved in the funders’ meeting; it was an opportunity to hear attitudes to IAN’s practice, without having IAN personnel present.

Table 8–5 Meetings observed for the Long Island Sound case study

Meeting series	Description	Dates
Listening tour	A series of five preliminary meetings at different locales around the Sound, during which IAN staff met stakeholders for each of the report cards.	11–13 March, 2014
Funders’ meeting	A meeting between the Funders’ Collaborative and the citizen organisations from Norwalk and Hempstead (IAN staff were not present at this meeting).	26 April, 2014
Report card workshops	Two report card workshops (one each for the Norwalk and Hempstead harbours). The workshop for the Sound-wide report card was not observed.	2–3 July, 2014

Table 8-6 summarises the key organisations involved in the production of the three report cards. Interviews were sought from the client, and from each of the local-level partner organisations for Hempstead Harbour and Norwalk Harbour. No interview was sought from partner organisations involved in the Sound-wide report card, because the workshop for that card was not observed.

Formal interviews (45–60 minutes long) were conducted with two representatives of the client, and one representative of Norwalk Harbour. Both Hempstead Harbour groups declined interviews.

These participants are also given a code, to aid reporting (Table 8-6). Codes suffixed with an ‘x’ indicate that no interview was undertaken, but notes of conversations and presentations were taken during observations. Not all participants’ contributions are discussed in the results (e.g. where their contributions were not relevant to this study); for simplicity, they are not given codes.

Table 8–6 Key organisations and participants for the Long Island Sound case

Program component	Key organisations	Interviewee/ participant codes
Client	Long Island Sound Funders’ Collaborative (LISFC), a collaboration of 13 philanthropic organisations.	FC01, FC02
Sound-wide report card	Long Island Sound Study (LISS), an agency jointly formed by: <ul style="list-style-type: none"> • US Environmental Protection Agency (EPA) • New York State Department of Environmental Conservation • Connecticut Department of Energy & Environmental Protection <p>University of Connecticut, which hosted the work of Vaudrey, a marine scientist (see Vaudrey et al., 2013).</p> <p>Save the Sound, a philanthropic organisation.</p>	n/a
Inner Hempstead Harbor report card (New York)	Two citizen-run non-profit organisations: <ul style="list-style-type: none"> • Hempstead Harbor Protection Committee • Coalition to Save Hempstead Harbor 	HH01x, HH02x, HH03x
Norwalk Harbor report card (Connecticut)	Harbor Watch (a citizen science water quality research program; part of EarthPlace, a community-run nature education centre).	NH01x, NH02x, NH03

Table 8-6 shows that no interviews were conducted for Hempstead Harbour. The absence of these interviews makes it difficult to critique IAN’s process with respect to that particular report card. This difficulty is exacerbated by anecdotal news that, in early 2015 (after this component of the PhD thesis had concluded), both Hempstead Harbour groups were dissatisfied with the report card results. Seeking reasons for this dissatisfaction may have led to greater insight into the strengths and weaknesses of IAN’s report card process. Although follow-up conversations with IAN staff, FC01 and NH03 provided some insight, all Hempstead Harbour participants declined. Further research may be required, and while the lack of interview data for this part of the case study means that

triangulation is not possible on this issue, the data collected during participant-observation nonetheless enables an evidence-based characterisation of IAN's process to be constructed.

(b) Data for the Arkansas and Red Rivers case study

This workshop was held on 14–15 May 2014, in Tulsa, Oklahoma. Five IAN facilitators (IAN01, 02, 03, 04, 08), and a total of 40 registered attendees from 31 organisations attended the workshop. Figures 8-5 shows the breakdown of attendees by sector, State, and area of expertise (self-reported as part of workshop registration). The most prominent imbalance appears to be geographical, with half of all attendees from Oklahoma. It is not entirely clear why there were so many from Oklahoma: proximity to the meeting location is the most likely factor; another may be that the Arkansas and Red river basins take up a higher proportion of Oklahoma's land compared to the other states, leading to a greater level of interest.

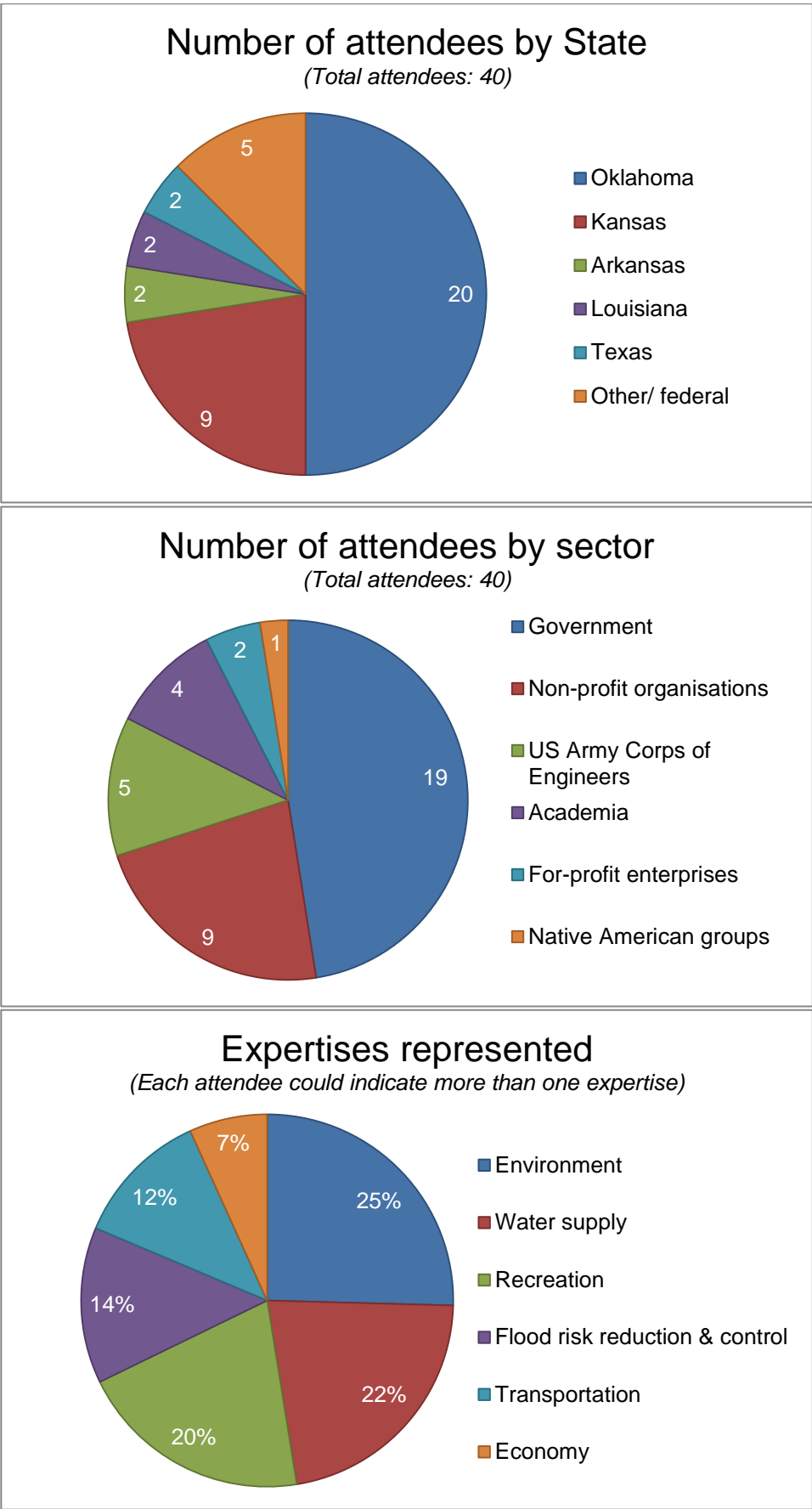


Figure 8–5 Distribution of attendees by State, sector & self-reported expertises
Note: 'government' refers to State & Federal government agencies, but not the military.

All attendees were invited to an interview. Nineteen expressed interest, but only 6 ultimately accepted. Table 8-7 assigns a code to each interviewee, and characterises them based on sector, State and expertise. Interviews were conducted by phone, 1–2 weeks after the workshop, and were 30–45 minutes in duration.

Table 8–7 Interviewees for the Arkansas and Red Rivers case study

Code	Sector	State	Expertise
AWI1	Non-profit	Kansas	<ul style="list-style-type: none"> • Flood Risk Reduction & Control
AWI2	Military	Oklahoma	<ul style="list-style-type: none"> • Flood Risk Reduction & Control • Recreation • Transportation
AWI3	Non-profit	Louisiana	<ul style="list-style-type: none"> • Water Supply • Flood Risk Reduction & Control • Economy • Environment • Recreation • Transportation
AWI4	Government	Oklahoma	<ul style="list-style-type: none"> • Environment
AWI5	Government	Kansas	<ul style="list-style-type: none"> • Environment
AWI6	Government	Oklahoma	<ul style="list-style-type: none"> • Water Supply • Economy

Ideally, triangulation would represent perspectives that could not be gained from participant–observation alone. This would include perspectives relating to a particular sector or area of expertise, or viewpoints associated with a particular State. (I have no expertise on any of the above.)

This sample is small, but not homogeneous. All areas of expertise are represented, but only half the sectors (with academic, private, and Native American perspectives absent). Of the States, Arkansas and Texas are not represented. The sample falls short of ideal – it would be extremely difficult to claim, for example, that IAN’s process fairly represented the views of all States. The coverage of all areas of expertise is also subject to this limitation, since an expert on the environment from Oklahoma is not necessarily an expert on the environment in Texas. Thus, finer claims based on who the interviewees represent (State, sector, expertise) are to be heavily qualified.

Nonetheless, two types of claim can be made. First, the opinions of any one interviewee stand for the fact that that person had the experience expressed. But so singular a claim is not very useful, given that study aims to generalise the lessons into a broadly applicable tool. Second, the interviewees’ opinions may also be considered to represent at least some other participants’ opinions – especially where more than one interviewee expresses the same thought. Suppose, for example, that 3 of 6 interviewees expressed a similar idea. While it cannot be said confidently that

50% of participants thought the same, it *can* be said with reasonable confidence that the idea was shared by a non-trivial number of participants – which may be sufficient to confirm the researcher’s observation or to make a qualified claim in support of a characterisation.

8.2. Results: Long Island Sound case

8.2.1. Before workshop: listening tour

As noted in Section 8.1.5, the primary activity before the workshop was a ‘listening tour’, comprising a series of five meetings at different locales around the Sound, during which IAN staff met stakeholders for each of the report cards. Table 8-8 lists the meetings of the listening tour.

Three IAN staff and I attended all meetings.

Table 8–8 Meetings held during the Long Island Sound listening tour

#	Date & Venue	Organisations represented	Number of attendees (excl. IAN)	Relevant report card
LT1	11 March 2014 Earthplace (Westport, Connecticut)	Harbor Watch/ Earthplace Shellfish industry (private enterprise) National Oceanic and Atmospheric Administration (US government) LISFC (Funders Collaborative)	7	Norwalk Harbour
LT2	11 March 2014 Long Island Sound Study (Stamford, Connecticut)	Long Island Sound Study (including Environmental Protection Agency)	6 (incl. 3 by phone)	Sound-wide
LT3	12 March 2014 University of Connecticut—Avery Point (Groton, Connecticut)	University of Connecticut Connecticut Department of Energy and Environmental Protection (DEEP)	7	Sound-wide
LT4	12 March 2014 A community meeting room (Seacliff, Connecticut)	Hempstead Harbor Protection Committee Coalition to Save Hempstead Harbor	3	Hempstead Harbour
LT5	13 March 2014 Stony Brook University (Stony Brook, New York)	New York State Department of Environmental Conservation Stony Brook University LISFC (Funders Collaborative)	7	Sound-wide

(a) Purposes of the listening tour

The listening tour had several purposes. First, it allowed IAN staff members to experience the region first-hand, which was intended to help them make sense of the report card data and stakeholders' perspectives. Second, it was an opportunity to meet stakeholders in person, and to discover stakeholders previously not known to IAN staff. Third, the listening tour allowed IAN to develop a preliminary understanding of stakeholders' perspectives of the health of the Sound, and what data was might be available to support the production of the report card. Some of these purposes are encapsulated in one of IAN's blog entries (Dennison, 2014a; also Dennison, 2014b, 2016):

This 'listening tour' was a really good way for us to become familiarized with Long Island Sound, Norwalk and Hempstead Harbors, meet key people that we will be working with and identify data availabilities and sources for our report card efforts. It was also nice to meet many of the partners we will be working with at their respective offices so we have a mental map of their locations as we work with them virtually or at centralized meeting locations in the future.

This extract emphasises a *personal* engagement with stakeholders, and also with the physical geography of the Sound. In-person familiarisation suggests that IAN seeks to understand the study area from the perspective of a person who is physically present in the study area (cf. e.g. a more abstracted and less contextual understanding by analysing data sent remotely). This recalls the theme of *getting to know the whole person* in Chapter 5.

In addition, one unstated goal of the listening tour was to begin a very abstract first draft of the report card product. This goal manifested in a number of sketches (draft conceptual diagrams), which will be discussed further below. In brief, these sketches were a visual way of recording IAN's evolving understanding of the Sound as the meetings progressed, and would ultimately become part of the report card. It recalls the recommendation in some of the conflict literature to record progress of negotiations in tangible form (e.g. the 'one-text' approach per Fisher & Ury, 2012, where negotiating parties take turns to edit the one memorandum; see Section 3.4.2).

(b) IAN's presentation on report card goals: solving versus studying

The overall structure for each meeting of the listening tour was similar. The meeting would open with a round of introductions. Sometimes, these introductions were no more than a 20-second self-introduction from everyone in the room (LT3, LT4, LT5). At LT1, the host organisation gave a longer introduction (5–10 minutes) about its work, and at LT2, the three remote participants shared their experience with a monitoring-and-reporting program in New England before disconnecting from the meeting altogether.

There was no insistence that IAN give the first substantive presentation. However, IAN did always give their presentation early in the meeting, beginning within the first 20 minutes. This presentation was a 10–15 minute explanation on report cards and how they are prepared.

The content of the presentation was consistent across all meetings. The 5 report card steps (Figure 8-1) were discussed. Most notably, in this presentation, IAN distinguished between academic goals ('getting it right'), and problem-solving goals ('getting it done'). Figure 8-6 below shows an IAN presentation slide illustrating the distinction. (Note: this slide comes from a different, unrelated project, but the one shown in the listening tour was identical.) According to the IAN presentation (and as the slide shows), IAN considers report cards to connect 'studying' and 'solving' environmental problems, because they communicate complex scientific information in ways that are widely comprehensible (recall the review of report cards in Chapter 3).

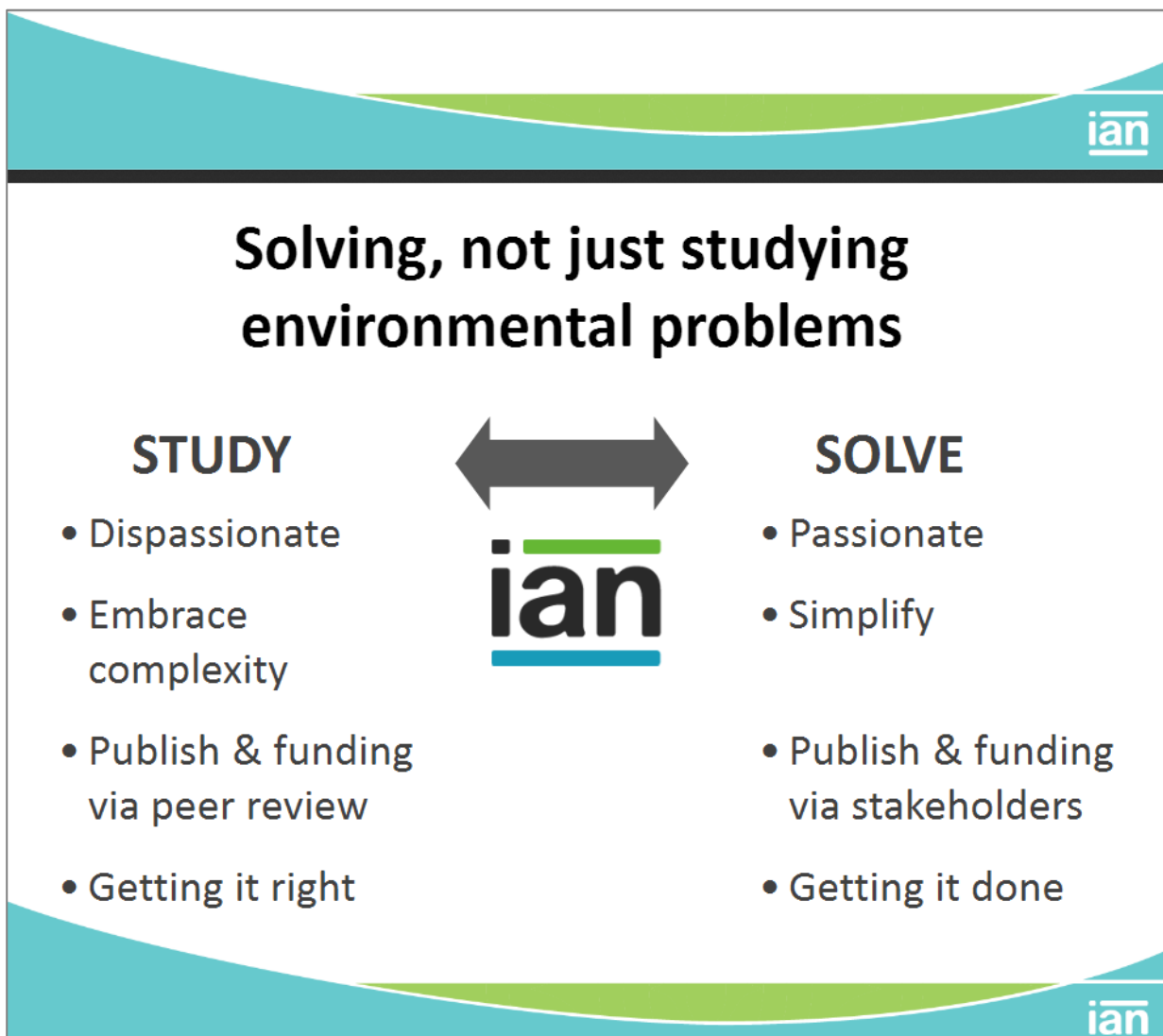


Figure 8–6 IAN’s distinction between academic & problem-solving goals

Source: Kelsey & Fries, 2014.

Despite representing IAN as sitting *between* ‘study’ and ‘solve’, some IAN presenters appeared to clearly distance IAN’s report card from academic study. In Meeting LT1, for example, IAN01 (administrator) sought advice on ‘dealing with academic partners’. The word ‘dealing’ seems to connote the need to control, correct, or cope with a problem. IAN01 suggested that academics tend to oppose the simplifications that report cards require, and therefore they often challenge the legitimacy of the report card product. The presenter went on to state that he did not want to ‘have to defend’ the report card process during workshops, which would detract from the workshop agenda of producing a draft report card. This distancing of report cards from academia was made explicit even where meetings were held at academic institutions, with academic researchers in attendance (Meetings LT3 and LT5).

The reason for this distancing is not entirely clear, although some reasons can be inferred from informal discussions with the IAN team on the tour. Firstly, this distancing appears to be, in effect, a methodological justification of the report card process. That is, IAN is declaring that report cards are an exercise in *praxis* (see Section 1.2); consequently, report cards need not have the precision demanded of academic study – a simplified assessment of ecological health is sufficient for the purpose of communicating monitoring data in broadly comprehensible ways. IAN did not use the term ‘*praxis*’ in its presentation (nor ‘satisfice’, *sensu* Simon, 1956; recall Section 6.2.1b), but other IAN literatures do explicitly state that *praxis* is a goal of IAN’s practice (Oliver & Dennison, 2014).

Secondly, in turn, such a declaration appears intended to aid the facilitation of meetings and later workshops. By making clear that report cards are *not* a finely precise scientific inquiry, IAN pre-empts objections to the report card process on the basis that it is a simplification. The quotes above suggest that this message is aimed primarily at attendees from academic backgrounds.

Thirdly, IAN may intend to establish a particular rapport with non-academic attendees. This discussion pre-empts concerns that report cards will be an academic exercise, lengthy to finalise and difficult to use practically. This message may be especially important in ecological regions that are the subject of many academic studies that have not ostensibly led to practical outcomes – to these attendees, IAN appears to proclaim that they are different from other academic organisations because they get practical results.

Finally, the robustness of the report card process is maintained: report cards are not wholly distanced from academic study, but treated as connecting ‘study’ with ‘solve’. Consequently, all stakeholders are encouraged to be confident in the assessment contained in the report card.

(c) Collaborative conceptual diagramming

The main part of each meeting consisted of a collaborative workshop creating a conceptual diagram of area to be reported on – that is, a conceptual diagram of the Sound, or Norwalk Harbour, or Hempstead Harbour, depending on the meeting. This form of collaborative conceptual diagramming involved IAN01 (administrator) drawing a cross-section of the Sound (or harbour) on a flipchart, and inviting participants to describe what they see to be the processes at work. The guiding question appeared to be (my words), ‘What are the ecological and human processes at work in this environmental system?’

As participants described these processes, IAN01 would draw what was said onto the flipchart, using words or ad hoc symbols to represent ideas. Questions and answers were exchanged; the focus was on ensuring that the diagram captured what the speaker was expressing. IAN01 would ask, for example, ‘There is low oxygen here? Is that right?’ It was clear that IAN01 understood what was being said, rather than merely being an illustrator; all IAN staff have science degrees, and in this case, they had read the most recent academic work on the Sound to inform them prior to attending (namely, Latimer et al., 2014).

An example of a draft diagram is given as Figure 8-7. The topmost diagram is a birds-eye representation of the Sound. The dotted lines separate the Sound into four sections: Narrows, Western (‘W’), Central (‘C’), and Eastern (‘E’). Between 3 and 6 flipchart pages were produced in each meeting. Previously prepared pages were shown at each subsequent meeting, and sometimes built upon directly; not every meeting started with a fresh diagram (again, recall the one-text approach, *sensu* Fisher & Ury, 2012; see Section 3.4.2). Consequently, later meetings tended to result in fewer pages.

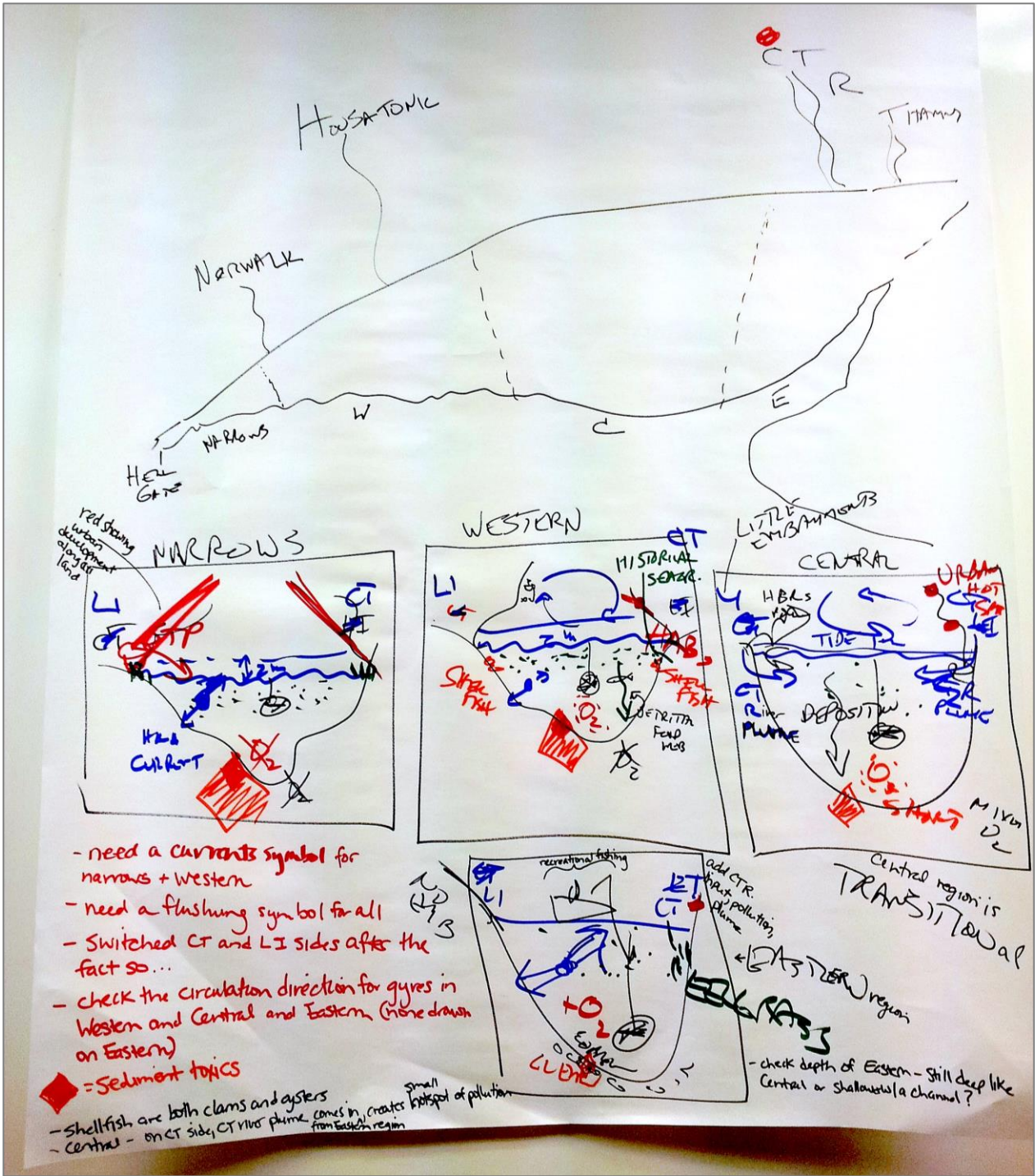


Figure 8-7 Draft conceptual diagram, sketched during listening tour

(d) Finding data and building a stakeholder list

In each meeting of the listening tour, attendees were explicitly asked a number of questions, which were intended to find datasets that could be used for the report card, and to build a list of stakeholders within the case study. The questions could be distilled into four main inquiries:

- Who should be invited to the workshop?
- What data could IAN use for the report card (and who owns the data)?
- To whom should the report card be presented?
- When and under what circumstances should the report card be released?

The last question was asked to ascertain whether there would be other events competing for public attention. At Meeting LT2, for example, EPA staff indicated that a new management plan for the Sound was to be released in September 2014. Discussions were had about whether the draft report card should be released at the same time, with each event complementing the other, or separately in case one distracted from the other. No conclusions were made at this stage.

Seeking to build a more complete list of stakeholders led IAN to learn about some stakeholders who had been omitted from any listening tour meetings. IAN made efforts to meet them where possible – IAN arranged a breakfast meeting with one scientist who could not attend any other meetings, in order to capture her perspectives.

Although the listening tour aimed to build a comprehensive list of stakeholders, not all stakeholders were to be invited to the workshops. The criteria for choosing workshop participants were not clearly stated. Stakeholders who owned and/or were familiar with relevant data were sought after (e.g. those conducting monitoring programs) – ideally, during a workshop, no indicator would be left unrepresented by a person who collected and analysed the relevant dataset.

Other criteria for selecting workshop participants were difficult to discern. Immediately after Meeting LT5, a member of the Funders' Collaborative met with two members of IAN to debrief. One person¹⁰ argued that established academic experts who are no longer collecting data may not be suitable participants, because some struggle to translate their established forms of academic knowledge into a report card format. There was also some debate (without resolution) about whether law-makers and policy-makers should be invited to the workshop. One person suggested

¹⁰ For this debriefing session, the organisation of opinion holders is not named, because the small size of the meeting makes opinions easily traceable to individuals, and because one participant in this meeting especially requested to be anonymous.

not, because they are not the end-users. Another noted that some decision-makers might have ‘a long-standing interest’. It was not clear whether that meant an interest in promoting or hindering ecological programs, but all agreed that it was important to ascertain the possibility of political hindrance. One person stated that it is ‘worth finding allies to find out who the enemies are’, while another suggested that inviting potential ‘naysayers’ might actually diminish political opposition to the report card, because those people would be included in the process. The language of combat and inclusion here recall a constructive/destructive binary; the former was not used repeatedly, so it is unclear whether meaning can fairly be ascribed to it. No firm actions were decided upon, but it is clear that part of the pre-workshop process involves considering the political context in which the report card will be created, in order to identify who ought to be invited to the workshop.

(e) Social interactions

Interactions extended beyond the meetings. Whenever time allowed, the IAN staff would invite meeting attendees to lunch or dinner. In this listening tour, IAN hosted one attendee for dinner at a restaurant in Sea Cliff (Hempstead Harbour), and one member of the Funders’ Collaborative for lunch on the last day. Conversation topics on those occasions were a mix of small talk and discussion about the report card.

8.2.2. During workshop

The Hempstead Harbour and Norwalk Harbour report card workshops were observed. They were held on consecutive days (2–3 July, 2014), both at EPA/LISS offices in Connecticut. The choice of meeting location was governed by logistics: it was central to participants; EPA/LISS were willing to host; and this location enabled IAN to reduce travel time (maximising work time). Attendees at each workshop are listed in Table 8-9.

Each workshop was structured with four main parts, discussed next:

- Participants’ desired outcomes for the report card program.
- Key narratives or messages to be included in the report card.
- Further conceptual diagramming.
- Identification of data sources.

Table 8–9 Participants at observed Long Island Sound workshops

	Hempstead Harbour	Norwalk Harbour
Also attended listening tour	3 x IAN 3 x NGO 1 x academic (expertise on community monitoring of the Sound)	3 x IAN (same persons as for Hempstead) 4 x NGO 1 x academic (same person as for Hempstead) 1 x Funders' Collaborative
Did not attend listening tour	2 x two consultants who had prepared a report for the NGOs 1 x member of the EPA	None

(a) Eliciting desired outcomes for the report card

Each meeting opened with IAN facilitators seeking what participants wanted to achieve with the report card, once published. One IAN facilitator framed the discussion by explaining that

This is *your* report card, so you have to own it; you need to be comfortable with the contents, and that's what we're here for. (IAN03, administrator)

Hempstead NGOs wanted the report card to attract more 'support' from a 'centralised monitoring program' (HH01x). The support sought was for interpreting the monitoring data that HH01x had been collecting. Support from whom was not stated, but both groups felt that collecting data and doing something meaningful with it was a burden falling on too few people. The goal stated (to attract more people to conduct activities in relation to harbour health) likely reflected this feeling of being over-burdened.

The Norwalk NGO had pre-defined goals for the report card. NH02x stated that the report card should be a 'call to arms' for addressing diffuse-source pollution. (Here again is the language of combat – potentially it is used from those with advocacy backgrounds.) Participants wanted the public to be more aware of the 'connection from street to river' (NH01x), with behavioural change consequent on such awareness:

We firstly want an 'aha' moment in people. We want a direct connection between individual action [and harbour health]. (NH02x)

What you got to do to stop Joe Bloe from dropping his leaves in the river? (NH01x)

These statements evidence a different set of goals from the Norwalk workshop, emphasising citizen mobilisation over attracting centralised support. The divergence in goals suggests that it is

important to establish participant goals at the outset of a workshop, so that ensuing discussion may be appropriately framed.

(b) Identifying and prioritising narratives included in the report card

After identifying goals, the discussion moved explicitly to a new stage: that of identifying and prioritising key narratives to be included in the report card. These narratives (or ‘stories’, as IAN facilitators termed them) were to be supported by the monitoring data, but separate from them. They were likely to be represented as short, informative segments within the final report card.

Hempstead Harbour

The Hempstead Harbour workshop focused on public perception of harbour health, with particular emphasis on public perception of the fishing and shellfish industry. According to HH01x, recurrent questions asked by the public were:

How’s the water? Can I eat the fish? Can I swim? Is there lots of life in the Harbour? (HH01x)

HH01x referred to a newspaper report declaring, ‘Beaches are crap’. It was unclear whether this was a quote or paraphrased; however, the point was that there was low public confidence in the cleanliness and safety of the beaches. HH01x explained that such newspaper articles mean that

people expect beaches to look blue – but it’s so nutrient-rich that it’s only ever going to be brown and green. (HH01x)

IAN01 (administrator) suggested that a ‘great story’ might be entitled ‘healthy bayside beaches’, which would feature photos and explanations of what makes beaches healthy (and moreover that brown and green water does not imply an unhealthy beach). According to IAN01, such a story would be ‘great’, firstly because it was a positive story, and secondly because the report card product could be used as a citizen engagement tool:

Ideally, you’d be able to point people to the report card to answer common difficulties [common questions] that you face. (IAN01)

With this framing in place, other stories were elicited from participants, who came up with a list of twelve possible stories (Box 8-1). Once brainstormed, participants were asked to vote on the top 5 stories by secret ballot, which determined the main stories. The topmost two stories (beach closures and public concerns) were supported overwhelmingly.

This choice reinforced the interest raised by HH01x at the beginning of the workshop, that the report card product be used as a public engagement tool; specifically, the workshop participants

were mostly concerned with *assuaging* public concerns to do with harbour health (cf. engagement intended to spur citizens to action: the former says things are fine; the latter says the opposite). Overall, for the Hempstead groups, the desired outcome was to obtain greater support in order to assuage the public of the safety and cleanliness of Hempstead Harbour.

Box 8–1 Hempstead Harbour: list of stories nominated by workshop attendees

- An explanation of beach closures.
- Public concerns: whether the harbour is fishable and swimmable, and whether the ecosystem is healthy.
- Reopening shellfish beds (how the monitoring program and other efforts demonstrated recovery of the shellfish beds from pollution, which led to the resumption of shellfish harvesting).
- What makes for a ‘healthy’ harbour (an explanation of harbour health indicators).
- What citizens can do to reduce nitrogen sources.
- How citizens can help to improve harbour health.
- Before & after: changes in the harbour over the last 25 years.
- Communicating the extent, diversity and richness of the ecosystem.
- Current efforts to improve and protect harbour health.
- Methodology: explaining how indicators are chosen.

Norwalk Harbour

Likewise, main stories were sought from participants of the Norwalk workshop. Box 8-2 lists the main ecological and human health issues, as well as a number of narratives relating to management efforts. The issue of shellfish closures was unknown to IAN at the time, demonstrating the value of asking participants to nominate key issues themselves.

Box 8-2 Norwalk Harbour: list of stories nominated by workshop attendees but listed above as vote-winning issues

Stories relating to ecological and human health issues

- Geese feeding leading to pollution in the harbour.
- Mowing near watercourses leading to siltation issues.
- Fertiliser use leading to high nutrient load in the harbour.
- Bacteria levels rising as a result of sewerage leaks, runoff, and wildlife.
- Impervious surface (45% of the area) leading to polluted runoff.
- Closure of the shellfish industry due to bacteria concentrations making produce unsafe for consumption.

Stories relating to management efforts

- The internship program at Earthplace is strong and attracting engaged, young people: 'We get a lot of funding because ... we churn out 45 kids a year' (NH01), who then go on to have careers in environmental science and management (NH03x).
- Funding received to triple the laboratory capacity of Harbor Watch laboratory, leading to greater capacity to monitor and improve the harbour.

These issues were further synthesised into short statements. After voting, three key stories emerged:

- The difference between point-source and non-point-source pollution: why non-point-source pollution is a significant issue within Norwalk Harbour ('the story of runoff': NH01).
- The 'ecosystem under the street' (speaker not recorded): how pollutants travel from individual households to the harbour.
- 'What can I do to help?' (speaker not recorded): actions that individuals can take to improve harbour health.

A number of secondary issues were identified:

- The connection between street-level pollution and harbour health, and the effect of such pollution on ecological and human health (including shellfish and bacteria levels).
- The effect of climate change and the need to adapt to warmer weather and rising bacteria concentrations.
- Methodology: explaining how indicators are chosen.

The issues chosen in this workshop reflects the participants' goals, of inspiring greater individual responsibility for harbour health. The concerns of these participants were to create an awareness that more action is required to achieve a healthy harbour—contrast the Hempstead Harbour workshop's concern to assuage public concerns.

Overall, empowering participants to describe their own key stories led to quite different stories that complemented each group's goals. In addition, both groups wanted the report card to explain how indicators were chosen, and how they demonstrate harbour health. This commonality underscores both groups' perception of the report card product as a communication tool, and therefore the imperative to make data accessible to lay readers.

(c) Further conceptual diagramming

The third part of the workshops involved further conceptual diagramming. By this time, diagrams from the listening tour had been converted into digital format, with custom symbols designed for each report card. Refining the diagrams was now done digitally, rather than on a flipchart: IAN01 (administrator) led discussion about whether the diagram accurately and comprehensively represented the system interactions within the harbour, while IAN07 (communicator) edited the diagram on Adobe Illustrator in real time. Participants could see the diagram evolve in response to the discussion.

Additional diagrams were drafted to reflect the narratives previously identified, on flip charts. For example, the 'ecosystem under the street' story for Norwalk Harbour was drafted by hand, to be digitised after the workshop. Thus, again, participant input was recorded visually, and confirmation of the visual representation of knowledge was sought prior to workshop close. The diagram (or a substantially similar version of it) became a feature of the final report card (e.g. Figure 7-3 in Chapter 7).

(d) Identification of data sources

The last stage of both workshops was identifying available data sources to inform the report card. A preliminary inquiry had been conducted during the listening tour; this discussion was more detailed, and included: what had been monitored, the completeness of the dataset, the period, frequency and spatial coverage of monitoring, and the availability of alternative and supplementary data sources.

In one workshop (not specified to preserve confidentiality), one participant revealed that there were some vested interests in the use of certain data that may show industry in a bad light. For example, a major fishing industry organisation provided funding to one NGO, and also owned certain data relating to water quality. Depending on the conclusions drawn, the use of that data might have been seen as a betrayal. While it is not known how this issue was ultimately resolved, the next section shows that such concerns are real, and may harm relationships between workshop participants and those with whom they work.

Moreover, in hindsight, FC01 (funder) indicated that this exercise was not sufficiently detailed, because this discussion did not reveal that the harbour-level groups had *different* types of data compared to the available data for the Sound as a whole (largely human health rather than ecological health):

Not only did they not have the same data as the main stem, but they didn't have the same stuff as each other. (FC01)

This incompatibility led to some dissatisfaction, discussed in the next section.

8.2.3. After workshop (process and reflections)

(a) Steps following the workshop

Post-workshop work at IAN was not observed due to time constraints (post-workshop work occurred after I left the USA). However, IAN03 (administrator) indicated that the remaining steps for producing a report card were:

- Receive data sets.
- Analyse data and set thresholds for each grade (e.g. what concentration of a pollutant constitutes a B+).
- Generate grades for each indicator and the report card as a whole.
- Provide periodic progress reports to the client.

(b) Dissatisfaction arising after the workshops

After the workshop, there arose some dissatisfaction about the process. Some 9 months later (and 3 months from publishing the report cards), IAN01 told me that, for one of the report cards, some participants raised concerns that the reporting results did not accurately portray the state of the Sound. Consequently, IAN staff repeated the analysis using new parameters, which was, IAN01 said, the same amount of work as the first analysis. IAN01 also noted that objections of this nature tend to occur only *after* the draft report is distributed; interim progress reports tend not to attract critical attention. This observation suggests that publishing a full report card *draft* is an important step, because it attracts critique prior to committing to the product.

It is unknown whether the previous paragraph refers to the same incidence, but the Hempstead Harbour report card raised dissatisfaction also. No representative from either Hempstead Harbour group agreed to speak on this issue, but FC01 indicated that the groups' objections arose because the harbour received a lower grade than expected (D+). Ordinarily, receiving a low grade is strategically desirable, because it adds weight to lobbying efforts:

My thought was, 'You got a D+! It's the perfect grade for a conservation organisation!' (FC01)

However, the Hempstead groups were reportedly concerned with how the low grade would damage their relationships with the shellfish and fishing industries. FC01 paraphrased their concerns:

Their response was, 'yeah, we get that [a D+ is good] from an advocacy perspective, but we have a lot of relationships with the shellfish people and fishing industry, who are trying to get people to understand that the water is not so horrible, and you should come down and eat their seafood.' (FC01)

What added to the Hempstead groups' objections was that the goal of the client was to enable comparisons of *water quality* conditions across the Sound, and this goal was not entirely clear to the local groups. In particular, the report card program was neither (a) to monitor only local conditions at each harbour; nor (b) to monitor human health indicators. FC01 describes the goal metaphorically:

Everybody wants to be able to compare apples to apples. And if you're going to do that, and you say that this apple on the north side of the tree is smaller than the apple on the south side of the tree. You can then go on to say, we think one of the reasons is that it's small on the north side is that that side doesn't get as much sunlight, or whatever reason it's making it smaller. But what the local group wanted to do was to say, 'we only want to compare north apples to north apples – that would be unfair for those poor apples who, through no fault of their own, were

born on the north side of the tree. And, you know, it makes them look bad. And they haven't done anything wrong.' So that's how we talk about susceptibility, right? The shape of the embayment matters. Its proximity to NYC matters, with respect to its water quality. All these things matter. And we want to have a better picture of what needs to happen on a local level. So how we deal with that on a local level is a whole other discussion. (FC01)

However, the local groups had assumed that the report card was to focus mostly on human health indicators, using localised data, which made up the bulk of their work. In turn, the clients (funders) had assumed that the local groups knew the goal was to create a compatible comparison across both harbours and the Sound as a whole and had data to do so. FC01 reflected that a preconception on data availability was not questioned until the first drafts were released:

We assumed, as funders (because we'd been receiving these 400-page reports from everybody from the last 10 years), that [local groups] had more than enough data to engage in this report card process. But as we went out and asked all the people who were responsible for the main body of water in the Long Island Sound, they quickly came up with the 'big 5' parameters for water quality – or at least, 'these are a good 5'. The local embayments, it turned out, had been *much* more engaged in human health indicators. These groups had been out measuring bacteria, *E. coli*. Because that's what mattered at the local level. And so when it came time to say, 'we need all your data on [water quality]', they said, 'we don't have any of that, but we have stuff on bacteria'. It became really hard to compare apples to apples to the main stem. And it was almost impossible to compare the embayments to each other. (FC01)

Similarly, NH03 (while being careful to note that Norwalk Harbour was pleased to be involved in the report card process) did suggest that the ultimate indicators chosen were not directly relevant to their work. NH03 said that

people don't think about ecosystem health [in terms of water quality]... They think, 'should my toddler be in the water?' (NH03)

Consequently, much of the data that groups from both Norwalk and Hempstead harbours had collected over years were not directly relevant to the report card. The report card was 'not representative of Harbor Watch's work', although it remained a useful, non-technical document that one could 'hand to people' as a talking point (NH03). NH03 also upheld the technical findings of the report card:

There's nothing in there that we couldn't stand behind, and [regarding the grading method as explained within the report card product] the level of transparency was really good. (NH03)

NH03 was asked to reflect on opportunities to improve the process. NH03 acknowledged that these report cards were a first attempt, and that ‘we can do better; it won’t be as hard next time’. NH03 wanted ‘greater involvement in the process’, stating that grading metrics (what constituted an A, B, C etc.) ‘kept changing’, and ‘we didn’t know until the very end’ what grade would be given. Greater involvement earlier in the process, NH03 said, would lead to better outcomes:

I wish we knew right now what we need for this summer’s report card ... If we’d been collecting data specifically for the report card, we would’ve collected chlorophyll data, and nitrogen data, and all kinds of other things that we’re perfectly capable of collecting samples for, and having them sent out and analysed. But we didn’t, and as a result of that, it wasn’t really a whole story. So I think that, hopefully, in the next round, we’ll have more narrative about what the targets are, so we can measure them... The only thing that disappoints me is that I know that we could have done a better job, if we had known further in advance what the indicators would be. It’s a solvable problem. Whoever’s in charge of it needs to make a decision, and make it early enough so that we can actually do the work. (NH03)

Overall, it appeared that insufficient communication about the goal of the report card, and the data required to achieve that goal, led to a surprisingly low grade for local groups. The low grade led to concerns about damaging relationships between local groups and their partner organisations. These concerns were magnified because the grade was not revealed until late in the process. At that point, only minor changes could be made (in retrospect, FC01 noted that, since the report card related to water quality and not human health, the front cover photo should not have been of ships).

The above quote from NH03 demonstrates an attitude that this first set of report cards was a learning experience. FC01 echoes this attitude (‘we wanted to do more than talk... [we preferred] to make mistakes quickly’). The extent to which local groups’ goals would be incorporated in future was uncertain, however. FC02 placed local groups’ interests in the context of the overall goal of the report card program thus:

The report cards had a specific purpose, and unfortunately, pleasing embayment groups wasn’t one of them. Maybe it’d be different if the purpose were different. (FC02)

No information was available as to whether the Hempstead Harbour groups will continue to participate.

(c) Release of the final draft and planning for the next report cards

The final draft was distributed to political and administrative decision-makers prior to public release. This gesture was intended to indicate a certain respect for decision-makers, because it

allowed them to prepare a response. In this case, the report cards were launched in two simultaneous public ceremonies on 8 July 2015. It was attended by a number of legislators from New York and Connecticut (NFWF, 2015). Inviting particular decision-makers was a strategic choice:

Yeah, we said that we gotta have this person there, and this person here, from this department of conservation, whatever. A lot of folks were specifically invited. (FC01)

Some of the elected decision-makers introduced funding and legislative reforms for the restoration of the Sound less than three weeks later (see Israel, 2015), but FC01 did not attribute the reforms to the report card:

I don't think we can make that attribution; there's a lot of movement around funding of Long Island Sound, with [Hurricane] Sandy and all that. (FC01)

Having released the first set of report cards, the Funders' Collaborative in October 2015 conferred responsibility for producing the next set to Save the Sound, an NGO based in Connecticut (FC02). The next release date is sometime in 2016, using 2015 data.

8.3. Results: Arkansas and Red Rivers case

8.3.1. Before workshop

Preparations for the entire Mississippi River Basin report card began in September 2012, when America's Watershed Initiative was formed. IAN had been involved since inception, and prior to the Arkansas and Red Rivers workshop had already determined six assessment areas that would be monitored across all five sub-basins. The six areas represented AWI's vision for the Mississippi basin, and they are shown in Figure 8-3 (above).

This workshop was the last of the sub-basin workshops, and IAN staff had had practice running workshops around these six areas. The size of the overall project meant that many stakeholders were not familiar with report cards. Therefore, IAN prepared an 8-minute video introducing report cards and the six areas upon which the report cards will be structured (IAN, 2014). This video was sent to all attendees ahead of every workshop. The content of this video included:

- The five steps involved in IAN's report card progress (Figure 8-1, above).
- The aims and activities of the workshop (namely to develop the content and structure of the report card through consensus).
- A description of a previous report card (Chesapeake Bay) as an example.

- An explanation of the rationale of the six areas of the report card.

America's Watershed Initiative invited attendees to the workshop. Unlike the Long Island Sound project, where IAN was instructed to develop a list of workshop participants, IAN had minimal involvement in this aspect here.

8.3.2. During workshop

(a) Representation

The workshop was held over two days at the Mayo Hotel in Tulsa, Oklahoma. Excluding IAN staff members, 40 people from 31 organisations attended. As discussed in Section 8.1.5 (in the context of the representativeness of the interviewees), nearly half of all participants were from government departments and statutory authorities, and a quarter from NGOs. Half the attendees were from Oklahoma, with others representing Kansas, Arkansas, Louisiana, and Texas. Self-nominated areas of expertise showed that, as a cohort, each of the six assessment areas were represented.

A presenter from AWI indicated during the workshop that, due to the difficulty coordinating schedules of so many, there was no specific effort to ensure that all States, types of organisations, and areas of expertise were represented, aside from inviting relevant stakeholders and generally attracting organisations to send a representative to the event. There appeared to be no representative from the hydropower industry (despite being significant: Uría-Martínez et al., 2015), and only one Native American nation represented (despite several in the region: Wang, 2014).

(b) Format of workshop

IAN and the client (AWI) began by giving a half-hour presentation on report cards (5 steps), the six assessment areas, and the division of the Mississippi Basin into six sub-basins. The workshop's stated goal was to produce a draft report card by the end of the second day. An IAN facilitator wrote '27 hours' in large letters on a board at the start of the workshop (updated again the following morning), to encourage attendees to focus on tangible outputs from the workshop.

After the introduction, attendees were split into groups of seven people, and asked to design their own report card. Each group was given an outline map of the Arkansas and Red river basins, and relied on their own expertise to draw a representation of issues in the basin, and how the health of the main issues might be assessed. An IAN presenter explained that this exercise was to enable participants to experience a scaled-down version of the task of the workshop as a whole.

The main aim of the workshop was to identify values within the basins, and indicators of the health of the values. For example, a healthy river ecosystem might be a value; its health could be measured

by monitoring nitrogen and phosphorus levels. To achieve this, attendees divided themselves according to each of the six assessment areas. Two 'breakout sessions' were held; that is, three assessment areas were discussed concurrently each time. The agenda of the workshop is reproduced as Figure 8-8, below, which illustrates more clearly the structure of the breakout sessions.

With this structure, each attendee could participate fully in two assessment areas, so long as the two sessions were not held simultaneously. (Some attendees were observed participating in concurrent sessions by attending some sessions partially.)

- The tasks undertaken by each assessment area was the same, and comprised three parts:
Identify values, indicators, and desired conditions.
- Prioritise values (similar to prioritising narratives in the Long Island Sound workshop), and identify data sources to measure each indicator.
- Present the conclusions of the previous two sessions to the plenary; receive feedback accordingly.

All tasks for two assessments were observed: Flood Risk, and Water Supply. All plenary sessions were observed.



Arkansas River and Red River Workshop
The Mayo Hotel, Tulsa, OK
May 14-15, 2014
AGENDA

DAY 1 - WEDNESDAY, MAY 14, 2014	
Breakfast on down	
09:30am-10:00am	Coffee and light refreshments
10:00am-10:35am	Welcome and Introductions
10:35am-10:50am	Report Card Concepts · Indicators, measures and desired conditions.
10:50am-11:00am	Assessment Framework: Goals, Values, and how sub-basins relate to the larger Mississippi River Basin report card.
11:00am-11:15am	Break
11:15am-12:30pm	Activity: Create your own Arkansas River and Red River basins assessment.
12:30pm-01:30pm	Lunch
01:30pm-03:00pm	Breakout Session 1: Identification of Values, Indicators, Desired Conditions · Flood Risk* · Economy · Recreation
03:00pm-03:15pm	Break
03:15pm-04:45pm	Breakout Session 2: Identification of Values and Indicators Desired Conditions · Water Supply* · Transportation · Ecosystems
04:45pm-05:00pm	Wrap up of first day
05:00pm-05:30pm	Reception at The Mayo Hotel (Penthouse), 115 West 5 th Street, Tulsa
Dinner on down	

DAY 2 - THURSDAY, MAY 15, 2014	
Breakfast on down	
08:00am-08:30am	Coffee and light refreshments
08:30am-08:45am	Recap Day 1 and Objectives for Day 2
08:45am-09:15am	Arkansas River and Red River Conceptual Diagram
09:15am-09:45am	Storyboard and Workshop Report
09:45am-10:00am	Break
10:00am-10:45am	Breakout Session 3 - Review of Day 1 Results, Identify data sources, and prioritize list: · Flood Risk* · Economy · Recreation
10:45am-11:30am	Topic Experts Report out results of indicator identification, feedback from larger group · Flood Risk · Economy · Recreation
11:30am-12:30pm	Lunch
12:30pm-01:15pm	Breakout Session 4 - Review of Day 1 Results, Identify data sources, and prioritize list: · Water Supply* · Transportation · Ecosystems
01:15pm-02:00pm	Topic Experts Report results of indicator identification; feedback from larger group · Water Supply · Transportation · Ecosystems
02:00pm-02:15pm	Workshop Summary
02:15pm-02:30pm	Scorecard Next Steps and Closing Remarks
02:30pm	Adjourn
* Breakout Sessions attended by researcher.	

Figure 8–8 Workshop agenda of AWI workshop

Utilising breakout groups is atypical of IAN's report card process, but was used in this case (and other Mississippi Basin workshops) to accommodate larger-than-typical workshop size and diversity of interest groups.

(c) Conduct of sessions for each assessment area

This section reports how the tasks for the Flood Risk and Water Supply assessment areas were conducted. The same IAN facilitator (IAN04, integrator) chaired both assessment areas. While observing two different IAN facilitators may have given a better range of observations, IAN01 requested that I assist in the running of the workshop, requiring me to attend those particular assessment areas. (In this sense, I was more an observer–participant than a participant–observer.)

Task 1 – identifying values, indicators, and desired conditions

For both assessment areas, Task 1 was conducted on a flip chart. An outline map of the sub-basin was drawn. The guiding question, provided by IAN04, was ‘What is happening here?’. Participants were invited to describe what processes and activities were taking place in the sub-basin, with respect to the particular assessment area. In the Flood Risk group, for example, IAN04 sought contributions on which regions flood, where (and what) flood management works are carried out, and who undertakes such works.

IAN04 recorded the information as symbols and annotations on the flip chart, asking clarifying questions from time to time. IAN04 controlled the drawing process – at no point did another attendee take up drawing duties.

By the end of the first session, a list of potential indicators for each goal was generated. The lists for both sessions appear in Table 8-10, below.

Table 8–10 Indicators arising from two breakout groups

These indicators originated from Task 1, for the Flood Risk and Water Supply groups respectively.

Flood Risk assessment area	Water Supply assessment area
<ul style="list-style-type: none"> • Flood indicators • Levee safety • Watershed dams condition (PL 566) • People at risk • Structures repeatedly flooded (damage claimed on insurance) • Declared emergencies (reservoir system) • Conservation pool (reservoir system) • Flood pool (reservoir system) • Downstream stage/flow target (reservoir system) 	<ul style="list-style-type: none"> • Water supply indicators • Water quality - meets designated use • Trends in groundwater level • Drought occurrence • Trends in use by permitted users; non-permitted use is a concern • Adequacy of water supply, as determined by comprehensive plans • Infrastructure needs assessment • Reservoir storage capacity • Trends in lake level • Trends in stream discharge • Usage rate per capita, efficiency of use • Usage restrictions

Task 2 – prioritising values and identifying data sources

Task 2 involved prioritising the values (and corresponding indicators) identified the previous day. Some indicators were eliminated due to insufficient data to conduct the report card assessment. Of the remaining indicators, an ordered list was created by consensus. Consensus was achieved by simply asking the room (i.e. participants collectively, rather than all individual participants) to confirm that the list was an accurate reflection of priorities, given the discussions in Task 1. It appeared that this consensus trusted participants to speak out if they objected or disagreed. No voting was conducted (unlike the Long Island Sound workshops).

There were no aggressive or vehement objections voiced in the sessions observed. The atmosphere was thoughtful and constructive. It is not known whether the IAN facilitator would have initiated a different method of building consensus, if the atmosphere were belligerent, rowdy, spiteful, or tense.

Task 3 – presenting progress to plenary and receiving feedback

The plenary sessions were an opportunity to contribute for those who could not attend more than one of their preferred breakout sessions (because of concurrent scheduling). As the indicators for each group were presented, others were invited to comment. There were no clashes of opinion

observed at this workshop; it is unclear how IAN staff would have dealt with strong, incompatible opinions. A further prioritisation of values was undertaken – this time, a ballot was cast using web-based form. Attendees could abstain from voting if they did not feel they had sufficient expertise in a particular assessment area.

During the plenary sessions, IAN08 (communicator) sat discreetly at the back of the room, and began to draft, in real-time, a report card on their graphics software (Adobe Illustrator). By the end of the last plenary session, she was able to deliver a rough draft of the report card, with headings, conceptual diagrams, draft indicators, and sample (made-up) grades. This draft was shown to the plenary (to positive reception), to demonstrate that the goal set at the beginning of the workshop (to produce a draft by the end of 27 hours) was met.

(d) Overnight – preparation by IAN

IAN's process at this workshop continued after attendees retired for the evening. On the night of the first day, IAN staff convened until nearly midnight in a hotel room, converting the information gained from the six breakout sessions into report card sections, laid out as a very early draft. The reason for doing so, according to IAN02 and IAN03, was to record the day's information while fresh in their minds. It also enabled them to show progress early next morning, which was intended to motivate the attendees to aim for tangible outputs at the end of the workshop.

(e) Miscellaneous observations

A number of miscellaneous observations about the workshop are recorded here.

- **Mood and atmosphere.** IAN facilitators made efforts to keep the mood and atmosphere was kept light and personable. Presentations and workshops were punctuated with jokes and stories. For example, IAN01 wrote a song about the Arkansas and Red Rivers, and set it to the tune of 'Oklahoma'. Other participants (including a Colonel of the Army Corps) were enlisted to perform at the conclusion of the workshop.
- **Social events.** Lunches and a rooftop reception were organised by AWI, providing an opportunity to mix socially.
- **Visitors from other sub-basins.** A resident of the Missouri River basin (which was the subject of a previous workshop for the AWI Mississippi River report cards), sought a special meeting with IAN staff. This resident was inadvertently not invited to the Missouri River workshop. IAN staff met to hear his contribution, and subsequently arranged a follow-up workshop to capture further information.

8.3.3. After workshop

A newsletter was published in July 2014, 6 weeks after the workshop. The newsletter showed the conceptual diagrams and the indicators, and gave narrative accounts of the values. No grades were published. According to IAN staff, this newsletter was intended to show progress and to maintain engagement in the project.

Like the LIS report card, scientific concerns were raised about the calculation of the grades after a draft report card was prepared and made publicly available. The data was re-analysed. According to IAN02, this second analysis resulted in significantly different analysis results, as a result of improved understanding of the data. However, there was no controversy as for Hempstead Harbour; it is not known why. The whole-of-Mississippi report card was published in October 2015 (RC478), and released at a summit with attendees from over 20 States (The Nature Conservancy, 2015).

8.3.4. Reflections on process from interviews

Interviews were sought after the workshops in order to capture participant perspectives of the workshop. Of the 20 who indicated at the workshop that they were willing to participate in interviews, 6 responded positively to a follow-up request. The interviews were semi-structured, and broadly guided along five questions:

- What is your work, and how are you involved in managing the river basin?
- What did you expect of the workshop? Were your expectations met, and what surprised you?
- Was there anybody missing from the workshop you thought should have attended?
- What aspects of the workshop did you think were successful, and what needed improvement?
- In what ways (if at all) do you think the report card will be valuable to your work?

The representativeness of the interviewees was assessed in Section 8.1.6, and is not discussed further here. Thematic findings are reported here.

(a) No strong preconceived ideas about the workshop; generally curious attitude

None except AWI1 had heard of the Mississippi Basin report card program until they had agreed to attend. AWI2 had ‘no clue’ about the program; AWI4 similarly had ‘no idea what it’s about’. AWI1 only had a basic awareness of the program. All shared similar initial attitudes: they were ‘curious’ (AWI3, AWI5), ‘open-minded’ (AWI1), and otherwise expecting to ‘go listen’ (AWI2).

The lack of firm pre-conceptions may have contributed to a constructive and civil atmosphere. AWI1 indicated that he felt ‘part of a group’, AWI6 ‘learnt a great deal’ from other attendees, and

AWI3 stated that ‘conversation was friendly’. While six interviewees cannot with confidence represent a cohort of 50, observation suggested that there were no attendees with an outspoken doubt about report cards, or with a particular agenda that they intended to promote at the workshop.

(b) Attendees expected more environmental representation and more even geographical representation

Three interviewees (AW2, AWI3, and AWI5) stated that there was insufficient representation of fishing and wildlife interest groups (‘I was surprised at the lack of “harder” enviro’: AWI3). AWI5 suggested that the substantive discussions were ‘slanted towards economic issues’, and that the cohort of attendees were ‘dominated by USACE’ (US Army Corps of Engineers). AWI4 agreed (the meeting was ‘nav-heavy’; navigation is managed largely by the USACE: ‘those folks roll out!’).

AWI6 also nominated hydropower groups as having a ‘huge effect’ on the basin, but were absent from the meeting. AWI5 similarly thought that the coal power industry, farming cooperatives, cities, and Native American tribes were not well represented.

Geographically, AWI1, AWI5 and AWI2 noted that ‘uplands’ (AWI1) areas were under-represented – that is, attendees from Kansas and Colorado. As an improvement to the workshop process, AWI5 recommended appointing ‘champions’ from each sector and geographic region to ensure even representation. Nonetheless, AWI5 thought there were ‘high quality people’ in attendance.

(c) Too soon to tell whether the report card will be useful; basin-scale of analysis both promotes and constrains usefulness

When asked whether the report card is likely to be useful, only AWI6 gave an outright positive response, saying that would be a ‘great marketing tool’ and ‘education piece’. In contrast, AWI2 said that the report card was likely to be ‘not hugely relevant to day-to-day work’.

Generally, there was support for a broad-scale assessment. Despite not expecting day-to-day relevance, AWI2 thought the report card would be a useful ‘gauge’ of trends within the basin (AWI6 similar). AWI1 was firmer in his support of a broad-scale analysis, saying that a multi-jurisdictional assessment was ‘long overdue’. AWI4 stated that the report card will help people ‘step back’ from their own fields of work.

There were criticisms that the analysis was at too coarse a resolution. AWI3 suggested that grading ‘specific reaches’ would better represent the diversity of the basins, and that the present approach was ‘too averaged’. AWI1 similarly suggested that local-scale improvements would not be

detectable at a ‘scattered’, basin-scale of analysis, and consequently it would be ‘difficult to convince people to act’.

(d) Mixed but overall positive feelings about the workshop process

In general, the interviewees thought the workshop enabled productive interaction among attendees. AWI2 enjoyed ‘listening to other views [and] learning from others’, with AWI1 and AWI6 expressing similar sentiments. AWI2, however, specifically suggested that more time be allocated to the breakout sessions. AWI4 thought the meeting was ‘well organised and efficient’, but suggested that attendees would have benefited from greater preparation and forewarning of the workshop process. (However, he had not watched the introductory video sent to all invitees, and YouTube statistics suggests that the video had only 30 total views at the time of the workshop.) AWI3 particularly appreciated the visual representation of information, emphasising the ‘beer coaster’ (recall Section 7.3.6a) as especially appealing.

The primary criticism came from AWI5, who thought that the workshop was ‘over-directed’ and followed a ‘pre-ordained path’. That is, IAN staff directed the process too strongly, and that attendees needed an opportunity to ‘sit back and listen [to] the voice of the people’ – that is, the attendees. Nonetheless, when asked whether he would attend another, similar workshop, AWI5 stated firmly, ‘yes’.

8.4. Results: Great Barrier Reef workshop

As noted in Section 8.1.3, only brief observations from the Great Barrier Reef case are provided. The 2-day workshop observed was one of a series of three, which aimed to produce a report card measuring climate change resilience (see GBRF, 2016). This goal is distinct from measuring the health of the Reef. Because resilience involves measuring the ability of an ecosystem to absorb shocks without changing identity (Walker & Salt, 2006), a snapshot-in-time may not indicate resilience. For example, depleted seagrass indicates poor ecosystem health, but that system may bounce back strongly – it is degraded yet resilient. Measuring resilience is tricky and the subject of much academic debate (Quinlan et al., 2015; Hodgson et al., 2015; Yeung & Richardson, 2016).

The first day of this workshop involved individual presentations by attendees, describing their research and nominating indicators for Reef health. The second day was dominated by discussion on how to conceptualise indicators for resilience. It appeared that nobody could articulate a clear way to measure *resilience* (cf. *health*) due to the trickiness of doing so. During one discussion, IAN01 said, ‘I don’t want to talk, let’s just get some diagrams on the board’; once basic diagrams

were drawn, he said, the conceptions can be refined. There was a short pause, before IAN01 resumed sketching.

It is difficult to make firm conclusions without having delved further. My interpretation was that IAN01 was torn between delivering a tangible output (a draft report card) and ensuring the scientific accuracy of the indicators chosen. This was a case where the latter is deeply difficult; yet, dwelling on it would sacrifice the former. IAN01 appeared to choose ‘getting it done’ over ‘getting it right’ in this case (recall the distinction between academic study and problem solving; see Figure 8-6). In addition (according to IAN01 later in conversation) the act of diagramming sometimes helps to order thoughts, whereas a verbal discussion can confuse. By drawing what is agreed first, contentious issues can be addressed against a backdrop of consensus.

This approach may work fine where the purpose is to produce a document that arranges monitoring data. If used as a tool for building constructive stakeholder relationships, it is a gamble. On one hand, diagrams may well help to order thoughts and to set a climate of agreement early in the process. But on the other hand, forging ahead without addressing participants’ discomfort risks alienating them from the process – and, once drawn, it might take courage to object to a diagram drawn five hours ago. In other words, forging ahead with diagramming may even entrench disagreement. This recalls AWI5’s feeling that that workshop was ‘pre-ordained’, and also echoes the destructive attributes of not feeling listened to in Chapter 5.

The discussion on this case study is somewhat speculative, based on opportunistically observing a workshop that serendipitously was available. However, it is important because AWI5 was the only interviewee to raise the abovementioned criticism. The sample for the AWI interviews was small, and how many others shared that view was not known. The Great Barrier Reef case shows that, despite fast turnaround times being characteristic of IAN’s process, there may be good arguments for slowing down the process in situations of disagreement.

8.5. Discussion: what is IAN’s report card process?

Synthesising the cases above allows the conceptual framework in Figure 8.2 to be filled in with detail. Figures 8-9 to 8-11 illustrate a generalised *before*, *during*, and *after* workshop process that reflects IAN’s report card process as observed. Each figure connects the *actions* comprising each stage of the process, and connects each action with corresponding *practical* and *relationship-building* functions. The last-most row gives pragmatic guidance (how the action was carried out) as a precursor to developing the report card tool for encouraging constructive relationships (Chapter 10). Note that these are *interim* processes; Chapter 9 will add to and refine these further.


BEFORE WORKSHOP 						
Action	Research monitoring region	Prepare template maps	Prepare symbol vocabulary	Identify stakeholders	Inform participants about report card process & method prior to workshop	Discuss and receive feedback on goal of the overall report card programs
<i>Practical function</i> How does this action contribute to report card production?	To learn knowledge that will help understand & elicit stakeholders' concerns (incl. while sketching conceptual diagrams).	To use as basis for conceptual diagramming.	To use as basis for conceptual diagramming. To enable knowledge to be depicted visually in conceptual diagrams.	To enable selection of workshop participants. To ensure all relevant perspectives are included in the report card.	To sensitise workshop participants to the task of producing the report card. To encourage participants to prepare for the workshop.	To ensure efforts are productive. To ensure practical barriers (e.g. availability of a particular type of data)
<i>Relationship-building function</i> How does this action contribute to encouraging constructive stakeholder relationships?	To contribute towards actual and perceived understanding of stakeholders' perspectives.	See 'Draw conceptual diagram of monitoring region' – <i>during</i> workshop phase.	See 'Draw conceptual diagram of monitoring region' – <i>during</i> workshop phase.	To ensure the report card process is (and is perceived to be) inclusive and representative.	To build a sense of shared mission.	To build a sense of shared mission. To prevent or foresee potential 'fault lines' of conflict. To understand interests of participants and their organisations.
<i>How?</i> From perspective of workshop facilitator, unless otherwise specified.	Conduct literature review (including grey literature).	Find/prepare outline maps and cross-sections of landscape. Practice drawing them by hand. Prepare blank printouts for group exercises.	Identify possible themes that will likely require depiction (e.g. particular fish species; people's houses). Practice drawing by hand. Prepare draft digital versions.	Stakeholder analysis: desktop review. Seek guidance from client and from other stakeholders: 'who else should we be talking to?'	Listening tour (face-to-face meetings). Video explanation (e.g. YouTube link).	Client to hold a discussion with potential workshop participants (and other stakeholders) about goal of report card. Client to invite feedback, and adjust in close consultation.

Figure 8–9 IAN report card process: *before* workshop phase


DURING WORKSHOP 									
<i>Action</i>	Re-inform participants about report card process & methodology	State clear goal for end of workshop	'Conceptionary' or other exercise: participants produce a scaled-down report card	Draw conceptual diagram of monitoring region	Identify & prioritise key narratives to be told in report card	Identify data sources to support conceptual diagrams and key narratives	Discuss timing of release, and who should be given a pre-release draft	Facilitators continue working after hours	Make opportunities for fun
<i>Practical function</i> How does this action contribute to report card production?	To ensure participants understand the task of producing the report card.	To declare and clarify the outcome expected by the end of the workshop.	To sensitise participants to the process of: representing concepts diagrammatically, selecting indicators, and assigning grades.	To record the participants' collective understanding of the functions of the social–environmental system to be monitored.	To elicit information that would accompany the grading assessment in the report card. To identify what narratives should be included.	To show which indicators are feasible (i.e. supported by data).	To decide a realistic and strategic deadline for completion.	To record each day's progress. To enable each day's progress to be shown to participants early next day.	To ensure sufficient rest for productivity.
<i>Relationship-building function</i> How does this action contribute to encouraging constructive stakeholder relationships?	To build a sense of shared mission.	To foster a sense of purpose, of progress and achievement.	To create opportunities for workshop participants to work together.	To show that there are points of agreement. To elicit disagreement in a climate of shared mission (i.e. to produce an accurate diagram).	To ensure that participants' stories are heard. To encourage participants to see that the report card reflects the messages they want to convey.	To ascertain how participants can contribute (by sharing data). To ensure the available data are coherent with the narratives participants want told.	To ensure report card has impact within public discourse. To ensure desired allies (e.g. policy-makers) are forewarned about findings.	To show progress, and to foster a sense of progress and achievement.	To enable participants to know each other personally, beyond professional work.
<i>How?</i> From perspective of workshop facilitator, unless otherwise specified.	Give oral presentation. Hand out examples of report cards from other regions.	Use a count-down (e.g. "27 hours until draft produced"), which is updated regularly.	Divide participants into small groups. Give each group an outline map of the monitoring region. Instruct each group to draw social and environmental interactions on the map, and/or define indicators of system health and allocate grades.	Use flipchart to draw maps of the region. Populate with symbols representing system interactions. For sequential workshops: allow subsequent groups to add to and comment on previous groups' diagrams.	Invite participants to nominate key stories to be told. (Potentially ensure each participant contributes.) Discuss stories and consolidate/expand if possible. Hold a vote to discover most popular stories.	For each indicator, ask, 'how can we measure this?' Ask what datasets participants have access to.	Consider: <ul style="list-style-type: none">• Events on the public calendar that might clash/ divide attention.• Coordinating report card launch with other events.• Allowing sufficient time for report card completion.	Digitise conceptual diagrams. Layout report card draft, with key stories. Use placeholder text if no substantive text available.	Consider: <ul style="list-style-type: none">• Group lunches and dinners.• Reception drinks.• Impromptu stories, jokes, and other breaks from work (e.g. songs).

Figure 8-10 IAN report card process: *during* workshop phase


AFTER WORKSHOP 						
<i>Action</i>	Catch up with stakeholders not able to attend/ unwittingly not invited	Publish newsletter summarising workshop	Distribute a draft report card & receive feedback	Continue to plan for best release date, and decide who should be given pre-release editions	Hold launch event	Monitor reception, seek feedback, and plan for the next report cards
<i>Practical function</i> How does this action contribute to report card production?	To incorporate perspectives not otherwise captured.	To invite feedback.	To invite feedback.	To ensure the report card launch gains public attention.	To ensure the report card gains public attention.	To ensure lessons learnt are captured and implemented.
<i>Relationship-building function</i> How does this action contribute to encouraging constructive stakeholder relationships?	To ensure that all stakeholders have (& feel that they have) the opportunity to be heard.	To encourage a feeling of progress. To remind participants of the workshop and (ideally) the spirit of cooperation experienced there.	To ensure that participants & other stakeholders are heard (and feel heard). To ensure that final product does not insult, offend, or unduly incite anger.	To alert stakeholders that the launch is forthcoming, and forewarn stakeholders to prepare for the launch (e.g. policy-makers may wish to prepare public responses).	To inject report card contents into public discourse (esp. robust and comprehensible data).	To ensure feedback is addressed; to demonstrate that participants' contributions are valued, & that grievances are understood.
<i>How?</i> From perspective of workshop facilitator, unless otherwise specified.	Be receptive to stakeholders who seek audience after workshop. Supplementary workshop (if numbers allow).	Send newsletter (possibly by email) within 8 weeks of workshop. Newsletter to report main findings – a de facto report card draft.	Send draft and invite feedback. Consider forum for receiving feedback (e.g. meeting, survey, phone call, email, etc.)	Consider scheduling clashes with other events and/or cross-promotion with other events. Consider using the launch to forge connections with new stakeholders: identify ideal connections and issue invitations.	Consider press conference, cocktail drinks, community day, etc.	Consider forum for providing feedback; potentially an additional face-to-face meeting.

Figure 8-11 IAN report card process: *after* workshop phase

8.6. Conclusion

This chapter aimed to characterise what is meant by ‘IAN’s report card process’. This research is necessary because IAN’s process is not defined elsewhere. While IAN’s self-published material documents their evolving self-conception, the process has never been independently documented, and never from an explicit social-process perspective.

Two contrasting case studies were chosen. The Long Island Sound case is a localised case study involving small workshop sizes (fewer than 10 people). The Arkansas and Red Rivers case involved a large geographical area and workshops of 40–50 people. By triangulating observations from both, commonalities constituting IAN’s process were identified. Key elements to the process were:

- **Conceptual diagramming** to characterise the monitoring region. This element includes both the live-sketching activity and the preparatory work that facilitates it (e.g. learning about the region, preparing maps, devising symbols).
- **Conducting the assessment.** This element includes deciding what would be a fair indicator of environmental health, which is in turn based on the conceptual diagram, the goals of the report card program, and data availability.
- **Crafting narratives.** This element involves identifying and prioritising (often by vote) key ‘stories’ to accompany the assessment, and to help readers make sense of the implications of the grade.
- **Showing progress.** The rapid capture, digitisation and presentation of information are prominent features of IAN’s workshops. Similarly, there is a sense of pressing for tangible outputs, like a draft report card by the second day of a 2-day workshop.
- **Finding the right opportunities to launch the report card.** Report card launches are treated as opportunities to connect with decision-makers and other strategically important stakeholders. Discussing when a launch is held, and who is invited, is part of IAN’s process.
- **Having fun.** Schedules generally create opportunities for social interactions, whether they be shared meals or ad hoc songs and jokes.

Some criticisms may be made of IAN’s report card process (Chapters 9 and 10 will discuss these further). Firstly, the Long Island Sound report cards led to dissatisfaction on the part of several local partners. This dissatisfaction arose in the context of local report cards commissioned as part of a larger suite of report cards for the Sound as a whole. The local partners’ expectations of their local report card were mismatched against the goals of the broader report card program, leading to a

grading that created potentially destructive tensions among the local partners, their stakeholders, and the report card program client.

Secondly, in the Arkansas and Red Rivers case, some sectors and States were not represented at the workshop. This has implications for the robustness of the report card product. But more relevantly to this thesis, incomplete representation may mean that key perspectives within an NRM relationship network are omitted, which may give rise to a feeling of not being heard – a potentially destructive influence.

Likewise, the Arkansas and Red Rivers case and the Great Barrier Reef case suggest that the quest for rapid, tangible output may mean that some perspectives are not heard. If so, this defining characteristic of IAN's process may need to be adjusted in order to make it an appropriate tool for managing stakeholder relationships.

Overall, this chapter's primary output has been to document IAN's report card process as observed, and Figures 8-9 to 8-11 comprise the main takeaways. Chapters 9 and 10 now assess in more detail IAN's report card process against the attributes of constructive and destructive relationships identified in Chapters 2 and 5.

Chapter 9. IAN's post-publication process & usefulness of report cards

This chapter is the last of three chapters examining IAN's report card practice (where practice means both process and product). The previous chapter focused primarily on the conduct of report card workshops and their preparation – the *before* and *during* workshop phases. The *after* workshop phase was not examined in detail, because both case studies in that chapter were nascent projects, with their first report cards not yet published during the time of participant–observation.

Yet, the *after* workshop phase is also critical to characterising IAN's report card process. Report card programs typically span years, with a report card published annually in order to track changes in the environment monitored. What happens after the workshop – and after publication – is itself often a preparation for the next report card. In this way, IAN's report card process can be seen as iterative, cycling through *before*, *during*, and *after* phases, with adjustments every cycle.

This chapter takes a broader look at IAN's report card process over a timescale of years, following publication of the initial report card. Specifically, the research questions are:

- How does IAN's report card process extend over multiple years?
- After publication, how has IAN's report cards been *useful*, or not? In what ways have IAN's report card practice (process & product) helped to build constructive stakeholder relationships?

The Chesapeake Bay report card program is the primary case study. This case relates to IAN's longest-running report card program, initiated in 2006, with new report cards published annually. The reporting region is Chesapeake Bay, which extends approximately 320 km in a north-south direction on the east coast of the USA, discharging into the Atlantic Ocean at its southern end. As Figure 9-1 shows, Chesapeake Bay has a number of tributaries, some of which are the subject of smaller-scale report cards. These tributary-level report cards are produced by local environmental groups, with training and advice from IAN. (The methodological implications of studying both IAN-produced and local-produced report cards are discussed in Section 9.2.) In this chapter, the Chesapeake case means the whole-of-Chesapeake report card (produced by IAN), as well as smaller-scale report cards produced by local environmental groups. These local groups are community-based, non-profit organisations, analogous to Australian NRM groups that are usually member-governed. Overall, this case shows how IAN's report card process involves a handover to others: after an initial report card (or initial set of report cards), IAN supports other groups to build capacity to develop their own report cards. This phase is referred to here as a *handover* phase.

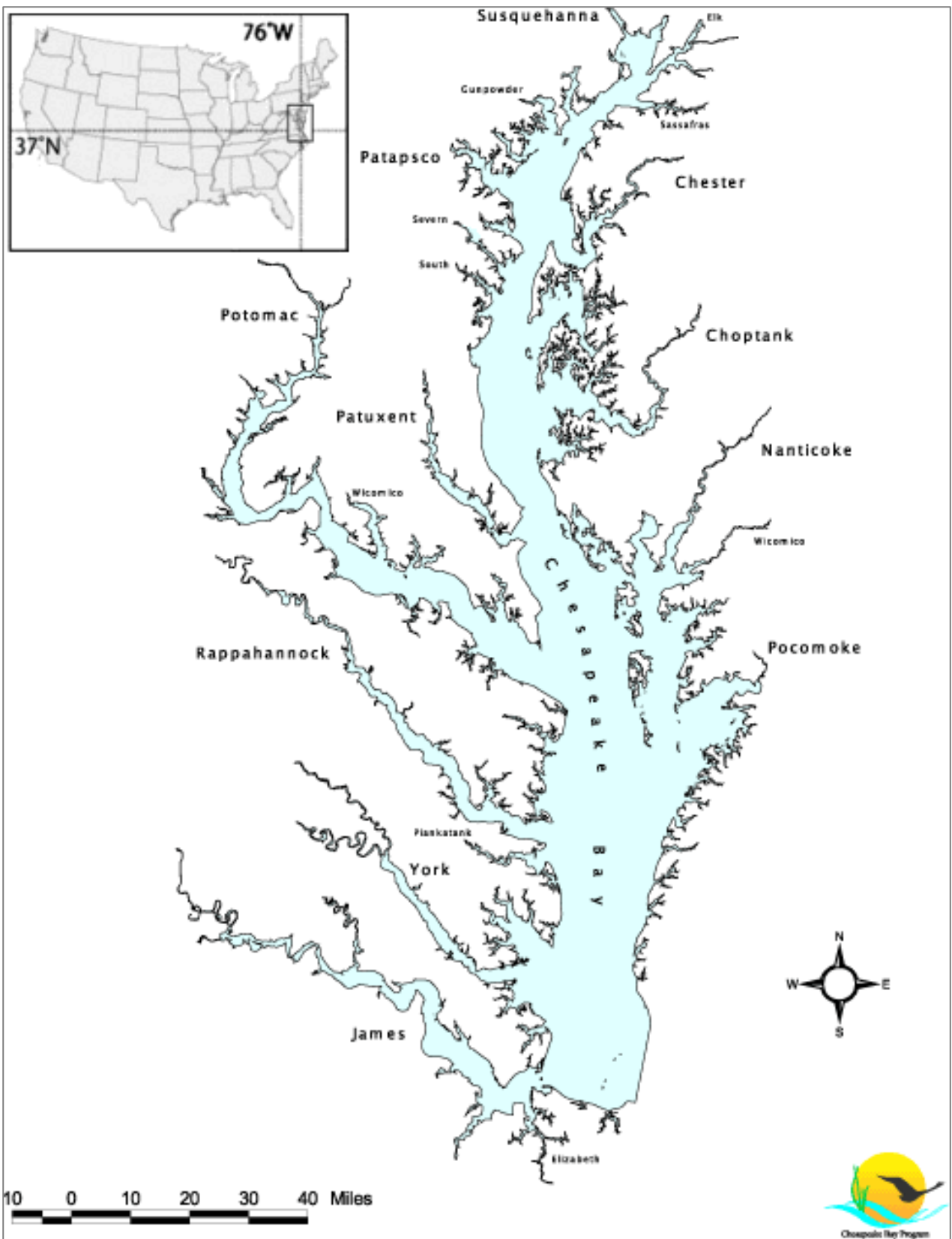


Figure 9-1 Chesapeake Bay and sub-watersheds
Adapted from CBF (2016); Williams, et al. (2009).

Observations from the Long Island Sound case study are also included, because they help to triangulate the observations from the Chesapeake case. While not originally designed to be a case study in this chapter, taking advantage of serendipitous chances to triangulate or add complexity is part of ‘messy research’ (recall Section 4.2; Sapford, 2006).

The next section describes the research design. Results from both case studies are recorded together (with the Long Island Sound results summarised from the previous chapter). The end point of this chapter is largely a statement of results addressing the research questions above. Synthesis of the handover phase with the process in Chapter 8 will occur in the next chapter, as will integration of the IAN studies with the constructive/ destructive frames established in previous chapters.

9.1. Research design

This section introduces the Chesapeake Bay case study. The methods of data sampling and collection are then discussed. The Long Island Sound context is not repeated (see Chapter 8), but its inclusion in this chapter is justified.

9.1.1. Chesapeake Bay case study

(a) Physical and human geography of Chesapeake Bay

Chesapeake Bay is a large estuary located near the eastern coast of the USA (see Figure 9-1). The bay covers an area of nearly 12,000 km², with a catchment covering approximately 172,000 km² (Williams et al., 2009) and including parts of six States (Maryland, Virginia, West Virginia, Pennsylvania, Delaware, and New York) (Albright, 2013). An estimated 17 million people live in the catchment (*ibid*: 4). Land cover is predominantly forest and agriculture, as shown in Figure 9-2, with nutrient input (nitrogen and phosphorous) ‘from a variety of sources, including urban and agricultural runoff, industrial wastes, and the effluent from wastewater treatment facilities’ (Williams et al., 2009: 15). Due to significant economic and ecological values, the Chesapeake Bay is managed by a collaborative coalition of government, academic, conservation, philanthropic and commercial organisations known as the Chesapeake Bay Program (Layzer & Schulman, 2013).

(b) Description of Chesapeake Bay report card program

The first Chesapeake Bay report card was published in April 2007, reporting on 2006 monitoring data (RC164). A report card has been published annually since then (see Appendix A, which lists all report cards). The ostensible client is EcoCheck, which is a partnership between IAN and the National Oceanic and Atmospheric Administration (NOAA, a government agency). EcoCheck was created to ‘enhance and support the science, management, and restoration of Chesapeake Bay’ (IAN, 2016b). Because IAN is one of the organisations functioning as client, the Chesapeake Bay

report card program can be seen as IAN's own initiative, albeit with funding and support from a wide range of partners across philanthropic, government, academic, and for-profit sectors (*ibid*).

IAN was also commissioned to develop localised report cards for tributaries of the Chesapeake Bay. The principal funder for these report cards was the Chesapeake Bay Trust (CBT), a private foundation that awards grants to the restoration and protection of the Bay (CBT, 2010). This led to the production of the Chester River (2007–08), Patuxent River (2007–8), and Severn River (2008) report cards (RC187, 188, 210, 211, & 212).

Subsequently, IAN trained and supported local organisations to produce their own report cards. Both IAN and the local organisations received CBT funding to do so (further details are given as research results). For example, the Chester River report card has been, since 2009, produced by the Chester River Association, after the first two report cards were produced directly by IAN.

IAN has supported local report cards in a different way. As described in a recent IAN presentation (Donovan et al., 2016), EcoCheck formed the Mid-Atlantic Tributary Assessment Coalition (MTAC) in 2010 in order to create two protocol documents (EcoCheck, 2013, 2011 respectively):

- Sampling & data analysis protocols for Mid-Atlantic non-tidal stream indicators.
- Sampling & data analysis protocols for Mid-Atlantic tidal tributary indicators.

The protocols aimed to standardise the collection and analysis of ecosystem monitoring across the Mid-Atlantic region of the USA, which includes Chesapeake Bay. By leading the creation of these protocols, IAN influenced the monitoring programs and report cards subsequently created. MTAC itself was a collaborative enterprise of nine local organisations.¹¹ MTAC was disbanded in 2014 (Donovan et al., 2016), after the protocols were finalised. Not all MTAC member organisations produced report cards; of those that did, some did so without ostensible contribution from IAN (as evidenced by the lack of acknowledgement in the report cards; see the West/Rhode Rivers and South River report cards: RC270, 307, 308, 364, 377). In this way, establishing the protocols can be seen as support distinct from giving training and feedback to local groups.

(c) Justification and limits of using the Chesapeake case study

As stated in the introduction to this chapter, the Chesapeake case was chosen because it is the longest of all of IAN's programs. This case provides the best opportunity to assess long-term

¹¹ The nine are: Sassafras River Association, Chester River Association, Nanticoke Watershed Alliance, Coastal Bays Program, Octararo Watershed Association, Gunpowder Riverkeeper, BlueWater Baltimore, South River Federation, and West/Rhode Riverkeeper.

impact of IAN's report card practice, particularly the handover phase. Including this phase helps to address the first research question of this chapter, how IAN's process extends over multiple years.

The second research question (whether IAN's report card practice has been *useful*) is approached with caution using this case study. Report cards that are prepared by local organisations differ in content and design from IAN's own report cards. The processes by which they are produced may also differ from IAN's processes. As such, they are (or have become) removed from IAN's direct influence, and attributing usefulness to these report cards cannot automatically be considered the same as attributing usefulness to IAN's report cards – it is necessary to confirm that the quality making the report card useful is also shared by IAN's report cards. Nonetheless, the building of others' capacity is seen as part of IAN's process, and in that sense usefulness can also be attributed to IAN. Overall, research results must be qualified to separate what can and cannot be fairly attributed to IAN.

(d) Data sampling, collection and analysis

Conversations with IAN staff during participant–observation was the primary method of engaging with IAN's perspective, along with use of IAN's extensive blogs, articles, newsletters and other documentary evidence on their website (ian.umces.edu). For recording the perspectives of local environmental organisations, as well as of a major funder and a policy-maker, semi-structured interviews were undertaken. The interview questions guided interviewees to discuss the topics set out in Table 9-1.

Six interviewees responded positively to a request for interview, with an additional respondent (CB04) corresponding by email. Four were local environmental groups (CB01–CB04, CB07); one represented a funder of several local report card programs (CB05); and one was a policy-maker at the Maryland executive administration (CB06).

Table 9–1 Guiding questions for Chesapeake case interviews

Guiding question	Rationale
Could you please describe the work of your organisation?	Necessary to identify how report card program has been useful to the organisation (useful for what purpose?).
Who are your key stakeholders?	Necessary step to identifying whether report card program has encouraged constructive stakeholder relationships.
When did you start making/ using/ funding report cards, and why?	Identifies how report card program evolved; may reveal how the program was extended over years. Also identifies expectation of report card outcomes.
How are report cards useful to your work – or not? Why?	Addresses Research question 2 of this chapter.
What process do you undergo to prepare a report card?	Adds to research question 1 – assists in assessing the extent to which the local groups' process differed from IAN's workshop process.
How does the report card (either the process of creating it, or the product itself) impact on your relationships with stakeholders?	Addresses Research question 2 of this chapter.
If report card program ceased – why did you stop making/ using/ funding report cards?	Research question 2 in the negative – how report cards were <i>not</i> useful.

Due to time constraints, further interviews were not conducted. This sample set is small, and confidence in the conclusions drawn is correspondingly cautious. Nonetheless, the sample collected has research value. First, the data are sufficient to relate experiences and ideas that may be useful to others seeking to use report cards as a stakeholder engagement tool. As Crouch and McKenzie (2006) argue, small sample sizes are suitable for examining the dynamics of a particular situation, even though they generally cannot be used to indicate proportionate occurrence of such a situation.

Secondly, the interviewees do represent qualitatively different categories of experience, raising potential analogies with the constructive/ destructive binary established earlier in the thesis. These categories (A, B, C and D) are shown in Table 9-2 below. For example, potential interviewees falling within Category A initially resisted report cards, but subsequently adopted them. This pattern potentially mirrored some aspects of relationships that shift from destructive (e.g. not trusting report cards or IAN) to constructive (e.g. believing in the value of report cards). The analogy is very loose: in general, there could be many non-relational reasons for an organisation to resist report cards (e.g. staff at full capacity); equally, there are conceivable non-relational reasons for later adopting them (e.g. received funding to do so). The main point here is to show that the sample set does cover a range of experiences, adding to its research value.

Table 9–2 Types of interviewees for Chesapeake Bay case

	Position changed over time	Consistent position
Currently supports report cards	<p>CATEGORY A</p> <ul style="list-style-type: none"> Initially resisted report cards, but have since adopted. Analogy: shift from destructive to constructive relationships? Interviewees: CB01, CB02** 	<p>CATEGORY C</p> <ul style="list-style-type: none"> Report cards adopted 2009 or earlier, still produced in 2015. Analogy: consistently constructive relationships? Interviewees: CB03, CB06, CB07.
Currently does not support report cards	<p>CATEGORY B</p> <ul style="list-style-type: none"> Initially adopted report cards, but then ceased. Analogy: shift from constructive to destructive? Interviewees: CB04*, CB05+ 	<p>CATEGORY D</p> <ul style="list-style-type: none"> Report cards never adopted (at time of research). Analogy: consistently destructive relationships? Interviewees: none.

*CB04 corresponded by email only.

**But neither CB01 nor CB02 were part of their respective group while it was resisting report cards, and so could not comment on the reason for changing position.

+CB05 is not opposed to report cards, but has reduced the amount of financial report; see results.

As Table 9-2 shows, Categories A, B and C are all represented. Even so, this representation is weak. Perspectives specifically on *why* initial support was abandoned, and *why* initial resistance was overcome, was only explored with CB05, who was the only interviewee with direct involvement in the decision to switch from support to resistance (or vice versa). CB01 and CB02 were not yet employees at the local group; and their predecessors had retired and were not contactable. CB04 would only correspond by email, which yielded some data, but the nuances could not be explored.

No interviewee was located for Category D. This was not surprising, given that groups consistently choosing not to adopt report cards are unlikely to interact with IAN, making it pragmatically difficult to identify them. The absence of Category D interviewees is not critical to the research. The purpose of the study is to consider how a report card program impacts stakeholder relationships; Category D may have functioned as a de facto control group, but insights from the experience of other categories can still be instructive.

Overall, therefore, what convinced users to adopt the report card, or to abandon it, could not be explored in detail – but would be a fruitful area for further research. As it stands, the dataset is still valuable because it indicates how each user uses their report cards, and, in some cases, the nature of the handover support received.

Data analysis was conducted using a grounded theory approach, as described in Section 4.3.3. Axial coding¹² was conducted specifically to relate the interview data to concepts of constructive and destructive relationships – to that extent the data analysis is not entirely built from the ground up.

9.1.2. Long Island Sound case study

The research methods for the Long Island Sound case are discussed in Chapter 8 and not repeated here. The applicable interviewee codes for this chapter are: FC01, FC02 (funders), and NH03 (local partner for Norwalk Harbour). This case is used here to:

- Give another example of a *handover* phase taking place.
- Explore stakeholder dissatisfaction developing *directly* from an IAN process (i.e., the Long Island Sound report card was created from IAN workshops, unlike most local Chesapeake Bay report cards).
- Provide further, triangulating data on how report cards have been useful already, even though publication in June 2015 was less than a year prior to the time of writing (timescale of months; cf. years in the Chesapeake case).

A number of limitations apply to the use of this case. First, because it has been less than a year since the report card was published, the stability of stakeholder relationships is not certain. For example, it may be too early to tell whether the relationship is in a destructive basin, or whether, given more time, it will turn again to its constructive attractor (i.e. nearly but not yet out of a constructive basin). In other words, this nascent stakeholder relationship may still be developing stable characteristics.

Second, the main purpose of the follow-up interviews (after publication of the report card) was to discover more about the dissatisfaction that arose. Consequently, more positive stories about the report card program may have been overlooked or underrepresented.

Finally, the key limitation is that the main groups dissatisfied with the report card program declined to be interviewed in relation to their dissatisfaction. Overall, these limitations reduce the confidence in the conclusions drawn from the data, but were not considered fatal to the case study as a whole.

¹² A step in the grounded theory approach, where initial codes are grouped into broader themes (Charmaz, 2006).

9.2. Results and discussion

The results from both case studies are organised according to the research questions. Section 9.2.1 describes how report card programs are handed over from being directly produced by IAN, to IAN supporting production by other groups. Section 9.2.2 relates how users, funders and policy-makers have considered the report card to be useful for their purposes, with a focus on stakeholder relationships. Section 9.3.3 discusses the limits of report cards, and includes analysis of the dissatisfaction arising in the Long Island Sound report card (as first reported in Chapter 8).

9.2.1. How does IAN's report card process extend over multiple years?

(a) Planning for handover

In a presentation by IAN staff, Donovan et al. (2016) state that the Chesapeake tributary report cards were always intended to be drafted by IAN at first, before handing over to local organisations afterwards. CB05 (funder, Category B) gave further detail:

... [I]n year one or two we would fund it maybe at the 15k level (US\$15,000), and UMCES¹³ would support it, and really teach the watershed organisation how to do their own report card in years out. Moving forward, once they were trained, we would fund the design and printing of their report card at \$5,000. Because that's still really our policy: if it's your first year out, we'll support a watershed organisation to work with EcoCheck at a higher level to not just do their first year of the monitoring and the design and the implementation of their report card, but to learn how to do it, and then in years out they can apply for up to 5-grand for support of design and printing. (CB05)

CB05's comments related not only to local organisations whose initial report cards were drafted by IAN, but also to those who had prepared their own report cards from the outset. Regardless, initial costs were higher, because local organisations needed to be able to send staff to undertake training, and also to acquire software to produce the report cards (mostly Adobe Creative Suite).

CB03 (local group, Category C) described how initial funding helped to commit a staff member to learning how to create report cards.

[She] spent a lot of time with UMCES – I'm not sure exactly the hours – but I think she was going over [to IAN's office] at least once a week, even twice a week. They really, really helped

¹³ University of Maryland Center for Environmental Science – which houses IAN.

that first year. I know there was a lot of software time, [learning about] conceptual diagrams... They were immensely helpful. (CB03)

The Long Island case showed a similar intent. FC01 (funder) stated their intention thus:

We wanted to have the report card process taught to us, then give it to a select group, and have them manage report cards for all the other local groups. (FC01)

The 'select group' has now been selected. FC01 indicated that Save the Sound (a program run within the Connecticut Fund for the Environment, a non-profit environmental organisation) has been awarded a multi-year grant to produce three report cards, with the first due in October 2016, using 2015 data.

While it is too soon to know the nature of the support IAN will provide Save the Sound after 2016, CB03 indicates that IAN continues to provide feedback *gratis*, even several years after handing over production:

I should say that still, every year, they are one of the people I send a draft to for feedback. Even though they're always slammed... they always give enough time to give really good feedback. They have a great eye – not only for technical, but also for layout (CB03)

Overall, these accounts demonstrate that IAN's process extends years beyond production of an initial set of report cards, and is often part of a planned transition from IAN-produced report cards to locally produced cards. Therefore, the process also extends beyond mere production, encompassing also an educative and capacity building outcome.

(b) Creating protocols

While the previous section highlighted in-person training as part of a handover phase, the protocols drafted as part of the MTAC can be seen as a written legacy that facilitate other groups to create report cards. Specifically, these protocols (EcoCheck, 2011, 2013) enable other groups within a particular region to create report cards that are consistent and comparable with other report cards within a region. CB05 (funder) explains the rationale for the protocols thus:

No one had any sort of consensus on what to actually measure, so everyone was creating their portraits based on their own metrics. [We] funded UMCES... to actually create a consensus among watershed organisations around what metrics would be included in tidal versus non-tidal watershed report cards. (CB05)

The language of consensus emphasises a collaborative approach, potentially to ensure that the protocols developed by IAN are suitable for their end users. The process of building consensus for the protocols was beyond the scope of this research; however, inviting end users to contribute to IAN's output appears to follow the same rationale as holding collaborative workshops as detailed in Chapter 8 – namely, IAN claims expertise only in creating report cards (and other science communication tools), and relies on local and regional experts to supply context-specific knowledge. Further research is needed to ascertain how the MTAC collaboration affected stakeholder relationships (as distinct from the Chesapeake report card programs).

This research uncovered no intention to create protocols for the Long Island Sound program. Possibly there is no need, given that a single organisation is responsible for delivering the entire program from 2016 onwards – which in turn is more feasible given the smaller size of Long Island Sound compared to Chesapeake Bay.

Even so, FC01 (funder) expressed a virtually identical goal of having all Long Island Sound report cards use similar metrics, to enable meaningful comparisons. Reprising a quote from Chapter 8 for readers' convenience:

Everybody wants to be able to compare apples to apples. And if you're going to do that, and you say that this apple on the north side of the tree is smaller than the apple on the south side of the tree. [Because there was not comparable datasets for the Sound-wide, Norwalk Harbour and Hempstead Harbour report cards], it became really hard to compare apples to apples to the main stem. And it was almost impossible to compare the embayments to each other. (FC01)

Similarly, NH03 (local group, Long Island Sound) did suggest that having clear protocols would help future efforts. In a balanced reflection on the process, NH03 said:

The only thing that disappoints me is that I know that we could have done a better job, if we had known further in advance what the indicators would be... We've already planned our monitoring program for this year. We know where we're sampling, and when we're sampling there, and if I need money and equipment to test new parameters, I don't need to know that in June – I need to know that in February. (NH03)

While not a direct request for protocols, NH03's comments reflect a need to develop clear expectations on what data was to be reported, which a protocol would satisfy. To be clear, NH03 was not arguing that the Long Island Sound process was a poor one, but rather assessing its strengths and weaknesses. FC01 (funder) appeared to agree generally with the assessment, saying

that the first year was intended to be a trial: ‘we wanted to do more than talk... [we preferred] to make mistakes quickly’.

Overall, creating written protocols appears to be one way of scaling up a report card program to enable many groups within a region to create independent report cards that use metrics comparable to other groups’. Doing so may also help to direct monitoring efforts – but protocols must be released in time for data collection programs to adjust.

(c) Differences between IAN practice and local practice – an evolution

The protocols developed for the Chesapeake were restricted to data collection and monitoring; as the literature review for this thesis suggests, there is no protocol relating to report card production as a social process, nor the design and layout of the report card. Local groups took the opportunity to develop their own style. CB03 (local group, Category C), for example, stated that

I think photographs are more effective than conceptual diagrams when you have limited real estate – that’s been my contribution to our report cards [since we took over report card production]. (CB03)

This statement shows that report cards tend to evolve during or after a handover period. Figure 9-2 illustrates such evolution using the front covers of the Chester River report cards. The last report card for which IAN was credited with involvement was in 2012 – which shows a shift to a photographic front cover, while retaining the general look and feel of its predecessors. The 2013 report card shows a more modern aesthetic, which has persisted until the latest report card in 2015. Overall, this evolution suggests that the Chester River Association has taken increasing ownership of report card production.

Further research could investigate what prompts local groups to change specific aspects of the report card upon taking over the production process. Such research may reveal how IAN’s process may be improved, or indeed illustrate how local groups are taking ownership of the process. The point in this chapter is that there *is* an evolution, which may make local-scale report cards appeal to a more localised audience.

Because of this evolution, local groups may appreciate some guidance on what makes for effective report cards, in order not to de-evolve into less effective report cards. Here, ‘effective’ means apt to achieve local groups’ goals, and may encompass ways to achieve the same goals better – including advice on software (‘I use InDesign ... It’s complicated, and it’s hard to understand ... but it works’: CB07, Category C).

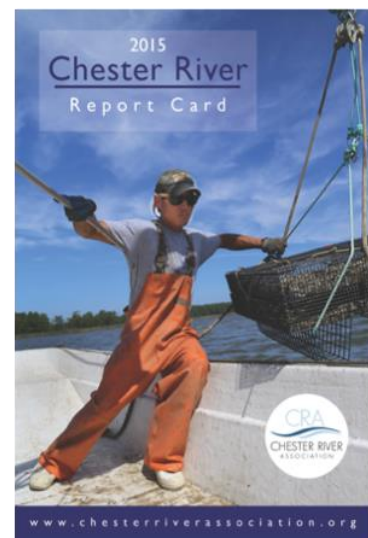
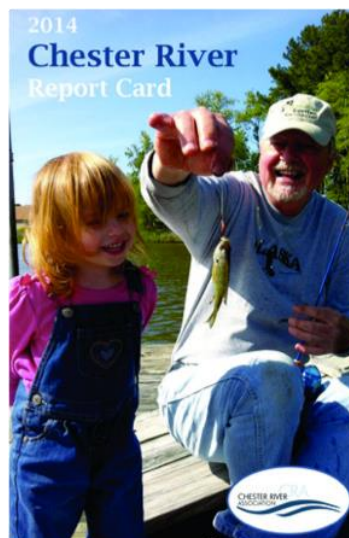
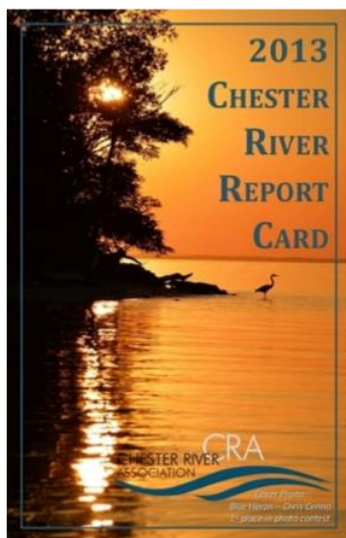
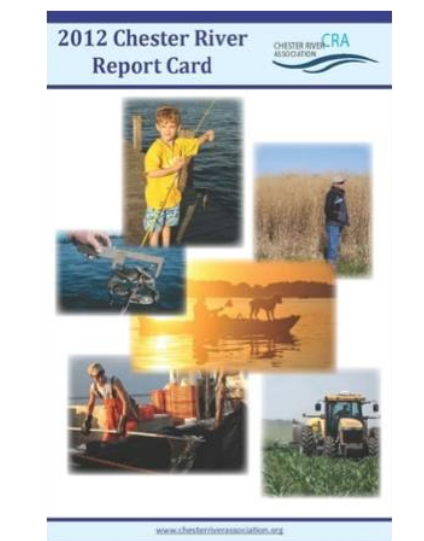
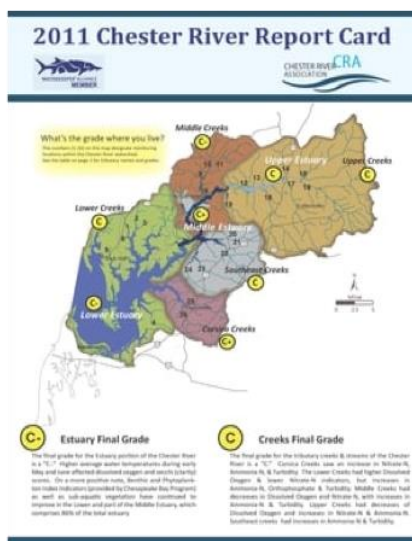
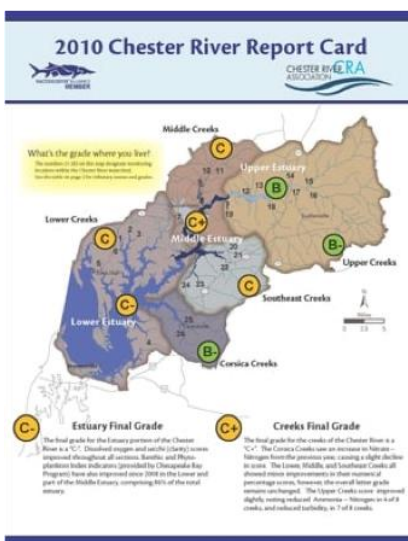
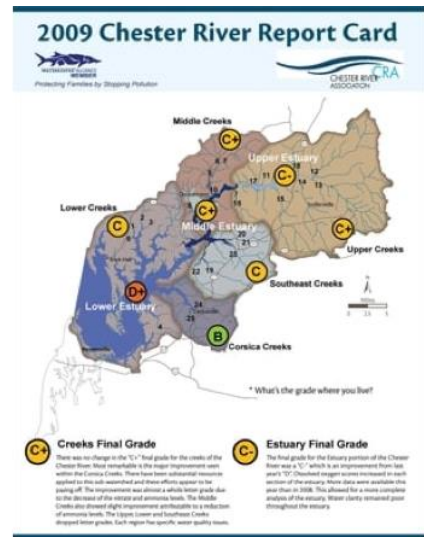
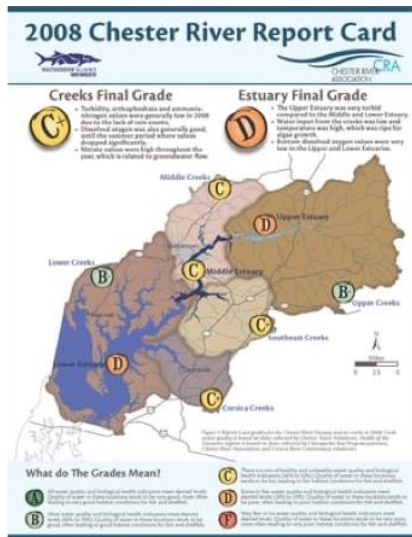
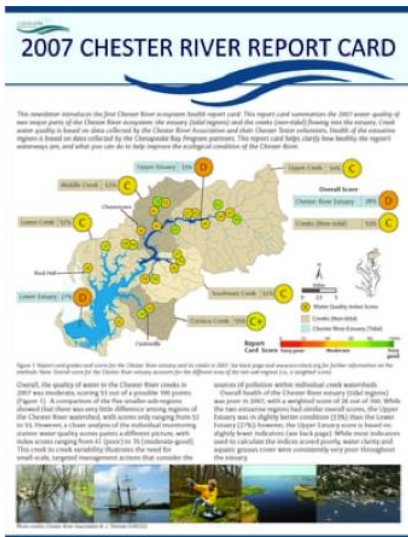


Figure 9-2 Evolution of front covers of Chester River report cards (2007-2015)

In the Chesapeake case, the West/Rhode Riverkeeper used Chesapeake Bay Trust funds to commission a focus group study, specifically to guide Chesapeake Bay organisations on effective report card design (Raabe, 2012). Such a study provided some guidance of this nature here. Similarly, while not a protocol *per se*, IAN's book, *Communicating Science Effectively: A Practical Handbook for Integrating Visual Elements* (Thomas et al., 2006) may also satisfy this need.

9.2.2. Usefulness of report card practice – especially re stakeholder relationships

Seven themes arose from this part of the research, as follows. Each is explored below.

- Report cards are conversation starters.
- Report cards are opportunities to honour partner organisations.
- Report cards build connections with other groups.
- A report card launch can spark and/or renew interest.
- Report cards are a data source which support decision-making.
- Comprehensibility and relevance of content are critical to usefulness.
- Trustworthiness of report card content is critical.

(a) Report card product as a conversation starter/ re-starter at a local scale

Across both case studies, local organisations agreed that the report card is a conversation starter with stakeholders. CB01 (local group, Category A) stated that report cards were usually handed out, regardless of the stakeholder, even though different stakeholders were engaged in different ways:

Our report card is a starting point for conversation. ... It lets us start the conversation with the County, and with the regulatory agencies. Now, of course [they also] use the report card as a starting point. They want to see your quality assurance plan; they want to see how you're collecting your data ... For our donors, we might have conversations throughout the year... like, your contribution helped us produce this; here's the product to you at the end of the year. *So it plays a different role for every stakeholder, but we'll use it for every stakeholder.* I mean, we'll use it for an outreach event, for people who know nothing about our organisation. It's a great thing to take to them to introduce them: 'Hey, you know that water quality's bad?' No, they didn't. 'Well here's a report card to show you, to show you that it's bad – and why you should get involved'. (CB01)

NH03 (local group, Long Island Sound) was similar:

We've basically been sharing it pretty broadly, at the venues where we share things like that. ... We've definitely been using the report card as an outreach document... I'm mostly using it as a handout for at public events. (NH03)

CB03 (local group, Category C) similarly stated that, 'For us the report card is a talking piece. We use it for outreach and education. It's a way for us to really engage with people.' CB03 added that wide distribution helps make their organisation known to people who had not previously engaged with them:

Maybe they see something in the report card, or in the river, and that prompts them to contact us with questions or things they've seen. It's a great way to build relationships... You know, sometimes really random things happen. I was at [a conference] a couple of months ago, and there was this guy from [another county], who wanted to do a report card over there. Report cards have really expanded where we're seen. (CB03)

CB07 (local group, Category C) agreed with enthusiasm:

Report cards go everywhere we do... Boaters, and fisherman, and general public, and we always talk about the report card. It's extremely helpful in just opening up communications if nothing else... I love it as a communications vehicle. (CB07)

Overall, there was consensus that the report card product is useful as a conversation starter for local organisations.

(b) Report card product acknowledges contributions of partner organisations

CB01 indicated that the report card product was a public way to acknowledge the contributions of their partners and funders in their work.

It's also an opportunity to recognise our partners, and the partnerships we've had throughout the year. So it's an important piece. (CB01)

While other interviewees did not make this point, it can be seen that the report card product has potential to build relationships between partners, by publicly drawing attention to partners' initiatives.

(c) Report card process builds connections with other groups

Prior to publication, the report card process may connect organisations that would not otherwise have worked together. NH03 (local group, Long Island) mentioned that creating the report card:

was a nice way to interface with other organisations who are involved. I never would have any reason to talk to the people from Hempstead Harbour if they weren't at those meetings. It's been a good opportunity to talk to some of the other data groups, and other people who are also thinking about these issues. (NH03, Long Island)

This observation is distinct from the foregoing, because it relates to relationships forming between people and organisations that are not necessarily stakeholders, in the sense that the 'other data groups' may not have a stake in the work of NH03. Rather, a community of people and organisations trying to achieve similar goals are built through the report card process.

(d) Report card launch process can spark and/or renew interest

CB03 (local group, Category C) emphasised efforts made to use a report card launch as a conversation starter:

We like to do a festival-type event. Right now, what we do is provide lunch for people, a BBQ, and – do you know the Fowler Sneaker Index?¹⁴ – we all go out in a big line, holding hands. (CB03)

CB01 (local group, Category A) similarly held events to launch their report cards:

[W]e don't just put out the report card or put it out on our website. Every year, we have the report card presentation, where we invite our donors, and the general public, to come to the presentation, where they can ask questions. (CB01)

CB07 (local group, Category C) described a deliberate strategy to invite policy makers and the media, partly to attract positive stories:

We did send notices to all the political people, elected officials in both counties. We did have one member of the press who put a really nice article on the front page of the newspaper... Real good coverage. (CB07)

¹⁴ An activity named after former Senator, Bernie Fowler, who informally tests water clarity by donning white sneakers and wading into the river, stopping to measure the depth at which he can no longer see his shoes (CBP, 2015).

FC01 (funder, Long Island) expressed similar ideas from an advocacy perspective. On the synchronised launch of all three Long Island report cards:

In terms of the impact, there were a lot more people talking about water quality, all up and down the Sound, at the same time. And that's really hard to get done... We said that we gotta have this person there, and this person here, from this department of conservation, whatever. A lot of folks were specifically invited... Those are the types of things that we aimed for. (FC01)

In other words, launching the report card *product* provides an opportunity to gather stakeholders in social gatherings, and/or to generate simultaneous public discourse on the content of the report card. The launch is a particular aspect of a report card *process*, which provides opportunities for people to interact in ways that encourage constructive relationships.

CB06 (policy-maker) further suggested that the cumulative effect of yearly launches has intensified community interest in the report cards:

The public awareness that goes behind a release have been impressive and building and steady, you know, there's not one time that it doesn't get coverage. (CB06)

Overall, the *sense of occasion* surrounding a report card launch appears critical to its usefulness to local organisations as well as at broader policy scales.

(e) Report cards are a data source which support decision-making

CB06 (policy-maker) emphasised the role of data in passing policies through political and administrative barriers. CB06 cited an instance where public funding was allocated to a 'cover crop program', whereby farmers were subsidised for growing crops that reduced the amount of nutrient runoff into Chesapeake Bay. The success of that program was attributed in part to being able to quantify the effect of that program:

[W]e have seven consecutive years of growth of the cover crop program, the most cost effective way to improve the Bay and that was really a result of targeting, people being on the same page, environmentalists and scientists agreeing that this is one of the best things we can do to improve this, and then seeing the results on the ground and the demand for the program. (CB06)

CB06 stated the need for an authoritative and reliable source of data more than once:

The key is watching the overall collective come-together, which is you we are able to bring the environmental and scientific community together with both policy makers and both executive and legislative branches and have them looking to one universal source of truth. (CB06)

Another, crucial use for report cards was that the data contained within them prevented politicking that would ordinarily delay – and sometimes ‘kill’ – a policy initiative:

[T]he normal way that things would happen is, someone would come to him and pop out a bill at the beginning of a 90 day session; a bunch of people would fight to water it down or kill it; at best you'd get a task force out of it that would take two years ... to meet and talk and do something. But [then] you are already starting from a watered down point.

What happened as a result of all these communities coming together through these collective efforts was this conversation [about Bay health] is going on all year long, so ... if someone was sponsoring a bill, everyone knew what was coming... [W]hen everyone comes in to testify against it to the committees, they can't say we need time to study this, we didn't even know about this. (CB06)

While these anecdotes were specific to legislative changes, CB01 (local group, Category A) recounted a related need to convince private funders to continue supporting restoration initiatives:

But for funders, they're going to be like, ‘Tell me more about this particular project. What's the data for this particular site? How are you going to monitor the data for this particular site over the long term?’ (CB01)

CB01 then suggested that report cards show ‘statistically significant, measurable differences’ to ‘large-scale projects, restoring 800 feet or 1,000 feet or 1,200 feet of stream at a time’.

Overall, these interviewees suggest that report cards must be scientifically substantial to be useful in this way. This attribute underpins some of the others identified so far – for example, a launch event of another kind of brochure may well create opportunities for stakeholders to mingle, but what makes report cards different is that they also represent monitoring data that supports policy and funding decisions. This idea is now discussed further.

(f) Comprehensible and relevant content critical to usefulness

A number of interviewees emphasised that the *quality* of the report card content is critical – specifically, its comprehensibility, relevance, and trustworthiness. *Comprehensibility* means that the report card presented information in a non-technical way. For example, CB03 held firm opinions:

No jargon; don't make it over-technical. It needs to be simple, easily understood... use a lot of photographs, [make sure] people in the watershed are seen... Don't expect everyone to read it from cover to cover (CB03)

As a funder, CB05 looked for similar comprehensiveness in their grant applicants:

[Stakeholders] don't want text-heavy documents and they don't want data heavy documents. They really like the grading system because they intrinsically understand it from their own grade school. "A" is good, "F" is bad... Because, and this is a sad statement, people don't want to read. They just don't. (CB05)

CB06 (policy-maker) phrased a similar idea thus:

I think the report cards have been really helpful in, and this is doing injustice to both UMCES and the general public, but in bringing a scientific component to, and then being able to dumb that scientific, true science down to something people can relate to, right? It's fantastic when we can talk about in terms, in respects, of nitrogen and phosphorous, my own personal belief is that if we just talked about poop and human faeces in the water, people respond better than do to nitrogen phosphorous, but still. (CB06)

Interestingly, CB07 emphasised how the grading provides a familiar entry point to less familiar material, but a slight opacity in the other material was an opportunity to engage:

It's not something you can look at and understand immediately, so... people ask questions; it gets them thinking about the river... and that's what we're here for... They understand the concept of a report card, which is drilled into you all your life until you get out of school. I think that's the helpful part about calling it a report card. it grabs their interest. (CB07)

Relevance meant that the stories told in the report card were evident to those living in the region. Moreover, residents wanted to be directed to actions that they could take – here, ‘directed’ means given a handful of actions, rather than an extensive menu. Thus:

Another thing that I've found is that people are really, really interested in the local watershed. They really associate with the body of water that goes through their place... As you know, we have so much water around [in this area], it's hard to not be engaged in the water. (CB03)

[Stakeholders] are looking for you to say "Okay, bacteria is high so I need to pick up my dog's waste... They want someone to tell them what is the action I can take to affect change on this metric. And they don't want to be told "Here are the twenty things you can do", they want somebody to tell them this is the problem, here is the *one* action you can do to affect it. They want it to be very simple, very digestible, and they want things to be laid out for them a way that seems manageable. (CB05)

CB06 (policy-maker) echoed the need for practical guidance, as well as the desirability of showing improvements arising from those actions. In other words, report cards are more useful if they can

instil a sense of personal responsibility in its problems, and provide positive feedback to show that actions are making a difference:

Another thing the report cards are great at are sort of just showing, you know, you can go back year after year after year and see where the improvements are, where the degradation is and then that makes it easier for everyone to sort of point to the actions that have been taken that improve it and the lack of actions taken to degrade it. (CB06)

While these quotes focus on the relevance of the text, CB05 (funder) mirrored CB03's preference for photographs – albeit this time, the photographs related to a call for action.

Images with people were successful... But [the most successful report cards] showed photographs of things people could do. Whereas other ones were saying you should do one of these twenty activities and they would list them in sort of a narrative format. (CB05)

Thus, a report card is useful where both text and visual elements are relevant to readers.

(g) Trustworthiness of report card content also critical

In addition to comprehensibility and relevance, *trustworthiness* was a theme that arose in several different ways. In the Long Island case, FC01 (funder) suggested that the method of grading must be trusted, if the discourse sparked by the report card is not to become derailed:

All report cards are based on consensus, whether it's grade school or whatever. It's based on an idea that these are the things we should be measuring, and there's a reasonable scale from A through F. If you have consensus, it's fine. Everybody talks about how you improve the grade. If you don't have consensus, everyone argues about what the grade is. (FC01)

CB01 (local group, Category A) stated that there was some public distrust of the data ('Some people ask, is it completely made up?') However, CB01 could instil confidence in the data because it was collected by under its own citizen science program ('the data doesn't lie'). The quality of the data therefore impacts on its trustworthiness.

Finally, trustworthiness was expressed in terms of the perceived *impartiality* of IAN. CB06 (policy-maker) suggested that, because IAN is *not* a conservation group, it is not perceived to benefit from manipulating the report card scores. Consequently, it is seen as impartial, which helps policy decisions to be made on the basis of the report card:

I think there was scepticism from... the raw environmental community cards [i.e. cards produced by local groups]. Of course they want to give it a D, because it's going to be good for fundraising, right? ... I think that, honestly, adding some more scientific components to it and

being able to demonstrate how they're arriving at a score and being more transparent about that, has really made it easier to justify funding in the general assemblies, start funding with the general public and show that improvements can be made and even though we're doing a lot, there is still a long way to go. (CB06)

Overall, the trustworthiness of a report card appeared underpinned by the robustness of the data, the transparency and sensibleness of the grading scale, and the perceived impartiality of the organisation creating the report card. In turn, this trustworthiness is likely to be a precondition to the other ways that report cards have been useful – for example, a report card launch is unlikely to be successful if people do not trust its contents; equally, a report card may not start a productive conversation (e.g. about what individuals can do to improve Bay health), if doubts about the impartiality of the report card distract the interlocutors.

9.2.3. Limits of report card usefulness

The previous section presented evidence suggesting ways in which report cards are useful for local environmental groups, funders and policy-makers. This section focuses on the *limits* of that usefulness, which are, in many cases, preconditions that must be fulfilled in order to access the usefulness identified above. Many of these limitations are implied in the above results; this section is correspondingly briefer, sometimes referring to quotes above rather than repeating them.

(a) Deeper engagement requires other tools

Earlier, it was suggested that report cards are useful because they start conversations with a variety of stakeholders. However, interviewees emphasised that the report card itself can only *start* conversations – other engagement is required. For example, CB01 (local group, Category A) cited report card launches as a mode of stakeholder engagement extending beyond the report card itself.

(b) Simplification sometimes treated with scepticism

In tension with the need to make report cards comprehensible to lay persons is the simplification of science that comprehensibility necessitates. IAN has acknowledged this trade-off in positioning itself as a pragmatic problem-solver rather than an academic research institute (recall the distinction between ‘getting it done’ and ‘getting it right’ – see Section 8.2.1b).

CB04 (local group, Category B), although initially part of a report card program, ultimately chose not to run the program. CB04 was vehement in its opposition:

Report cards are used primarily for publicity and fundraising. Little to do with protecting or restoring the resource... Report cards are a joke given that we have passed the tipping point [of

environmental destruction] and report cards are for elementary school. [We] frowned on participating in the charade. If we want a grade on how we are doing protecting the environment, go with a big fat F. (CB04)

Although the emails with CB04 were not sufficiently detailed to explain the source of such opposition, the quote above does appear to attack the scientific trustworthiness of report cards. A newspaper article by Scott (2013) reports other local organisations as holding similar reservations about the report cards (see also Kelly, 2011). While acknowledging the methodological risks in relying on media articles as an evidence source here (I cannot verify the reliability of the article and the quotes therein), the article does suggest that the perceived simplicity of report cards can limit their usefulness.

As noted, CB01 and CB02 were not able to comment on why their organisation initially resisted adopting report cards, because they were not yet employees at the time. IAN01 suggested that there was also a concern that the report cards were too simplified as to be good science (CB02 believed that that was the case also); the development of the protocols allegedly resolved that concern.

(c) 'Hard' grading may damage stakeholder relationships

Although a low grade may facilitate conservation advocacy (FC01: 'a D+ [is] the perfect grade for a conservation organisation!'), the Long Island Sound case shows that low grades may harm other stakeholder relationships. Unfortunately, the Hempstead Harbour participants declined to be interviewed. While some interviewees were reluctant to speculate on their feelings (NH03: 'I don't want to speak for them'), others were more willing to do so. In summarising the general feeling of Hempstead Harbour organisations towards the grade, FC01 stated:

Their response was, 'yeah, we get that [a D+ is good] from an advocacy perspective, but we have a lot of relationships with the shellfish people and fishing industry, who are trying to get people to understand that the water is not so horrible, and you should come down and eat their seafood.' And to now come back with this thing that says D+ on it is a bust. (FC01)

The Chesapeake groups did not comment on this point.

(d) Stakeholder involvement in decisions relating to purpose of the report card, choice of parameters, and grading

The previous point may have been exacerbated because some local groups within the Long Island case may have felt insufficiently involved in decisions relating to the report card process. Again, without interviews with Hempstead Harbour representatives, it is difficult to say with confidence

what the precise grievance was. However, again being careful not to speak on behalf of Hempstead Harbour, NH03 indicated some of its own concerns.

[The report card is] something that we can hand people that's nice looking... but at the same time, it doesn't really tell them about most of what we do. 90% of our work is on bacteria, there's not really a bacteria there 90% of our work is on bacteria, there's not really bacteria there... [That's important because] people don't think about ecosystem health [in terms of water quality]... they think, 'should my toddler be in the water?' ... I think it was a missed opportunity to connect with an audience that we want to connect with. (NH03)

NH03 seems to be saying that the ultimate product did not truly reflect its work, which limited the usefulness of the report card to a mere conversation starter. (Nonetheless, NH03 freely accepted that the funders had a whole-of-Sound intent in mind.)

Additionally, NH03 had some concerns with the grading, which goes towards the trustworthiness of the report card in the eyes of the community. NH03 took efforts to portray the overall experience as positive ('you expect those kinds of stumbling blocks because it was the new program here. I didn't make it sound like we had a terrible experience, because we didn't'). However, one can detect suggestions that greater involvement of NH03's organisation in the grading process may have been an improvement (emphasis added):

The other things that people are angry about is the scaling for the letter grades was pretty arbitrary. They were graded on a 0–100 scale where a 50% was the mean of that variable, versus if you got a C in school, it would have been an F in the report card. Most grading is done on a curve where a C is the average, not an F. I think the grades were worse [than expected as a result]. When an average person thinks about a C, that's not great, but a C in the report card was actually what an average. Basically there wasn't the right amount of scaling done to the way letter grades are used in school, such that the connections were made, I think, with how good or bad things actually work. That was really only for a big picture, and *we weren't included in any of that. I came in too late of the process to be more adamant about changes than I was. I think that I probably would have been more on top of how the pattern was put together, if I had been brought on sooner.* (NH03)

There was also an apparent lack of forewarning as to what the grade would be: 'we didn't really know until the very end that that was actually going to be what it was going to be' (NH03).

Therefore, aside from the substantive grievance of a low grade damaging some stakeholder relationships, it can be inferred that the Long Island Sound case involved some procedural grievances – namely that local partners were, at times, not involved or forewarned of decisions that

would affect them. A related grievance was product-based. FC01 and NH03 suggested that the cover photo (boats on the water) implied that the report card related to human health, when in fact it was solely about water quality. Potentially, earlier engagement even in the visual elements would have been a fruitful part of the process.

9.3. Conclusion

The first research question for this chapter related to how IAN's report card process extends over multiple years. The results showed that IAN's process includes a *handover* phase, during which it:

- Trains local groups to begin producing their own report cards;
- Creates protocols to record and standardise processes across a broader monitoring region; and
- Hands over report production and associated decision-making to local groups, providing feedback on report card drafts where sought.

This *handover* phase adds further detail to the findings of Chapter 8, which set out the model of IAN's report card process.

The second research question sought to discover ways in which IAN's report card practice has been useful, from the perspective of local groups, funders, and policy-makers, and with a focus on building constructive stakeholder relationships.

The results show that, from the perspective of a local group, the report card *product* is used to start conversations, acknowledge partners, and maintain relationships with stakeholders who may not be active participants in an organisations' work. Generally, though, further processes (such as making a community event out of launching the report card) are necessary to build or *deepen* constructive relationships. Over years, the report card product becomes increasingly useful as a repository of data that supports decision-making, and can prevent politicking that delays policy. In this manner, report cards can be considered to weaken destructive attractors.

However, these benefits are only realised if a number of limits are observed. Firstly, the report card must be *trustworthy*, in the sense that the data must be (and perceived to be) robust, and the grading must be conducted by an impartial entity (who is also perceived to be impartial). The report card content must be *relevant* to the intended readers, in order for the report card to function as a conversation starter. The report card must also be *comprehensible*, without being too *simplistic* – this is a difficult balance to strike, and has prompted some local groups to opt out of the report card program. Finally, the Long Island Sound case shows that a report card program risks creating destructive relationships where (a) a stakeholder disagrees with the content of the report card (e.g.

the final grading and the cover photo); and (b) where such stakeholders feel that insufficient opportunity was given to contribute accordingly.

Overall, this chapter marks the end of empirical research for the thesis. Chapter 10 will now take these findings and synthesise them with the findings of Chapters 7–9 into a practical guide for using report cards to build stakeholder relationships. It will also link the IAN study with the Australian NRM study (Chapters 5–6) to critically evaluate the potential of report cards to achieve this purpose.

Chapter 10. Using environmental report cards for encouraging constructive stakeholder relationships

This chapter synthesises the foregoing chapters to describe how report cards may be used as a tool for encouraging constructive stakeholder relationships. It also adds further ideas by discussing the research findings through the constructive/destructive frame. Within the structure of the thesis, this chapter serves as a *substantive* summation of the research findings. The following chapter, which concludes the thesis as a whole, is a self-reflection on the achievements of this thesis, its limitations, and next steps.

The synthesis within this chapter is intended to provide a *useful* guide for people and organisations who are using (or wish to use) report cards (*on usefulness*, recall the discussion of *phronesis* in Chapter 1). The structure of the chapter reflects a practical progression of deciding to use the tool, using it, and what outcomes to expect, thus:

- **Deciding whether to use report cards** – a tool for what purpose? For use by whom?
- **Using report cards** – how should report cards be used, as supported by the evidence presented in this thesis?
- **What results to expect** – what *can't* such a report card practice achieve, and what more might be needed?

Broadly, these questions were asked as part of an exercise in problematisation, which here means identifying and challenging underlying assumptions (Alvesson & Sandberg, 2011). While problematisation is ordinarily a deep, critical inquiry, the problematisation here was much shallower, intended only to enable the key components of the tool to be established. In short, the above structure was developed from asking who, what, when, where, how and why. These questions are discussed in the sections below. Overall, this chapter functions as a how-to guide for users to implement their own report card practices.

10.1. **Deciding: are report cards for me? Purposes of a report card tool, and suitable users**

This thesis puts forward report cards as a tool for the purpose of encouraging constructive relationships among stakeholders, in a natural resource management context. This statement can be further unpacked, with reference to content from earlier chapters.

The word 'tool' refers to a practice (i.e. process and/or product), used with intent to achieve some purpose (see Section 3.2). The purposes of environmental report cards were discussed in

Section 3.3. As a reminder: historically, they have been used as tools for aiding adaptive management (by periodically feeding back data into decision-making), and for communicating science to decision-makers (often with the ultimate purpose of gaining funding for conservation programs). IAN's report cards are also explicitly used as tools for communicating science to the public.

The contention of this thesis is that report cards can also be used as a tool for building constructive relationships among stakeholders. Particular emphasis was given to the *process* of creating report cards as instrumental in achieving this purpose (Section 2.2). While some of the above-listed uses touch upon this purpose, the explicit examination of report cards as involving relational, social processes has not been done previously (Section 3.3.2).

The term 'constructive' refers to a quality of stakeholder relationships, characterised chiefly by:

- Trust in each member of the relationship (*feeling safe*);
- An environment that encourages new and creative ways of thinking about and doing things (*encouraging creativity*); and
- Desire to work with each other (*motivation to solve problems*).

A 'constructive' relationship is half of a binary pair, the other half being 'destructive' relationships. These concepts were examined in Section 2.4, which established that the key characteristics listed above are themselves influenced by other characteristics of a relationship. Overall, however, all characteristics interact to create *stability* in the relationship: a constructive relationship is one that survives periods of disagreement, such that the relationship returns to these characteristics time and again. This stability is described in Chapter 6 using the basins-of-attraction model.

In summary, the purpose of the report card tool in this thesis is primarily to influence stakeholder relationships into a constructive mode, and away from destructive modes. Box 10-1 provides a checklist summary.

Box 10–1 Report cards in this thesis: a tool for what purpose?

The report card tool in this thesis is a tool for:

- Monitoring the health or performance of a particular region/ social-environmental system.
- Communicating such performance to a lay public and/or decision-makers.
- Forging & maintaining constructive relationships among stakeholders within the region.

How might report cards be used within the Australian NRM context? Report cards are already being used in Australia (see, for example, GBRF, 2016; GHHP, 2015; Healthy Waterways, 2016). But as argued in Chapter 2, the *process* of report card creation tends not to be emphasised in these programs. A collaborative report card process might, in many cases, fit easily within existing NRM initiatives, since a considerable component of NRM practice already requires managing stakeholder relationships (see, e.g. Zurba et al., 2012; Hart & Bubb, 2016). Indeed, Australian NRM faces particular challenges of collaboration, because historical models of local, community-based NRM did not always up-scale neatly to the current regional model described in Chapter 5 (Benham et al., 2015). As Prager (2010) argued, intermediary bodies (such as regional NRM groups) would ideally ‘link local groups’ enthusiasm and knowledge to the regional planning and management process’. A report card process, administered by an NRM group, may be a useful tool to create such linkages.

The report card process may complement other existing collaborations, such as the preparation of Catchment Management Plans and Catchment Action Plans, many of which are created with community input (see e.g. DELWP, 2016; OEH, 2013), and some of which already report monitoring data in a manner similar to report cards (e.g. Hunter Water, 2011: 12). It is not argued, of course, that report cards will always be an appropriate tool for stakeholder engagement or community collaboration. The main point is that report card programs are *an* option for a multitude of NRM initiatives, particularly where they can complement existing collaborations.

The question of *who* report card users are arises as the next question for deciding whether a report card program should be embarked upon, for the purpose of encouraging constructive stakeholder relationships. That is, who are the envisaged users of this tool? The research scope did not exclude any particular class of user, except that users must be involved in natural resource management. Empirically, a number of users were encountered, as listed in Table 10-1, with corresponding uses are listed alongside.

Table 10–1 Potential users of report card tool & corresponding purposes

User type	Description	Possible purpose in using tool	Examples from research
Local environmental group	Non-profit groups whose work involves monitoring and improving the ecological health of a particular region.	To start conversations with other stakeholders; to expand stakeholder networks. To communicate results of monitoring programs. To seek funding on the basis of monitoring results.	Australian NRM groups in Queensland and Western Australia (i.e. non-governmental). Citizen-science, community associations within the Chesapeake Bay watershed, working to improve a particular tributary. Embayment groups operating within Long Island Sound catchments.
Coalitions	Non-profit organisations that operate as hubs through which other stakeholders can interact.	To bring together a diverse range of stakeholders. To pool knowledge and share perspectives. To achieve consensus on the issues and further actions.	America's Watershed Initiative (Mississippi River report card program).
Philanthropic organisations	Private organisations seeking to achieve environmental outcomes by supporting (through funding, advice, etc.) monitoring, research, and advocacy work undertaken by other organisations.	To build capacity of local organisations (see above, <i>re</i> local environmental users). To monitor, record and communicate, from year to year, environmental improvements (or not) as a result of the projects/ local groups supported. To support advocacy and fundraising efforts.	Chesapeake Bay Trust. Long Island Sound Funders' Collaborative. Great Barrier Reef Foundation.
Governmental decision-makers	Policy-makers and law-makers seeking to drive evidence-based decision-making.	To create an evidence-base for making decisions. To persuade others to support decisions, based on the evidence.	Members of the Executive branch of the State of Maryland government (Chesapeake Bay case).

The types of users in Table 10-1 are not exhaustive, but a reflection of the main classes encountered in the research. In particular, a ‘user’ here connotes those who actively participate in the report card process – as workshop attendees, funders, or ‘owners’ of the report card program. Those less invested in the program (such as general members of the community who might only read the report card) are not included, because they are considered passive consumers of the report card product, and this chapter is written to be useful to active users seeking to use report cards for a purpose. To be clear, excluding these users is not to imply that they are unimportant; rather, how report cards affect them, and vice versa, must be the subject of further research. Aside from the active/ passive distinction, this table does not suggest any restriction on who would make a suitable user. (The distinction is immaterial, because passive users cannot, by definition, purposively make use of a report card tool.) This research suggests at least two characteristics that suitable users must have:

- **Genuine desire to learn.** Chapter 5 (Australian NRM study) suggests that the use of data for ulterior motives (e.g. to gain a negotiating or political advantage) tends to promote destructive relationships. A user seeking to exploit a report card process for an ulterior advantage is unlikely to achieve constructive outcomes. For example, manipulating the grades in order to demonstrate the need for further funding risks eroding trust in the accuracy of the report card contents, and in the people and organisations who produced the report card.
- **Perception of genuineness.** Some interviewees in Chapter 9 (IAN post-publication phase) suggested that it was important for IAN, which was perceived as impartial, to be running the report card process. The mere perception of bias would also harm trust in the report card product, and its producers. Thus, a factory owner accused of contributing to river pollution may wish to initiate a report card program to show that its mitigation efforts are leading to improvements, and to start conversations with concerned local residents. Even if these efforts were undertaken in good faith, the factory’s interest in showing improvement may mean that the factory owners’ goals are not achieved – they would be advised to ask another, less ostensibly biased organisation to initiate the report card program.

In summary, the report card tool may be used by a wide range of organisations, for a range of purposes. People and organisations considering using a report card tool should reflect on their motivation in doing so, and how others perceive their motivations. In Australian NRM, using report cards to build stakeholder relationships may be particularly attractive for community-based NRM groups, who, in the absence of formal regulatory authority depend on consensus-based techniques to achieve their goals (see Section 5.1.1). There is no inherent reason why statutory NRM groups would avoid using report cards, although their identity as a representative of government may influence the perception of impartiality.

10.2. Using the tool: what is it, and how is it used?

10.2.1. Outputs

The output of the tool is a report card, or a series of report cards published periodically (typically, one per year). The focus of this thesis has not been on the report card *product*, but Chapter 7 (and some interviewees in Chapter 9) gives some guidance on the components and characteristics of the report card product:

- A variety and high concentration of visual elements – particularly photos, conceptual diagrams, and maps. (Charts and graphs are less common.)
- Report card grade displayed prominently on the front cover.
- Grades for each indicator set out, with colour coding according to grade.
- Explanation of how the grades were calculated.
- Key narratives on what is happening in the monitoring region.
- Practical action readers can take to improve environmental outcomes.
- Acknowledgements of partners.
- A photo of workshop participants.

For further detail on the design of report card products in IAN's style, readers are referred to Thomas et al. (2006), which is a visual design guide produced by IAN with a specific focus on science communication applications.

10.2.2. Processes

The report card *process* has been the primary focus of this thesis. The process recorded was structured temporally, relative to the participatory workshop (or workshops) that is the focal point of IAN's process – i.e. *before* workshop, *during* workshop, and *after* workshop phases. Chapter 8 recorded *before* and *during* phases, with only limited focus on the *after* phase (which, due to time constraints, was not extensively observed during the period of participant-observation).

Further details on the *after* phase were uncovered and reported in Chapter 9, and in particular a long-term *handover* phase. The handover phase occurs after publication of the report card, and involves IAN giving training and support to other organisations, to enable them to produce report cards. This phase is conceptualised as a fourth, additional phase.

Figures 10-2 to 10-5 put together all phases of the process. The evidence base for these figures came from eight months of participant-observation of IAN's practice, and 15 interviews with

process participants and report card users. These figures are not intended to imply a linear process; Figure 10-1 shows that they are part of a cyclical process, where publication of one year's report card leads to the beginning of the next. Upon handover, a new producer embarks on the process.

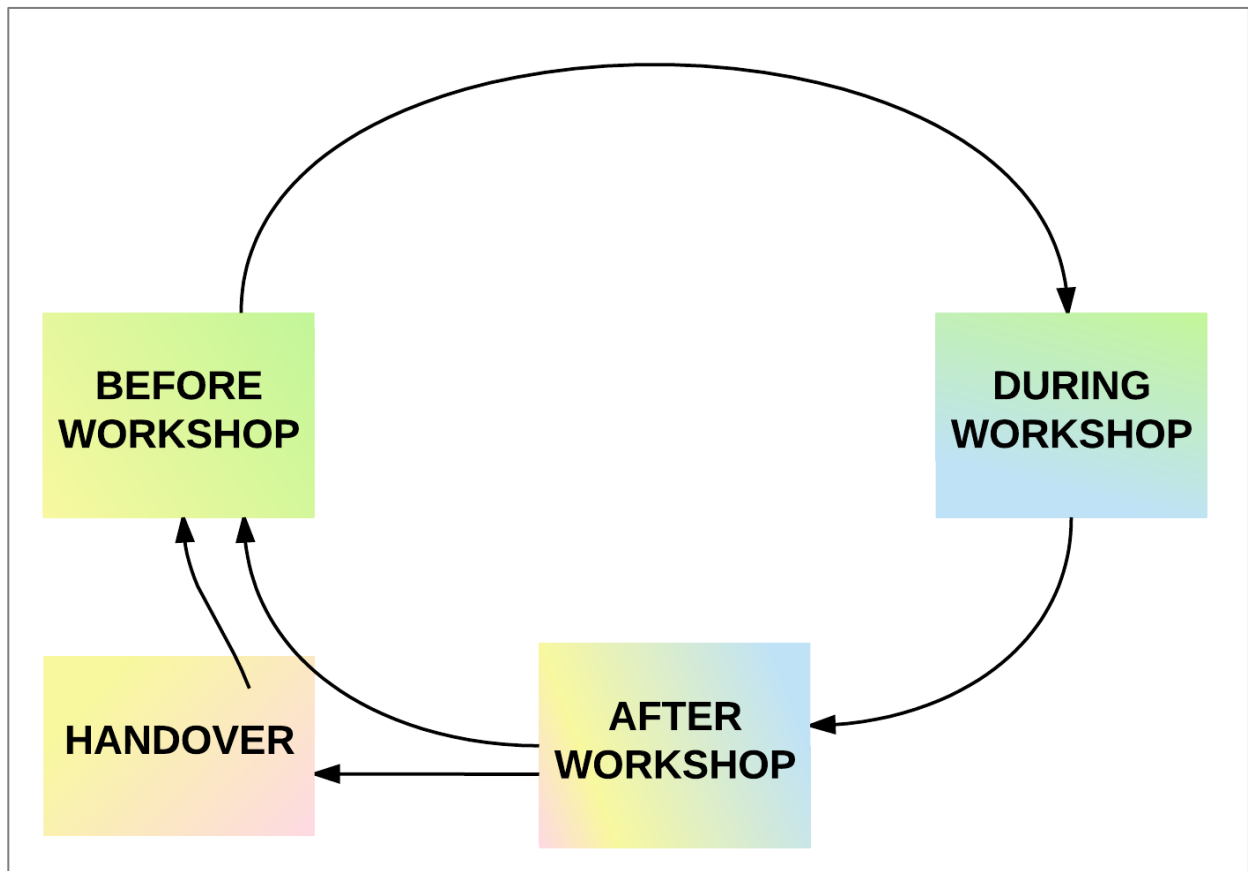


Figure 10–1 IAN report card process is cyclical

Note: colours correspond to the figures below.


BEFORE WORKSHOP 						
<i>Action</i>	Research monitoring region	Prepare template maps	Prepare symbol vocabulary	Identify stakeholders	Inform participants about report card process & method prior to workshop	Discuss and receive feedback on goal of the overall report card programs
<i>Practical function</i> How does this action contribute to report card production?	To learn knowledge that will help understand & elicit stakeholders' concerns (incl. while sketching conceptual diagrams).	To use as basis for conceptual diagramming.	To use as basis for conceptual diagramming. To enable knowledge to be depicted visually in conceptual diagrams.	To enable selection of workshop participants. To ensure all relevant perspectives are included in the report card.	To sensitise workshop participants to the task of producing the report card. To encourage participants to prepare for the workshop.	To ensure efforts are productive. To ensure practical barriers (e.g. availability of a particular type of data)
<i>Relationship-building function</i> How does this action contribute to encouraging constructive stakeholder relationships?	To contribute towards actual and perceived understanding of stakeholders' perspectives.	See 'Draw conceptual diagram of monitoring region' – <i>during</i> workshop phase.	See 'Draw conceptual diagram of monitoring region' – <i>during</i> workshop phase.	To ensure the report card process is (and is perceived to be) inclusive and representative.	To build a sense of shared mission.	To build a sense of shared mission. To prevent or foresee potential 'fault lines' of conflict. To understand interests of participants and their organisations.
<i>How?</i> From perspective of workshop facilitator, unless otherwise specified.	Conduct literature review (including grey literature).	Find/prepare outline maps and cross-sections of landscape. Practice drawing them by hand. Prepare blank printouts for group exercises.	Identify possible themes that will likely require depiction (e.g. particular fish species; people's houses). Practice drawing by hand. Prepare draft digital versions.	Stakeholder analysis: desktop review. Seek guidance from client and from other stakeholders: 'who else should we be talking to?'	Listening tour (face-to-face meetings). Video explanation (e.g. YouTube link).	Client to hold a discussion with potential workshop participants (and other stakeholders) about goal of report card. Client to invite feedback, and adjust in close consultation.

Figure 10–2 IAN report card process: *before workshop* phase (revised from Ch 8)


DURING WORKSHOP 									
<i>Action</i>	Re-inform participants about report card process & methodology	State clear goal for end of workshop	'Conceptionary' or other exercise: participants produce a scaled-down report card	Draw conceptual diagram of monitoring region	Identify & prioritise key narratives to be told in report card	Identify data sources to support conceptual diagrams and key narratives	Discuss timing of release, and who should be given a pre-release draft	Facilitators continue working after hours	Make opportunities for fun
<i>Practical function</i> How does this action contribute to report card production?	To ensure participants understand the task of producing the report card.	To declare and clarify the outcome expected by the end of the workshop.	To sensitise participants to the process of: representing concepts diagrammatically, selecting indicators, and assigning grades.	To record the participants' collective understanding of the functions of the social–environmental system to be monitored.	To elicit information that would accompany the grading assessment in the report card. To identify what narratives should be included.	To show which indicators are feasible (i.e. supported by data).	To decide a realistic and strategic deadline for completion.	To record each day's progress. To enable each day's progress to be shown to participants early next day.	To ensure sufficient rest for productivity.
<i>Relationship-building function</i> How does this action contribute to encouraging constructive stakeholder relationships?	To build a sense of shared mission.	To foster a sense of purpose, of progress and achievement.	To create opportunities for workshop participants to work together.	To show that there are points of agreement. To elicit disagreement in a climate of shared mission (i.e. to produce an accurate diagram).	To ensure that participants' stories are heard. To encourage participants to see that the report card reflects the messages they want to convey.	To ascertain how participants can contribute (by sharing data). To ensure the available data are coherent with the narratives participants want told.	To ensure report card has impact within public discourse. To ensure desired allies (e.g. policy-makers) are forewarned about findings.	To show progress, and to foster a sense of progress and achievement.	To enable participants to know each other personally, beyond professional work.
<i>How?</i> From perspective of workshop facilitator, unless otherwise specified.	Give oral presentation. Hand out examples of report cards from other regions.	Use a count-down (e.g. "27 hours until draft produced"), which is updated regularly.	Divide participants into small groups. Give each group an outline map of the monitoring region. Instruct each group to draw social and environmental interactions on the map, and/or define indicators of system health and allocate grades.	Use flipchart to draw maps of the region. Populate with symbols representing system interactions. For sequential workshops: allow subsequent groups to add to and comment on previous groups' diagrams.	Invite participants to nominate key stories to be told. (Potentially ensure each participant contributes.) Discuss stories and consolidate/expand if possible. Hold a vote to discover most popular stories.	For each indicator, ask, 'how can we measure this?' Ask what datasets participants have access to.	Consider: <ul style="list-style-type: none">• Events on the public calendar that might clash/divide attention.• Coordinating report card launch with other events.• Allowing sufficient time for report card completion.	Digitise conceptual diagrams. Layout report card draft, with key stories. Use placeholder text if no substantive text available.	Consider: <ul style="list-style-type: none">• Group lunches and dinners.• Reception drinks.• Impromptu stories, jokes, and other breaks from work (e.g. songs).

Figure 10–3 IAN report card process: *during* workshop phase (reprinted from Ch 8)


AFTER WORKSHOP 						
<i>Action</i>	Catch up with stakeholders not able to attend/ unwittingly not invited	Publish newsletter summarising workshop	Distribute a draft report card & receive feedback	Continue to plan for best release date, and decide who should be given pre-release editions	Hold launch event	Monitor reception, seek feedback, and plan for the next report cards
<i>Practical function</i> How does this action contribute to report card production?	To incorporate perspectives not otherwise captured.	To invite feedback.	To invite feedback.	To ensure the report card launch gains public attention.	To ensure the report card gains public attention.	To ensure lessons learnt are captured and implemented.
<i>Relationship-building function</i> How does this action contribute to encouraging constructive stakeholder relationships?	To ensure that all stakeholders have (& feel that they have) the opportunity to be heard.	To encourage a feeling of progress. To remind participants of the workshop and (ideally) the spirit of cooperation experienced there.	To ensure that participants & other stakeholders are heard (and feel heard). To ensure that final product does not insult, offend, or unduly incite anger.	To alert stakeholders that the launch is forthcoming, and forewarn stakeholders to prepare for the launch (e.g. policy-makers may wish to prepare public responses).	To inject report card contents into public discourse (esp. robust and comprehensible data).	To ensure feedback is addressed; to demonstrate that participants' contributions are valued, & that grievances are understood.
<i>How?</i> From perspective of workshop facilitator, unless otherwise specified.	Be receptive to stakeholders who seek audience after workshop. Supplementary workshop (if numbers allow).	Send newsletter (possibly by email) within 8 weeks of workshop. Newsletter to report main findings – a de facto report card draft.	Send draft and invite feedback. Consider forum for receiving feedback (e.g. meeting, survey, phone call, email, etc.)	Consider scheduling clashes with other events and/or cross-promotion with other events. Consider using the launch to forge connections with new stakeholders: identify ideal connections and issue invitations.	Consider press conference, cocktail drinks, community day, etc.	Consider forum for providing feedback; potentially an additional face-to-face meeting.

Figure 10–4 IAN report card process: *after* workshop phase


HANDOVER 			
<i>Action</i>	Train others to create report cards	Develop protocols as written guides for report card production	Provide feedback on others' report card efforts
<i>Practical function</i> How does this action contribute to report card production?	To encourage more report cards. To create more human resources for starting other report card programs.	To facilitate transfer of knowledge relating to report card processes. To encourage consistency across monitoring regions within the same overall region (e.g. tributaries within a catchment)	To ensure quality of report cards produced.
<i>Relationship-building function</i> How does this action contribute to encouraging constructive stakeholder relationships?	To empower other organisations to monitor regions relevant to them – thereby encouraging residents in that region to notice conservation and restoration progress. To develop a sense of long-term ownership of a report card process, and to allow other to see local partners owning the process: the report card 'finds a home'.	To enable even more groups to participate in report card workshops within the region. To encourage hitherto non-participating organisations to seek relationships with and advice from participating organisations.	To maintain working relationships with new report card producers – to foster a climate of support and encouragement.
<i>How?</i> From perspective of workshop facilitator, unless otherwise specified.	Run training workshops. Invite new person-in-charge of producing report card to be part of process for initial report cards.	Prepare documents setting out protocols – collaboratively, with local organisations advising.	Welcome submission of report card drafts, questions about process, and other requests for feedback.

Figure 10–5 IAN report card process: *handover* phase

10.3. Outcomes: what can a user expect of a tool?

This section considers what outcomes a report card tool can be expected to achieve – and what it may not be able to achieve. The practical purpose of this section is to acknowledge that, while report cards are a versatile tool for multiple purposes, they are not useful for all circumstances.¹⁵ In some ways, the ensuing discussion is related to Section 10.1 – because the decision to use the tool in the first place is affected by the outcomes that can plausibly be expected.

There is a second, conceptual purpose to this section, which justifies its discussion in this part of the chapter. The preceding section described the relationship-building functions of each action. However, not all lessons learnt from the previous two chapters are captured in those figures. What is missing is an explicit link to the attributes of constructive and destructive stakeholder relationships, as identified in Chapter 5 (Australian NRM study). This linkage is provided here. An overall summary is provided in the next sub-section, with ensuing sub-sections discursively exploring particular issues:

- How (and to what extent) report cards can be used to create and maintain constructive relationships;
- Whether (and to what extent) report cards can shift a destructive relationship into a constructive one; and
- The risk that a report card tool may *worsen* a stakeholder relationship.

10.3.1. Mapping report cards to constructive/ destructive attributes

Table 10-2 below systematically compares Chapter 5 findings with components of the report card process. The two left columns reproduce the key themes arising from the Chapter 5 findings. The right-hand column links findings from Chapters 7–9 to the findings from Chapter 5. Structurally, the right-most column is intended as a discursive essay, with the left-two columns operating as links to Chapter 5.

¹⁵ I reiterate the warning of my late advisor, Dr Peter Oliver, who often cautioned me against trying to fit all observations within the concepts occupying my interest at the time: ‘When all you’ve got is a hammer, everything starts to look like a nail’.

Overall, it can be seen that the report card process observed generally matches the constructive influences. Some adaptations may also be required – specifically:

- When used as a tool for building stakeholder relationships, the report card tool may need to balance fast progress on the page (i.e. a draft report card produced by the end of the workshop) with opportunities to listen to others.
- Funders need to listen to grievances, lest they be seen as wielding top-down authority over those who depend on their funding.
- As discussed in Section 10.1, the impartiality of the data sources, the report card methodology, and the process facilitators is of critical importance. Both actual and perceived impartiality are important, and require attention.

Table 10–2 Linking IAN report card study to Australian NRM study

Guiding question: can (and how can) IAN's report card practice encourage constructive relationships?

From Ch 5 (Australian NRM study)		From Ch 8, 9, 10 (IAN process)
Constructive influences	Destructive influences	Link to report card process
<i>Dialogue & communication</i>		
<ul style="list-style-type: none"> Stakeholders feel understood, having had an opportunity to <u>air grievances freely</u>. Managers accept due share of responsibility for damage caused by environmental hazards. Managers communicate with a <u>respectful attitude</u>. Communication is <u>genuine, authentic and honest</u>. Communication seeks to understand a <u>person as a whole</u>, beyond their professional identities. Often communication is <u>face-to-face</u>. 	<ul style="list-style-type: none"> One stakeholder <u>wields authority</u> over others (e.g. a government agency, or a private organisation acting under a permit granted by government). Authorities fail to give reasons for their decisions. Communication is undertaken with <u>ulterior motives</u> (e.g. to obtain information to use later in negotiations) – calculating and selfish communication. A <u>'bullish' attitude</u> is adopted. 	<p>As noted in Section 10.1 above, it is critically important that participants are motivated by a <u>genuine, authentic and honest</u> desire to understand the status quo – i.e. to pool together and analyse monitoring data in order to highlight the health of the region.</p> <p>In contrast, a report card process will likely lead to destructive outcomes where stakeholders participate with <u>ulterior motives</u>.</p> <p>The workshop (and the listening tour) provided opportunities for <u>face-to-face</u> communication. In both the Long Island and Mississippi cases, opportunities for social activities were created, to help participants get to know each other as <u>whole persons</u>.</p> <p>Without more data, it is difficult to tell, but the Long Island case might demonstrate the destructive effect of <u>wielding authority</u>, at least from the perspective of the dissatisfied groups, who <i>may</i> have felt as though the funders did not listen to their grievances ('The report cards had a specific purpose, and unfortunately, pleasing embayment groups wasn't one of them': FC02).</p> <p>In the process set out above, facilitators are advised to show fast progress by:</p> <ul style="list-style-type: none"> Stating clear goal for the workshop at the outset of the workshop; Continuing to work after hours, digitising the previous day's discussions; Publishing a newsletter shortly after the workshop, summarising key findings and showing an interim draft. <p>However, in the Great Barrier Reef case, there appeared to be some doubt among participants as to whether the conceptual diagrams accurately captured their scientific understanding of the environmental system. In the face of such doubt, insisting on fast progress may be seen as a <u>bullish attitude</u>. This sentiment was echoed by AW15 in the Mississippi case, who thought that the workshop was 'over-directed', followed a 'pre-ordained path', and who wanted more opportunities to 'sit back and listen' to other attendees. Facilitators are therefore advised to balance progress in producing the report card against ensuring that participants feel that their thoughts are listened to and captured.</p>

From Ch 5 (Australian NRM study)		From Ch 8, 9, 10 (IAN process)
Constructive influences	Destructive influences	Link to report card process
<i>Partisan politics & media</i>		
<ul style="list-style-type: none"> Parties <u>keep disagreements private</u>, with statements to media emphasising cooperative efforts. <u>Decision-makers refuse to take sides</u>, but oversee cooperative processes where stakeholders work through incompatibilities together. Decision-makers provide <u>no alternatives to cooperation</u>, and communicate as much. 	<ul style="list-style-type: none"> Representatives of government <u>take substantive positions</u> (whether in personal or professional capacity) – encouraging other stakeholders to seek political victories. Political victories driven by electoral tactics. Along with associated media coverage, issues become simplified and polarised. Groups exist that have an interest in creating and maintaining conflict. 	<p>According to CB06 (Chesapeake Bay, policy-maker), policy decisions were made in accordance with scientific data. While further research is needed, it seems that insisting on using monitoring data to inform decisions is similar to <u>refusing to take sides</u>, or a <u>providing no political alternatives</u> ('we can demonstrate both through the report card and through other scientific data that there are certain parts of the state where if you build septic tank, they pollute ten times more than if you are on central sewer': CB06).</p> <p>The report card process involves eliciting and identifying narratives from participants <i>during</i> the workshop. Often, these are positive stories (what can you do? what efforts are we making?). These contribute to a sense of <u>keeping disagreements private</u>, and showing only positive stories of cooperation to the media – similar to the Mount Sylvia case in Chapter 5.</p> <p><i>After</i> the workshop, the process calls for deciding who should receive a pre-release draft. This list includes public figures, such as law-makers and policy-makers. It is not clear from the data whether this is constructive or destructive, but potentially it allows public figures to prepare a nuance response at the launch, which makes it less likely that they will revert to default <u>substantive positions</u>.</p>

From Ch 5 (Australian NRM study)		From Ch 8, 9, 10 (IAN process)
Constructive influences	Destructive influences	Link to report card process
<i>Use of data</i>		
<ul style="list-style-type: none"> Scientific evidence is used in a <u>transparent and unbiased</u> way to persuade others of a conclusion. Data provided to support others' decisions (without persuasive agenda). Data is represented in a way that is <u>comprehensible</u> to decision-makers. 	<ul style="list-style-type: none"> Basis of decision-making not understood: modelling algorithms not comprehensible to stakeholders. 	<p>As above (see partisan politics & media): report cards synthesise and report scientific data, and the use of such data to support policy decisions is likely to lead to constructive outcomes. However, the use of data must be <u>transparent and unbiased</u>; use of data with <u>ulterior motive</u> (see dialogue & communication) is unlikely to have constructive outcomes.</p> <p>The design features of report cards (see Chapter 7) make data <u>comprehensible to laypersons</u>, which encourages constructive outcomes.</p>
<i>Involvement of third party</i>		
<ul style="list-style-type: none"> Parties <u>agree to accept the decision of a third-party</u> (prior to the decision being made) – this provides an <u>alternative, easier pathway to a constructive basin</u> (see Chapter 6). The third party is neutral: an '<u>honest broker</u>'. 	<ul style="list-style-type: none"> n/a 	<p>As a branch of a university, IAN is seen to be <u>impartial; an honest broker</u> who brings only expertise in science communication, and not any no substantive interest in the monitoring region. Users of the report card tool are advised to consider whether they are, and are seen as, impartial (as discussed in Section 10.1).</p> <p>In the <i>handover</i> phase, responsibility for report card production may be passed to a group who is not impartial, or not seen to be impartial. This may undo constructive influences forged initially. Conversely, where responsibility is handed to a group perceived to be <i>more</i> impartial, then relationships among stakeholders may become more constructive.</p> <p>Involving IAN as an impartial third party may provide an <u>alternative, easier pathway to a constructive basin</u>. This is discussed further in Section 10.3.3, below.</p>

While Table 10–2 provides a discursive link between the Australian NRM research and the report card research, the 3D landscape model can provide a more conceptual synthesis. As discussed in Section 6.3, in this model the ball represents the current position of a relationship, as defined by the dimensions along which a relationship can be described, just as one might describe a physical position using x, y, and z coordinates. The dimensions of human relationships are too many to enable a literal plotting of the relationship according to coordinates. But considered conceptually, the ball would ‘move’ if there were a change in any of the dimensions. For example, the ball would move in response to an inflammatory message by one party, or a shift in the level of trust, or even the passage of time with no manifest interaction. Tracking the position of the ball over time would reveal a ‘landscape’ of basins, reflecting the tendency of destructive relationships to remain destructive (i.e. in destructive basins), and vice versa.

Embarking on a report card process would constitute a shift in a relationship. There is an inherent shift, because working together in a report card process is a new interaction. There are also likely to be secondary shifts, because working together may lead to shifts in the degree of trust, the respect held for other parties, the stated positions of each party, and so forth. In this way, report card processes drive changes in the relationship; in terms of the 3D model, they move the ball to a different part of the landscape. While this model does not specify why the ball is moving, it helps to conceptualise how the relationship response to a report card process.

The specific changes would depend on context. This thesis has envisaged that report card processes be used to drive constructive changes in stakeholder relationships – forming a constructive basin where no relationship existed previously, or deepening an existing constructive basin, or shifting the relationship from destructive to constructive. Table 10–2 above describes the circumstances in which constructive and destructive effects may take place. Further discussion is given in each of the three sections below (Sections 10.3.2–10.3.4).

10.3.2. Creating and maintaining constructive relationships

Report card programs have been useful for creating constructive relationships where there was no relationship before, or only a shallow, constructive relationship. Specifically, interviewees for the Arkansas & Red Rivers case (Chapter 8) noted that the workshops were a good opportunity to interact with and learn from others whom they had not met before. Similarly, some respondents for the Chesapeake Bay case (Chapter 9) described how the report card product, and community events surrounding the report card (e.g. annual launch), enabled local groups to engage with new members of the community as well as re-engage with lapsed members. These examples are consistent with the role of report cards as a ‘conversation starter’ with stakeholders.

Beyond initial outreach, the data do not suggest that report cards have been useful for creating deeper constructive relationships. The Chesapeake case suggests that, to effect behavioural change among members of the community, local organisations must do more than produce the report card. What more is required was not systematically explored in the interviews, but opportunities to speak to stakeholders face-to-face (e.g. in a phone call, at a conference, or at a report card launch) were cited as instances of engagement. These examples are consistent with the findings of Chapter 5, which, among others, showed that dialogue, especially conducted face-to-face, was a constructive influence.

The conclusion here is *not* that report cards *cannot* be used as a tool to create deeply constructive relationships. Simply, no examples of deeply constructive relationships were unearthed in the research, and so the contribution of report cards to such relationships could not be explored. It is conceivable that report cards' role as conversation starters creates a shallowly constructive relationship, which creates opportunities for other interactions to deepen the relationship. It may even be possible that, after a stable, constructive relationship has been established, the report card program need not be maintained (at least not for relationship-building purposes).

Whether (and if so, how) report cards can be used to build deeply constructive stakeholder relationships would be a fruitful area for further research. One research design might be to identify an extant case study that can be considered deeply constructive (e.g. according to the factors listed in Chapters 2 and 5), and to trace how report cards have featured in that relationship, and what effects can fairly be attributed to it.

10.3.3. Shifting from destructive to constructive

The data from this thesis detected a potential ability for report cards to shift shallowly destructive relationships to a shallowly constructive basin. The pertinent example is the Maryland policy-maker (CB06), who suggested that the report card process helped to create an evidence base that helped to pass controversial bills. Further research is needed to discover how exactly the process did so. For example, was the outcome here attributable to the report card *product*, or the collected monitoring data (in which case the report card itself is unimportant), or the opportunity for would-be opponents to work together, or some other reason?

The research for this thesis does allow an interpretation to be constructed, however. First, it appears that participation in a report card program is unlikely to be controversial. If seen as impartial, then the ostensible goal of creating a report card is merely to report the status quo, not to support any particular partisan position. As Long Island Sound interviewee FC01 put it:

When you're talking about ecosystem health and water quality, you're not talking about any of the economic trade-offs. The grade is just a grade. Everybody agrees that a B is better than a C. Nobody says that 'you shouldn't be monitoring!' or 'No grade should be given!' There's just no way to grab that issue. There's recommendations that go along with it ... and then you get into an argument about that. (Long Island Sound, FC01, funder)

IAN04 stated something similar, in an email discussing the potential for report cards to be used as a tool for conflict management:

[T]he report card is, by design, something that nearly everyone can envision and can agree that it would be a good thing to have. By comparison, the process of negotiating a consensus on desired conditions and objective measures of success promises to immediately take everyone into the conflicted territory of defending interests and negotiating tradeoffs. (IAN04)

Although some may dispute the scientific accuracy of report cards (recall the objections of CB04 to the Chesapeake report cards), the above quotes suggest that report cards are *non-threatening* actions that are unlikely to trigger shifts to further destructiveness (note: counter-interpretations discussed below). Once initiated, the report card provides *information* that can help to determine questions of policy. Provided such questions can be resolved by a factual inquiry (cf. questions relating to moral values), it would be difficult to oppose a decision that is now supported by data.

Depending on the conduct of the report card process, there may be some loss of face (see Folger et al., 2005) involved in raising an objection. Specifically, as the Australian NRM study (Chapter 5) showed, there is an incentive to participate in the report card process, lest one's absence allows

others to make disagreeable decisions. If a report card product then includes a photo of all workshop participants (as many do; see Chapter 7), then upon publication the persons who attended might then be perceived to have endorsed the final product. Consequently, a would-be opponent is less likely to take an uncompromising position.

This interpretation appears consistent with the influences on constructive/ destructive relationships, as identified in Chapter 5. There is a non-threatening action, the use of evidence to make decisions, and a de facto agreement on the using the report card to support decision-making (similar to agreeing to accept the ruling of a neutral third party). The process of a report card also involves constructive elements – for example, working together in a collaborative workshop, and having a social dinner afterward – may build interpersonal bonds that encourage further constructiveness.

Seen a different way, report cards may provide a conduit from destructive relationships to constructive ones – which can be shown as three basins, similar to the one shown in Chapter 6 (see Figure 10-6 below). In this figure, the overall effect of initiating the report card process is to create an interim constructive basin (yellow) connected via a passageway to the initial destructive basin (red). Exiting the destructive basin via this passageway is easier than transitioning directly to the final constructive basin (green), as depicted by the sparser distribution of contour lines.

The constructive/ destructive influences identified above can now be explained using the 3D model. A number of characteristics of the report card process may lower the barriers to participation (i.e. create the passageway). Firstly, as noted above, report cards are non-threatening because they only claim to present the status quo, leaving policy or management decisions for another process. Participating in the report card process (a) does not lock the participant into any particular policy or management decision; and (b) creates opportunities to shape understanding of the environmental system being reported on. Secondly, the emphasis on reporting scientific data discourages ideological objections – if there is evidence for a proposition, it should be reported; otherwise, it should be rejected. Thirdly, the fact that the process is run by a non-partisan organisation (e.g. a university) may build trust in the report card process and product. Finally, if the report card process is held out to be a collaborative one, in which all participants have equal voice, then a sense of procedural and interactive justice (including a possible shift in power relations) may further encourage participation.

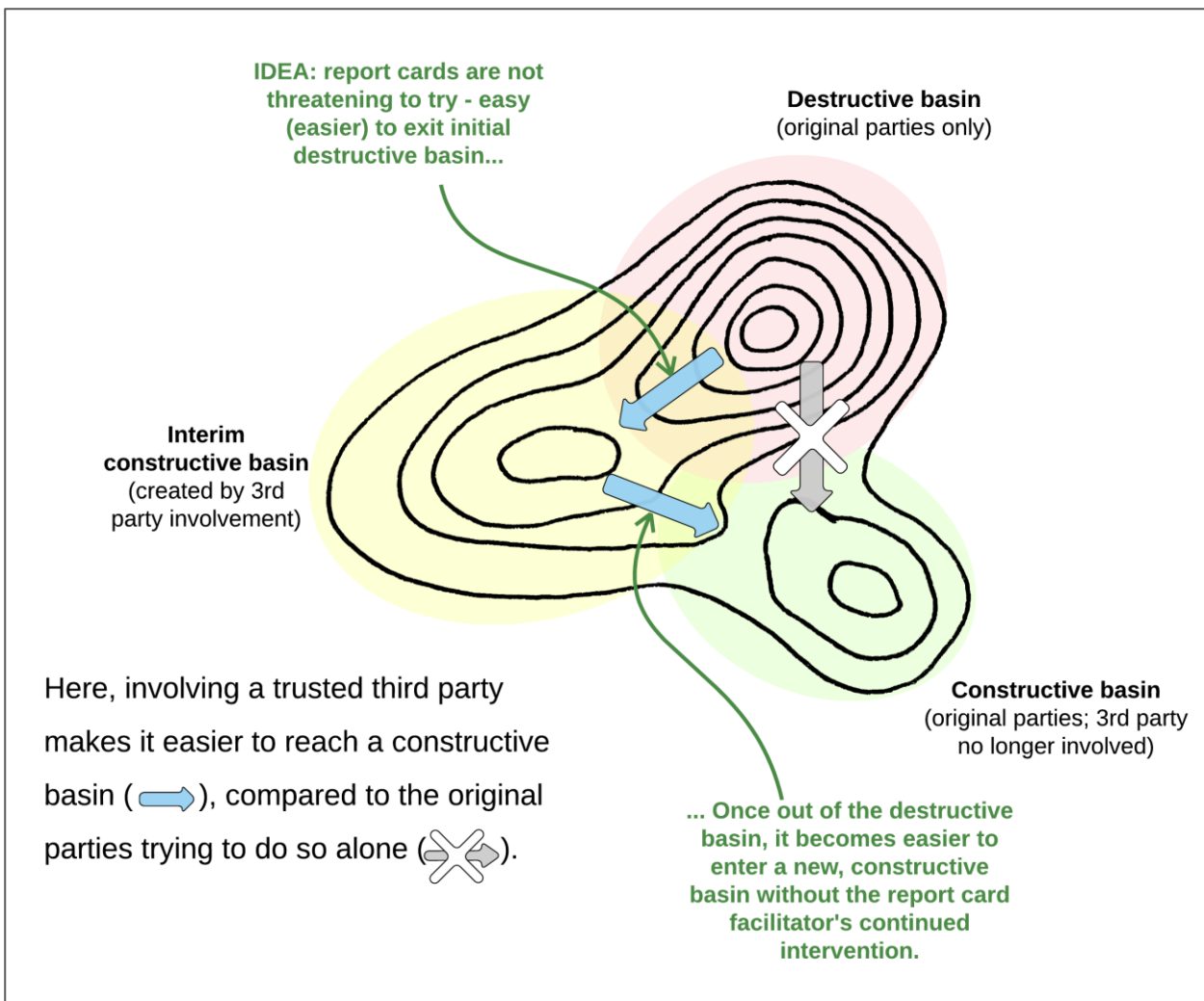


Figure 10–6 3D landscape diagram: IAN as trusted third party

Like a trusted third party, a report card facilitator like IAN may help parties move out of a destructive basin. Once out, they may find it easier to maintain a constructive relationship even if the facilitator withdraws from the relationship.

In the scenario illustrated by Figure 10-6, all of these factors combine systemically to change the relationship between the parties, such that the passageway between the red and yellow basins forms. The yellow basin itself takes shape (deepening and widening) during the report card process, with constructiveness encouraged as described in Sections 9.2.2 and 10.3.2 above (e.g. constructiveness is encouraged because extended face-to-face interaction provides opportunities for constructive dialogue). Once the report card process is over, the withdrawal of IAN (or other facilitator) leads to a new basin being formed. Upon doing so, the other parties' relationship shifts to an independently constructive relationship, represented by the transition from the yellow basin to the green.

While this interpretation was constructed from ideas detected in the interview data, there is insufficient data from this research to strongly support it. Counter-interpretations are open. For example, the above interpretation suggested that report cards do not pose a threat to anybody's interests, because they merely report the status quo. But conceivably a person or organisation might

feel that a report card would place blame upon them for, e.g. polluting a waterway. They might anticipate being blamed for a number of reasons – perhaps because:

- They believe the producers of the report card are actively seeking to do so; or
- They mistrust the accuracy of the data or its simplified representation in a report card; or
- They really are at fault, on an impartial, objective basis, but wish not to reveal it publicly.

These reasons encapsulate some of the key characteristics of destructive relationships (see Chapter 5), namely threats of central importance to one of the parties, and mistrust in the motives of others and/or how others represent evidence. In other words, the scenario described in the counter-interpretation is deeply destructive, where there is reluctance even to engage in a joint fact-finding activity such as a report card process. Consequently, while the evidence from CB06, FC01 and IAN04 do make plausible the primary interpretation outlined above, it is unclear whether report cards could be used to shift deeply destructive relationships.

Another deeply destructive scenario might arise where there is conflict over a question of value, rather than one of fact. The literature on intractable conflict suggests that both facts and values are often disputed together (see especially Lewicki et al., 2003, in the context of intractable environmental conflicts; also Daniels & Walker, 2003; Coleman 2011; Elix, 2003). However, suppose for the sake of argument that parties to such a conflict accept the accuracy of scientific data and its simplified representation in a report card, but still object on a principled basis. For example, one can accept a proposed port facility will, as a matter of fact, boost economic development, but argue, as a matter of value, that its environmental impact makes a bad development.

In such a scenario, can report cards be used as a tool for making deeply destructive stakeholder relationships into constructive ones? It may be a platform for bringing together people who might not otherwise meet; it may provide opportunities for face-to-face dialogue, for seeing others as whole persons, for discouraging politicised debates that will be played out in the media (all themes discussed in Chapter 5). On the other hand, the report card process may be hijacked for ulterior motives that prevent constructive relationship building.

As such, to what extent report cards can shift destructive relationships is flagged as an area for further research. One fruitful case study might be the Gladstone Harbour report card (see GHHP, 2015). Gladstone is a city in Queensland, Australia. It is a major port for the transport of mineral resources, and it also has a strong recreational fishing culture. In 2011, the sudden appearance of fish disease led to widespread public concerns that dredging operations (which commenced earlier that year), were harming aquatic life (Hendry, 2011). Subsequent studies suggested that exceptional

rainfall events that year were the primary contributor to the disease (Wesche et al., 2013). However, fishing and boating communities, as well as some Indigenous and environmental groups, remained suspicious of dredging and port activities (Australian Senate, 2014). Against this background, the Gladstone Healthy Harbour Partnership (GHHP), a partnership of 25 organisations from a wide range of sectors, was created, as ‘a forum to bring together parties... to maintain, and... improve the health of Gladstone Harbour’ (GHHP, 2014) – a ‘coalition’ user, in Table 10-1, above. This case appears to demonstrate a scenario where a report card tool was used in order to shift a set of destructive relationships to a constructive one – but even so, producing the report card is not the only activity of GHHP, and the extent to which the (presumed) constructive relationship of today can be attributed to it would require investigation.

10.3.4. Possible harm: shifts from constructive to destructive?

Finally, can report cards shift a relationship from constructive to destructive? The scenario envisaged here is one of unintended outcome – as a normative matter, it is not suggested that report cards be used deliberately to make a relationship destructive. However, this question is raised because a user, in assessing the suitability of report cards as a tool for some purpose, should consider the risks if something goes awry.

The Long Island Sound case suggests that there *is* a risk of making relationships more destructive that would otherwise have been, but for the report card process. As reported in Chapters 8 and 9, some workshop participants in the Long Island Sound case were dissatisfied. Firm and nuanced conclusions could not be drawn on the nature of the dissatisfaction because some of the dissatisfied parties declined to be interviewed. However, the data *suggested* that there was dissatisfaction related to both the product and the process, as follows.

Product:

- The report card grade implied waters were unsafe for fishing, shellfish and recreation – which some participants saw as undermining prior efforts to reassure the public that the waters were safe. In turn, participants were concerned that the grade would damage the relationship between the participants and *their* stakeholders (in the fishing and shellfish industry).
- Other visual elements (e.g., the cover photo showing ships on the water) also implied that the report card related to human health indicators, when in fact it related only to ecological health.

Process:

- The initial discussions (e.g. during the listening tour) led some participants to believe that their human health data was going to be the primary data source, when in fact ecological health data

was sought. On the other hand, the funders and IAN assumed that the participants did have ecological health data. Overall, there was a miscommunication on overall purpose of the report card (ecological health only), and corresponding data requirements and availability.

- The report card final grade changed during the process, so the participants did not know what the final grade was going to be until ‘very late in the process’ (NH03, local group).

What effect this dissatisfaction had on the parties is uncertain. NH03 acknowledged that the first report card was intended to be a learning experience, and that it would participate again:

I think we'll do a better job this time, and I think there was a ton of learning that it came out of what we did last time, and I think that especially people who are in charge of it are listening, and I feel that they're listening and I don't think that we have to go through it again like the first time. (NH03, local group)

Whether the Hempstead Harbour participants would participate again is not known. It is at least conceivable that they no longer trust the report card process to fulfil their expectations; they may also consider the report card product to be antithetical to their own interests. Again, it is not known – but the point is that there *is* a risk that a report card tool might contribute to the destructiveness of a stakeholder relationship. For this reason, the report card process outlined in Section 10.2.2 includes the after-workshop action, ‘Distribute a draft report card and receive feedback’. More broadly, the fact that such a risk exists is compelling reason to further examine report card production as a social process – that is, for extending the research of this thesis.

The Hempstead Harbour case also raises a potential scenario where the goals of the report card client (in this case, the funding body) do not align with the goals of one or more contributors. The evidence from NH03 (above) suggests that some contributors are willing to participate even if there is not exact alignment of goals. To minimise misalignment of goals (and destructiveness arising from such misalignment), Section 10.2.2 includes the pre-workshop step of ‘Discuss and receive feedback on goal of the overall report card programs’.

Even so, it is possible that potential participants’ goals are so divergent that a destructive relationship would be difficult to avoid, if a report card process were to proceed. This scenario is not the same as attempting to use report cards to shift a deeply destructive relationship to a constructive one, because there is no pre-existing relationship. The scenario is whether embarking on a report card process would create a destructive relationship where there was no relationship before. It is possible that the report card is not appropriate until the broader divergences in

aspirations are aligned first. The pre-workshop step referred to in the preceding paragraph would function as an early decision-point as to whether to proceed with the report card program at all.

10.4. Conclusion

This chapter has functioned as synthesis discussion of the findings from Chapters 5 to 9. Potential report card users are guided through an initial decision on whether to use report cards, by focusing awareness on *who* constitutes a suitable report card user and *what* constitutes a suitable report card purpose. The key point here was that report cards are suited to a range of users and uses – but in all cases the use must be underpinned by (a) a genuine, authentic desire to learn from monitoring data, and not to use the report card to give a veneer of legitimacy to ulterior motives; and (b) a perception of such genuineness by other stakeholders.

Next, the report card process, as practiced by IAN was documented. As explained in the introduction to Chapter 8, this process had not been documented before, and is a major contribution of this thesis to knowledge.

Finally, the potential outcomes of report cards were discussed, through the lens of constructive/ destructive relationships. This last part linked together findings from the Australian NRM component of the study (Chapters 5 and 6) to discuss the findings from the IAN component of the study (Chapters 7 to 9). In doing so, it identified ideas that were detectable in the IAN research, but require further research to substantiate.

Overall, this chapter wraps up the substantive research of this thesis. The next chapter will conclude the thesis in the context of a scholarly work being submitted for examination, as well as set out an agenda for further research.

Chapter 11. Conclusion

This chapter concludes the thesis as a whole. While the previous chapter summarised the substantive argument, this chapter reflects on the thesis as a scholarly work. I ask:

- Whether the research aims were achieved (and to what extent)?
- What contributions to knowledge were made?
- What further work might be done to strengthen the claims made in the thesis?
- What further work might be done to extend the ideas presented in this thesis?
- What skills have I demonstrated as a PhD candidate, and how might I do better?

Structurally, the chapter will first examine whether and to what extent the broader aims of the thesis were fulfilled, before a finer examination of each research question (Points #1–3 above). Reflection on next steps (#4) and my own learning (#5) will conclude the chapter.

11.1. Achievement of broad thesis aims

This section evaluates the internal completeness of the thesis: did I achieve what I initially set out to achieve? As the Preface states, my motivation for undertaking this thesis was to find ways to have data-rich and relationship-building conversations with people who had quite different ways of making sense of the world around them. From that motivation I distilled a more precise goal, which was to help improve relationships among stakeholders, within the context of natural resource management (NRM). Because I saw relationships as *dynamic processes* (they change and develop over time), in order to help improve them, I wanted to develop a tool that had an explicitly-examined temporal dimension. That is, I wanted to develop a tool that would be applied not as a one-time intervention, but over a period of time during which trust and respect among stakeholders could be cultivated.

At its core, this aim was a practical one, and the role of academic scholarship was to provide phronetic guidance to praxis. As explored in Section 1.2, *phronesis* is practical wisdom; *praxis* is thoughtful doing; and the two reinforce each other. *Praxis* and *phronesis* found expression in this thesis because it harnessed academic inquiry in order to recommend a course of action. Thus, in a broader sense, the thesis aimed to be *useful*, and usefulness was the end which the acquisition of knowledge served; usefulness was not a mere consequential benefit of the acquisition of knowledge.

Specifically, Chapter 1 stated my desire to offer three useful things from this thesis. These things are re-stated in Table 11-1, along with a description of the chapters in which they were addressed. At this general level, it can be seen that each are covered – and indeed, Chapter 6 (3D landscape model) went beyond the initial goals.

Table 11–1 Checking off the broad aims of the thesis

Useful thing offered	How was it addressed?	List of chapters
A shared understanding of how to foster and manage NRM relationships.	Chapters 2 and 5 synthesised and extended the literature on stakeholder relationships. They imported from the broader conflict and collaboration literatures to establish an understanding of stakeholder dynamics around a constructive/ destructive binary.	Ch 2 (Literature Review I, conflict & collaboration) Ch 5 (Australian NRM study)
A shared vocabulary with which people involved in NRM can think and talk about their relationships.	Chapter 5, in analysing the empirical data from Australian NRM interviews, identified key influences on the constructiveness/ destructiveness of stakeholder relationships – these influences established a vocabulary of key concepts with which people can discuss their stakeholder relationships (and indeed, was used thus in later chapters). Chapter 6 went beyond establishing a vocabulary and proposed a mental model for understanding the systemic nature of stakeholder relationships.	Ch 6 (3D landscape model of stakeholder relationships)
A tool with which those people can improve their relationships with stakeholders, in the context of NRM.	Chapter 10 delivered such a tool. Chapters 7, 8 and 9 analysed evidence in order to substantiate the tool delivered in Chapter 10. Chapter 3, in reviewing the literature, placed report card tools within a family of other tools.	Ch 3 (Literature Review II, report cards and related tools) Ch 7 (IAN report card product) Ch 8 (IAN report card process) Ch 9 (IAN report card process: handover) Ch 10 (A tool for encouraging constructive stakeholder relationships)

11.2. Summary of research findings against research questions

Table 11-1 also indicates the overall research design, which Chapter 4 (Methodology) explored in detail. Broadly, the research design was a marriage of two complementary components: a study of Australian NRM relationships, and a study of IAN's report card practice. The former contributed an understanding of how stakeholder relationships evolve as processes – but it did not provide a useful tool for encouraging constructive stakeholder relationships. The latter did provide a tool – but because IAN's practice was not expressly designed to develop stakeholder relationships, the former component was required in order to assess its suitability for this purpose.

These two components led to the three research questions constituting this thesis. Figure 11-1 restates the research questions, and illustrates their relationship with the two components above, as well as the chapters in which each question is addressed. This section now evaluates the extent to which each research question was addressed.

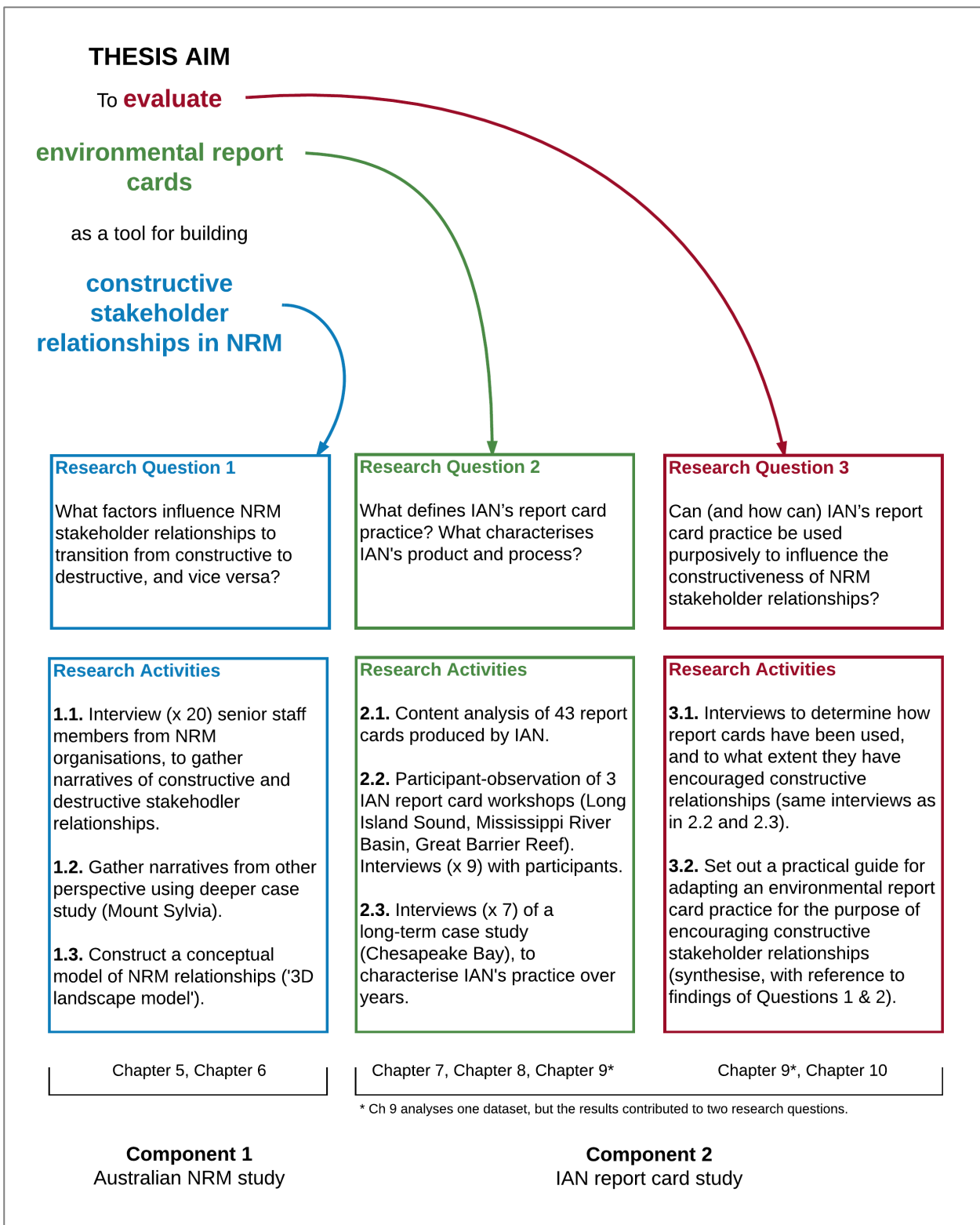


Figure 11–1 Overall structure of thesis (reprinted from Chapters 1 & 4)

11.2.1. Research Question 1: constructive & destructive factors

This section addresses Research Question 1: What factors influence NRM stakeholder relationships to transition from constructive to destructive, and vice versa?

(a) Australian NRM study (Chapter 5)

The literature review in Chapter 2 synthesised, from the collaboration and conflict literatures, the attributes of constructive and destructive relationships. This frame had not been used specifically assess stakeholder relationships in the context of NRM. The research conducted in Chapter 5 was intended to fill this gap.

Chapter 5 undertook interviews with 20 out of the 56 NRM organisations in Australia. These interviews yielded 50 stories of constructive and destructive stakeholder relationships, and how they progressed over time. From these interviews, constructive and destructive influences were detected and organised into four themes. These were set out in Table 5-4 – and, to directly answer the research question, this table provides an empirical catalogue of factors that influence NRM stakeholder relationships. The main factors were:

- **Communication and dialogue:** Constructive outcomes were more likely where stakeholders felt understood, with an opportunity to air grievances freely, and where stakeholders listened to each other with genuine desire to learn each other's perspectives. Understanding others as *whole persons* – that is, beyond their professional or vocational identities; for example, through social interactions – was also conducive to constructive relationships. In contrast, *wielding authority* over others (e.g. as a government agency) tended towards destructive outcomes.
- **Partisan politics and the media:** Constructive outcomes were more likely where *disagreements were kept private*, out of media scrutiny, and where *collaboration was the only option*. Conversely, destructive outcomes occurred where *decision-makers took substantive positions*, especially when issues were *politicised within electoral politics*.
- **Use of evidence:** *Using evidence* to support decisions generally led to constructive outcomes, but only where the data was used in a *transparent and unbiased* way.
- **Involvement of third parties:** Multiple interviewees described constructive outcomes arising because a *neutral third party* helped to facilitate some form of agreement.

These factors were largely consistent with the literature reviewed. The value of this part of the research, therefore, was to provide empirical confirmation of the concepts found in the literature (which was not all to do with NRM contexts). Two ideas were detected that did not appear well explored in the literature:

- **Role of media in constructive outcomes:** while the *destructive* effect of media attention is documented in the literature (see, e.g. Nie, 2003), two interviewees related narratives in which media attention was managed so as to encourage *constructive* outcomes. The constructive potential of media in NRM is not well explored (see Wolfsfeld, 2004), and this finding raises potential for fruitful further research.
- **Inability of stakeholders to understand data leading to destructiveness:** while the constructive effects of providing comprehensible, unbiased and transparent data are found in the literature (e.g. Jackson et al., 2012; Innes, 2004), one NRM narrative suggested that destructive outcomes arose when decisions were made on the basis of models incomprehensible to laypersons. The models were, as far as the interviewee knew, unbiased and used with genuine intent to be fair – which makes this case different from situations where data is used disingenuously.

These two ideas provide opportunities for further research. However, this part of the study was subject to limitations, chief of which was that the only perspective gathered was from managers in NRM groups. Supplementary interviews were sought to overcome this limitation. Two case studies were sought: the repair of Mount Sylvia Road (Queensland, Australia) after flooding in 2011, and the management of the Barmah–Millewa Forest on the border of Victoria and New South Wales (NSW), Australia.

The Mount Sylvia case is a case of a constructive relationship arising after efforts were made to restrict media attention on a dispute. The uniqueness of this case is that the constructive relationship appeared to have been triggered by negative media attention in the first place. This seemed to run counter to the general wisdom, that media attention is divisive. Some reasons why were proposed (Section 5.4.1d); however, the scope of the study did not allow these propositions to be explored. Overall, this case appears to stand for the proposition that negative media attention *can* spark constructive efforts.

The Barmah–Millewa case was not written up as a case study in Chapter 5. The reason was that the critical stories could not be gathered – either the interviewees failed to respond to requests for interview, or they expressly declined. This case is briefly recapped here, because it sets up potential research opportunities.

This case related to the management of an internationally significant forest, in which approaches on the Victorian and NSW sides differed. The NRM group interviewee indicated that the Victorian side of the case was sparked initially by outspoken, public conflict, on one side involving a coalition of environmental and Indigenous interest groups, and on the other involving a coalition of timber and cattle grazing interests. This conflict was exacerbated by a native title claim by the Yorta Yorta people, which was rejected in the courts (Atkinson, 2000). In response, the Victorian State Government launched a scientific investigation into the management of the forest (VEAC, 2008), and subsequently made good on an election promise to enter into co-management agreements with the Yorta Yorta people in lieu of native title (DEPI, 2016). In contrast, the NSW management approach was more top-down (according to the NRM group interviewee), involving large tracts of forest protected from logging under legislation, sparking litigation relating to land rights.

The original research intention for considering this case study was twofold. First, having two different States manage geographically the same forest provided a rare opportunity to directly observe the effect of different management approaches. Moreover, the Victorian side appeared to showcase a situation where, despite protests, deeply held values, and electoral politics (associated with destructive relationships), the outcome was a co-management agreement that might be construed as constructive. In this way, it was a counter-intuitive case study. However, the assumption that the outcome was constructive needed to be confirmed by interviewees – particularly the Yorta Yorta people and the cattle and timber industries. These not being secured, the case study remains only a potential avenue for further research.

In summary, this research did identify factors influencing the constructiveness/ destructiveness of stakeholder relationships. However, the fact that these findings come mostly from managers' perspectives, and also the fact that additional insights gleaned from the case study, suggests that there is more going on. While data saturation (Mason, 2010; Fusch & Ness, 2015) appears to have been reached from the managers' perspective, further triangulation is required to tease out further influences. Recognising that further work is required does not invalidate the findings: while it cannot be claimed that these influences are the only or even predominant influences, it *can* be claimed that the influences identified exist, and are supported by evidence.

(b) 3D landscape model

An additional claim is that the influences identified do not operate in isolation, but interact systemically. This observation is important to this thesis, because a list of influences does not highlight how stakeholder relationships unfold as *processes* – a list would be a *variance* model (see Section 2.2).

The primary example of systemic interactions between influences was the positive feedback loop formed when an NRM issue is politicised: the more media attention given to an issue, the more it can be used as a political issue, which is often ‘won’ by simplifying the issue in the media to gain further public support, and so on. This process was presented in Chapter 6 using a landscape model, reproduced here as Figure 11-2.

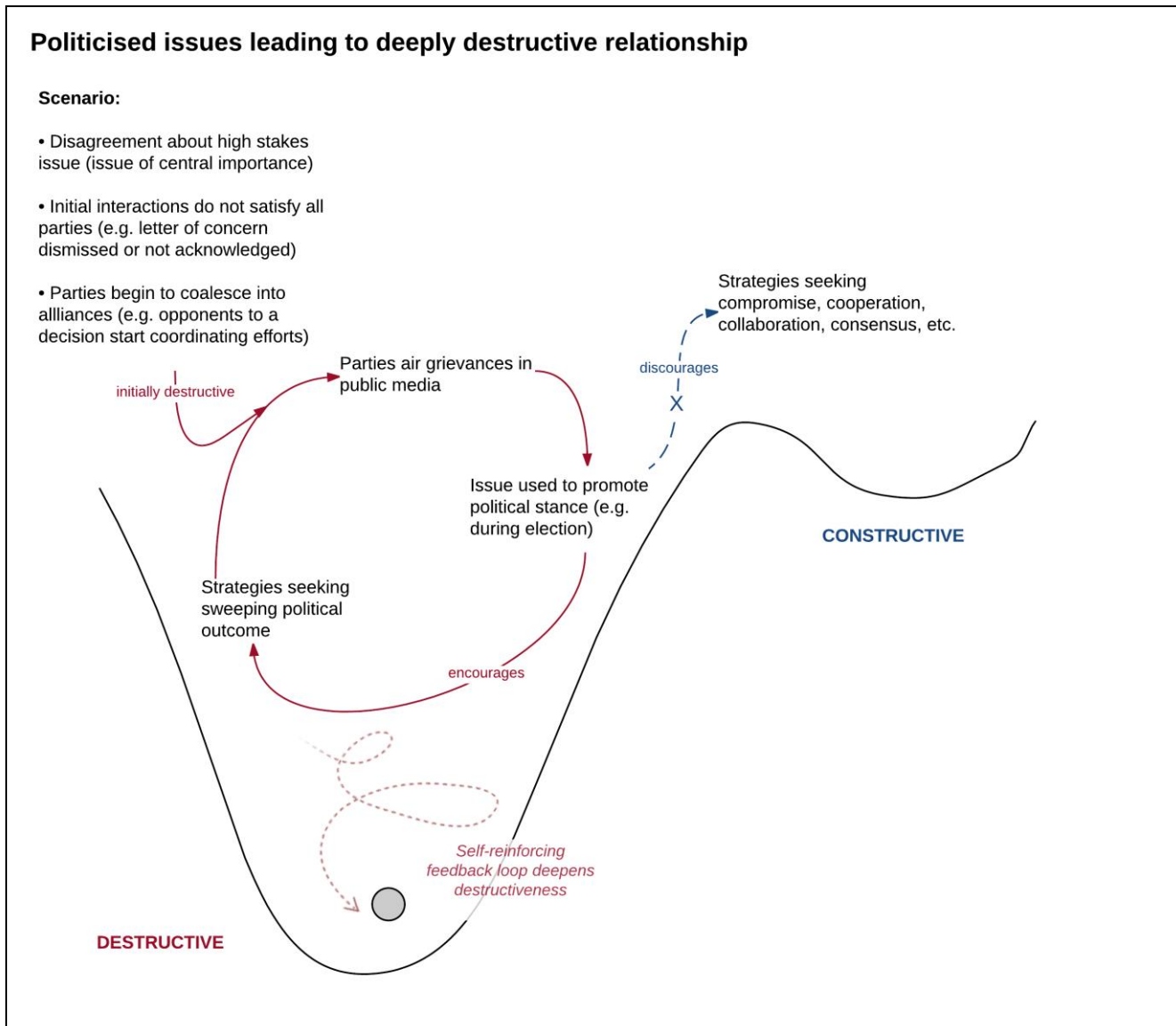


Figure 11–2 Systemic interaction in destructive relationship (reprinted from Ch 6)
How media attention and politicisation of issues lead to self-deepening destructiveness

The two-dimensional landscape model was not new, but derived from literature on intractable conflict (see Coleman, 2011; Vallacher et al., 2010). However, Chapter 6 identified situations that could not adequately be represented in two dimensions (e.g. what happens when a new stakeholder joins or leaves the relationship?). By digging deeper into the dynamic systems heritage of the landscape model, Chapter 6 constructed a three-dimensional model, which facilitated further exploration into the nature of stakeholder relationships.

In particular, the three-dimensional model was able to represent how the introduction of a neutral third party (e.g. a mediator) can be conceptualised as creating an interim constructive basin. This model represents how mediators act as a catalyst, making it easier for parties to reach an ultimate constructive basin, compared to attempting to reach the same point by themselves. This conceptualisation was represented diagrammatically, as shown in Figure 11-3.

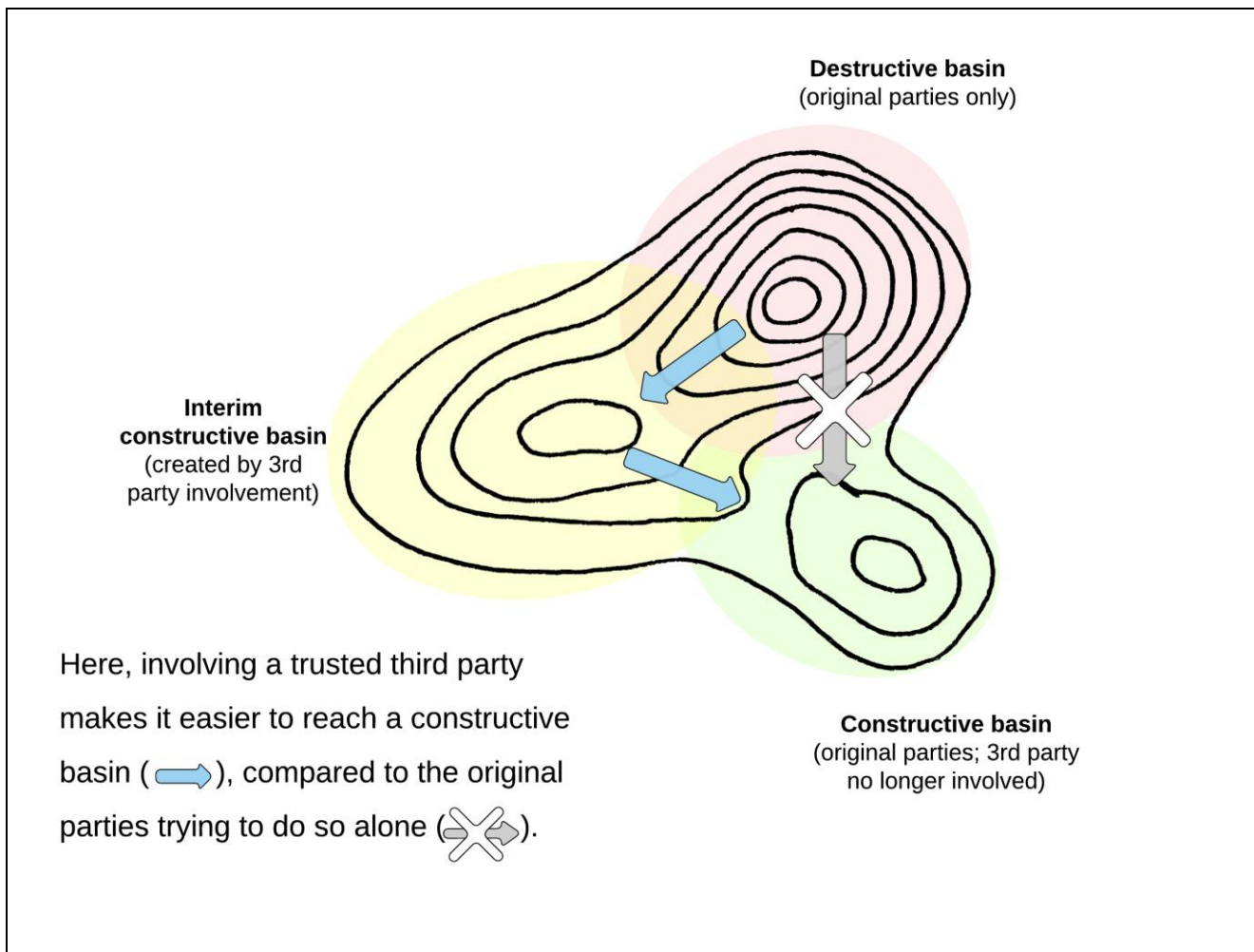


Figure 11–3 Ability of 3D landscape model to describe role of mediators
Third-party mediators can help conflicting parties move into a stable, constructive relationship, more easily than they might have done alone.

This 3D model is, to the best of my knowledge, entirely novel. Its chief academic value is that it provides a mental model and a heuristic for interrogating the nature of stakeholder relationships (see Section 6.3). The practical value of this model is that it is an intuitive metaphor for how stakeholder relationships evolve over time (it is intuitive because our experience of gravity means we instinctively understand how balls behave in basins). Although not tested in this thesis, the model may be a powerful tool for helping stakeholders make sense of the history of their relationships (recall the first two aims in Table 11-1). Perhaps it can be used in a participatory setting, where conflicting stakeholders collectively construct their understanding of the relationship

(including their interests and grievances), and from there engage in constructive dialogue. The use of this model in such a setting would be an opportunity for action research.

11.2.2. Research Questions 2 & 3: IAN's practice & constructive relationships

This section addresses Research Questions 2 and 3 together: What defines IAN's report card practice? Can (and how can) IAN's report card practice be used deliberately to influence the constructiveness of NRM stakeholder relationships?

Characterising IAN's report card practice was important, within the argument of the thesis, because it was a step along the way to developing a report card practice specifically designed as a tool for encouraging constructive stakeholder relationships. (The term 'practice' referred to both *product* (the report card document), and the *process* by which it is produced.

Chapter 7 undertook an examination of IAN's report card product, in order to characterise it. It is novel because no published literature exists undertaking such a characterisation, although Thomas et al. (2006) sets out in detail the design principles of IAN's science communication products (including report cards), and Raabe (2012) reports on a focus group study in which Chesapeake Bay groups assessed what design features had been most appealing to them. As stated, the study in Chapter 7 was a shallow one, undertaken for the purpose of facilitating the discussions relating to IAN's process, set out in Chapters 8 and 9. In general, IAN's report card product typically featured:

- Report card grade displayed on front cover.
- Extensive use of visual components, including photos, maps, and diagrams.
- Use of icons (symbols) that are especially designed to suit the local context.
- An explanation of grading method.
- Narratives highlighting ecosystem functions, particular issues facing the monitoring region, other conservation efforts.
- Acknowledgements of partners (by displaying their logos).
- A photo of contributors.
- Brevity (usually 6-8 pages long), and published in full-colour.

Chapters 8 and 9 identified IAN's report card process. The process of interest here was not the scientific method of using indicators to assess ecosystem health (which has been recorded in the literature; see Chapter 3), but the social process of generating report cards. Documenting report card production as a social process had not been done before, although participatory processes for

developing sustainability indicators (related to report cards) have been explored (Reed et al., 2005, 2006, 2008; Fraser et al., 2006). Doing so was therefore a novel contribution to knowledge.

The findings were presented in Chapters 8 and 9, and synthesised in Chapter 10. (Since the findings are presented in the previous chapter, they are not repeated here.) The process was arranged temporally, with reference to a collaborative workshop that was taken as the centrepiece of IAN's report card process. Thus, four phases were identified:

- *Before* workshop (preparing for the workshop; identifying workshop participants);
- *During* workshop (eliciting knowledge from participants);
- *After* workshop (determining grading, planning for report card launch); and
- *Handover* (training and supporting other organisations to take over production).

The evidence base for the process identified was participant–observation over 8 months embedded within IAN's offices in Maryland, USA, and interviews from three case studies: Long Island Sound, Arkansas and Red Rivers (within the Mississippi River Basin), and the Chesapeake Bay. The former two cases provided opportunities to observe the *before* and *during* phases in detail, with interviews undertaken to triangulate against the observations made. The *after* and *handover* phases were derived from interviews with participants and stakeholders from the Long Island Sound and Chesapeake Bay cases.

The major limitation on these studies was the number and range of interviews conducted. In particular, the Long Island Sound case ended up with at least two participant organisations dissatisfied with the report card product, and possibly also the process. This dissatisfaction transpired after the period of participant–observation, and although interviews with the relevant groups were sought, they declined. Consequently, the precise nature of the dissatisfaction could not be teased out, although other interviewees indicated that the dissatisfaction was two-fold. First, the report card reported only on *ecological* health (and not *human* health) indicators. The resultant grade was low (D+), which was seen to undermine those groups' efforts to convince their communities that their harbour was safe to swim in and fish from. This concern was exacerbated by the front cover photo, which showed people engaging in recreation on the water, thereby implying that the content of the report card related to human health. This was a product-based dissatisfaction. Second, the report card grade fluctuated in the *after*-workshop phase, as continuing analysis of the monitoring data led to refinements. The participant groups did not know of the final grade to be given until shortly before the public launch of the report card, giving them little time to forewarn their own stakeholders. This was a process-based dissatisfaction. The main point here is that there

remain some perspectives missing from the analysis of the Long Island Sound case, and further research is needed to refine the process identified.

Similarly, the Chesapeake interview sample was also small, with only seven respondents, one of whom only provided thoughts via email. However, the Chesapeake case study is complex, because it has been running for nearly a decade and involves multiple local organisations, a patchwork of different funding bodies, several States, and stakeholders at varying scales of governance (e.g. local, State and federal agencies). The interviews conducted did enable patterns to be detected, relating to how report cards have been *useful* to the interviewee organisations. Key findings included:

- Report cards are useful as ‘conversation starters’ – that is, for initiating and maintaining constructive relationships. Not only the product was useful, but also the events surrounding the product, such as an annual launch event to which community members, decision-makers, and funders were invited. Most interviewees suggested that report cards were not, by themselves, able to create a deeply constructive relationship, instead requiring other avenues of engagement to do so.
- Report cards are useful as generally uncontentious data-reporting exercises which facilitate evidence-based decisions later in a political process, effectively de-politicising certain policy issues and reducing the potential for destructiveness.
- There is some scepticism over the accuracy of report cards, with some documentary evidence and one respondent stating that they are too simplistic and a ‘charade’.

Overall, in direct answer to the research questions, IAN’s report card practice was documented, and synthesised in Chapter 10 as a tool for building constructive stakeholder relationships. By matching the elements of IAN’s practice to the Australian NRM research, the tool’s ability to encourage constructiveness was substantiated.

There are clear opportunities for further research. The need to explore the nature of dissatisfaction in the Long Island case has already been mentioned. Further, a more systematic set of Chesapeake interviews will strengthen, refine or even challenge the three findings listed immediately above – certainly there is more going on than the data reveals, as discussed in Chapter 10. For example, can a report card tool shift a deeply destructive relationship – or would distrust of the accuracy or impartiality of the report card scuttle such an attempt? In other words, characterising IAN’s report card practice *has* yielded a template process that the evidence suggests will be useful for

encouraging constructive stakeholder relationships, but there are more lessons to be learnt, and more dynamics to uncover than could be achieved within this thesis.

11.3. Contributions to knowledge: a summary

The previous section reflected on the activities undertaken for this thesis, and the extent to which they answered the research questions. This section repackages the same achievements in a different way, to highlight this thesis's contributions to knowledge. Table 11-2 sets out these contributions, as well as their limitations and potential for further research.

It can be seen that there are a number of distinct contributions: empirical evidence showing influences on the constructiveness and destructiveness of NRM relationships in Australia; a novel 3D landscape model of stakeholder relationships; a hitherto undocumented report card practice from a social process perspective; and a practical guide on applying such a practice for the purpose of encouraging constructive stakeholder relationships.

Each contribution does come with limitations, and consequently my claims are often about *detecting* certain ideas, with further work required to tease out the dynamics involved. Partly, this was by design. Each of the two components (Australian NRM study and IAN study) could have furnished a thesis in itself. However, they needed to be married together in order to provide a *useful* output. Partly, this was a result of this thesis being my first major scholarly undertaking – as my advisors were fond of reminding me, this thesis is a 'PhD, not a Nobel Prize' (see also Mullins & Kiley, 2002, who make the same point in surveying how Australian examiners assess PhD theses). Leaving further research is normal, although in the next section I reflect on my research technique and what I have learnt over the course of this thesis.

Table 11–2 Contributions to knowledge, limitations & further research

Contribution	Chapter	Limitations	Further research ideas
<p>Empirically identified influences on constructive/ destructive stakeholder relationships, in Australian NRM context.</p>	<p>5</p>	<p>Mostly managers' perspectives.</p> <p>Mt Sylvia case has gaps in the interview set. Barmah–Millewa case did not have sufficient data to proceed.</p> <p>Initial framing as <i>conflict</i> may have precluded narratives about consistently constructive relationships.</p>	<ul style="list-style-type: none"> • Can the influences be associated with other patterns, such as voting patterns, predominant land use, State, etc.? • When might an initially destructive set of actions (e.g. media attention) play an active role in triggering a constructive outcome? (e.g. Mount Sylvia case, where negative media attention apparently induced receptiveness to cooperation; e.g. Yorta Yorta case, where failed litigation and election promises seemed to lead to stable, cooperative relationships). • Are there any common intervention points? That is, what are the best opportunities to intervene if one wanted to push a relationship out of a destructive basin (e.g. community unity after a natural disaster)? • What interventions have been successful in the past? Would report cards be a suitable intervention tool? • Frame further interviews as <i>relationships</i> (cf. <i>conflict</i>), which may yield more stories about deeply constructive relationships. • Special focus on deeply, potentially intractably destructive relationships. Are there factors that make them more likely? To what extent can those factors be deliberately controlled – by parties, by managers, by governments, etc.?

Contribution	Chapter	Limitations	Further research ideas
<p>Developed a 3D landscape model of stakeholder relationships, contributing to a gap in the extant 2D model. Furthermore, provided theoretical justification for framing the model as one of relationships, rather than conflict.</p>	2, 6	<p>There remain some unanswered theoretical questions that would be better tested with more scenarios.</p>	<ul style="list-style-type: none"> • The 3D model is a mental model – how can 3D model be integrated with other models of conflict/ relationships (e.g. predictive models, numerical models), to provide better nuance? • What are the ways in which 3D models can be represented visually, so that they are useful to people as mental models and/or collaborative planning tools? (Current representation as contour maps relies on map-reading skills, which limits their application.)
<p>Documented IAN's report card practice, from a perspective independent from IAN's self-assessment.</p> <p>Provided a critical assessment of environmental report cards as social processes.</p>	7, 8, 9	<p>Key patterns detected, but some nuances need further teasing out.</p>	<ul style="list-style-type: none"> • Identify the nature of the dissatisfaction in the Long Island Sound case. • More systematic study of Chesapeake Bay case – particularly to tease out the effect of IAN's report card practice on deeply destructive relationships, or the role they play (if any) in establishing deeply constructive relationships. • A longitudinal study of a single program as it unfolds from client initiation to handover.
<p>A practical guide to using report cards as a tool for encouraging constructive stakeholder relationships</p>	10	<p>The breadth of application is untested – e.g. whether the tool is able to shift deeply destructive relationships.</p>	<ul style="list-style-type: none"> • Action research: use the tool in a range of real-life relationships and document its effects. • Consider the Gladstone Healthy Harbour report card as a case study of report card being used as a tool to alleviate a deeply destructive conflict (see Section 10.4.2).

11.4. Development as researcher

Aside from its substantive aims, this thesis also aimed to improve my own skills as a student of research. I relate two key lessons for my own record, and for other students to reflect upon.

(a) Design the social research carefully

Prior to starting this thesis, I had limited experience in qualitative social science, my undergraduate degrees being Engineering and Law. While this diverse background offered me interesting perspectives into the research, in retrospect I would have benefited from more careful design of the study. In the early stages, I took a ‘let’s see what I find’ approach. Exploratory phases are integral to an iterative research process, but in future I would be more deliberate in translating my exploration into a robust and flexible research design. Some of the difficulties in securing interviews for deeper case studies in the Australian NRM component (Set 2 interviews) may have been circumvented, if not avoided, with a greater range of contingencies planned for.

If I were to do this thesis again, I would have read more deeply into the methodology literature, earlier in the process. Although I did read through key texts (such as Blaikie, 2007, 2009; Charmaz, 2006; Strauss & Corbin, 1998; Checkland & Scholes, 1999), their nuances became clearer to me only after I was grappling with making sense of my research results. Now that I *do* have familiarity with social science methods, I am confident my next research project will be better planned.

(b) Begin with the end in mind: plan blocks of work around papers

This thesis is submitted as a monograph, and not an anthology of published papers. The original intention was to submit the latter but I found it difficult to write for a journal – mostly because the story I wanted to tell, and the arguments I had in mind, appeared to require more words than most journals would accept. Partly, a PhD thesis does need to demonstrate greater self-awareness than a journal paper. But partly my difficulty arose because, while I did envisage the thesis panning out in discrete blocks of work, I did not consider capping each block such that it would naturally fall within a 5,000–7,000 word paper. It is probably easier said than done, but I would attempt to implement this strategy in my next project.

11.5. Final remarks: significance of this research

As discussed in Chapter 3, environmental report cards have their roots in ecosystem monitoring. They are growing in demand partly because of the increasing recognition that adaptive management requires tools that feed information back into decision-making processes. The growing global reach of IAN’s own report cards attests to this demand.

However, environmental report cards are converging with other trends, and they may shortly be required to play additional roles. One trend is the rise of ‘big data’. Report cards will likely have a growing role in making large volumes of data comprehensible (Ackland, 2013; Taylor & Schroeder, 2015), in similar ways to infographics. Another is the continued use of indicators to track progress in business, public policy, human rights, healthcare and other diverse areas (Chafouleas et al., 2007; Marasco et al., 2005; Coe, 2003; Evans et al., 2006). A third trend is the increasing need to impartially and accurately account the social effects of ordinarily commercial enterprises, for the purposes of social impact investment (Allman, 2015; Wilson et al., 2015).

Underpinning much of these trends is a recognition that ‘wicked’ problems (Rittel & Webber, 1973) demand decisions that reflect differences in *value* across people within a society. ‘Value’ here simply means ‘what people consider to be important’ (Becker & Vanclay, 2003: 132) – but since there are often wide and reasonable divergences in values, the *process* of making decisions become paramount (see Waldron, 1999). Therefore, such processes need diverse knowledges to contribute to collective decisions, and need decisions to be recorded, monitored and re-evaluated (as in a *phronesis–praxis* loop: recall Figure 1-2) so that societies can co-evolve with each other and with their physical environments (see e.g. Ison, 2010; Keen et al., 2005).

Report cards are just beginning to move into an expanded role that extends beyond biophysical indicators. The Mississippi Basin report card, for example, is the first of IAN’s that includes socioeconomic indicators. The Gladstone Harbour report card includes social, economic and cultural indicators (GHHP, 2015), *and* it was probably initiated for the purpose of alleviating a deeply destructive conflict (see Section 10.4.2). In a blog post, Dennison (2016b) recognises this trend too, writing about how report cards can ‘democratize science’. If report cards are to maximise their potential as tools not only for managing ecological health, but also for holistically improving the wellbeing of societies and the environments they are inseparably connected to, then report card users must pay careful attention to *how* they are used, and *in what ways* report cards help to navigate differences in *values*. By critically examining report card production as a social process, this thesis, I hope, helps report cards grow into the role into which they are just beginning to expand.

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Appendix A List of IAN report cards

RC code	Report card title	Year (on cover)	Region	Produced by IAN?	Date online	Type (Ch 7 analysis)
164	Chesapeake Bay Habitat Health Report Card	2006	Chesapeake Bay, eastern USA	Y	18/04/2007	Historical– technical
186	Chesapeake Bay Health Report Card	2007	Chesapeake Bay, eastern USA	Y	3/04/2008	Historical– technical
187	Chester River Report Card	2007	Chesapeake Bay, eastern USA	Y	10/04/2008	Technical
188	Patuxent River Report Card	2007	Chesapeake Bay, eastern USA	Y	21/04/2008	Technical
202	Report card for the Mesoamerican reef	2008	Caribbean Sea, Central America	Y	30/03/2009	Extended report
208	Chesapeake Bay Report Card	2008	Chesapeake Bay, eastern USA	Y	2/04/2009	Historical/ legacy
210	Patuxent River Report Card	2008	Chesapeake Bay, eastern USA	N	25/03/2009	External
211	Chester River report card	2008	Chesapeake Bay, eastern USA	N	26/03/2009	External
212	Severn River report card	2008	Chesapeake Bay, eastern USA	N	30/03/2009	External
225	South Caucasus region transboundary report card	2008	South Caucus, Eurasia	Y	29/05/2010	Historical/ legacy
228	Maryland Coastal Bays report card	2008	Chesapeake Bay, eastern USA	Y	8/06/2009	Historical/ legacy

RC code	Report card title	Year (on cover)	Region	Produced by IAN?	Date online	Type (Ch 7 analysis)
261	Chesapeake Bay Report Card	2009	Chesapeake Bay, eastern USA	Y	18/05/2010	Historical/ legacy
264	West & Rhode River Report Card	2010	Chesapeake Bay, eastern USA	N	10/04/2010	External
268	Magothy River Index	2009	Chesapeake Bay, eastern USA	N	17/02/2010	External
270	South River Scorecard	2010	Chesapeake Bay, eastern USA	N	9/03/2010	External
272	Chester River Report Card	2009	Chesapeake Bay, eastern USA	N	29/05/2010	External
274	Maryland Coastal Bays Report Card	2009	Chesapeake Bay, eastern USA	Y	30/06/2010	Historical/ legacy
293	Nanticoke River Report Card	2009	Chesapeake Bay, eastern USA	N	27/10/2010	External
294	Sassafras River Report Card	2009	Chesapeake Bay, eastern USA	N	1/12/2010	External
300	Magothy River Index	2010	Chesapeake Bay, eastern USA	N	17/02/2011	External
304	Deep Creek Lake Baseline Assessment Report	2011	Chesapeake Bay, eastern USA	Y	18/03/2011	Extended report
307	South River Scorecard	2011	Chesapeake Bay, eastern USA	N	29/03/2011	External
308	West & Rhode Rivers Report Card	2011	Chesapeake Bay, eastern USA	N	7/04/2011	External

RC code	Report card title	Year (on cover)	Region	Produced by IAN?	Date online	Type (Ch 7 analysis)
310	State of the Anacostia River	2010	Chesapeake Bay, eastern USA	N	9/04/2011	External
311	Chesapeake Bay Report Card	2010	Chesapeake Bay, eastern USA	Y	27/04/2011	Contemporary
318	Maryland Coastal Bays report card	2010	Chesapeake Bay, eastern USA	Y	17/06/2011	Contemporary
324	Chester River Report Card	2010	Chesapeake Bay, eastern USA	N	17/06/2011	External
328	Nanticoke River Report Card	2010	Chesapeake Bay, eastern USA	N	15/07/2011	External
329	Great Barrier Reef First Report Card 2009 Baseline	2009	Queensland, Australia	Y	12/08/2011	Technical
331	Great Barrier Reef Report Card Regional Summaries– 2009 Baseline	2009	Queensland, Australia	Y	12/08/2011	Technical
339	Sassafras River Report Card	2011	Chesapeake Bay, eastern USA	N	5/12/2011	External
343	Baltimore Harbor's Ecological and Human Health	2010	Chesapeake Bay, eastern USA	Y	14/12/2011	Technical
360	Magothy River Index	2011	Chesapeake Bay, eastern USA	N	15/02/2012	External
364	South River Report Card	2012	Chesapeake Bay, eastern USA	N	13/03/2012	External
365	Chesapeake Bay Report Card	2011	Chesapeake Bay, eastern USA	Y	17/04/2012	Contemporary

RC code	Report card title	Year (on cover)	Region	Produced by IAN?	Date online	Type (Ch 7 analysis)
366	State of the Anacostia River - 2011	2011	Chesapeake Bay, eastern USA	N	11/04/2012	External
368	Chester River Report Card	2011	Chesapeake Bay, eastern USA	N	22/04/2012	External
370	Samoa 2012 Environmental Outlook-developing a vision for the next 50 years	2012	Samoa, Pacific Ocean	Y	13/06/2012	Contemporary
376	Nanticoke River Report Card	2011	Chesapeake Bay, eastern USA	N	30/07/2012	External
377	West & Rhode Rivers Report Card	2012	Chesapeake Bay, eastern USA	N	7/04/2012	External
385	Maryland Coastal Bays report card	2011	Chesapeake Bay, eastern USA	Y	19/11/2012	Historical/ legacy
395	Baltimore Healthy Harbor report card	2011	Chesapeake Bay, eastern USA	N	4/10/2012	External
396	Old Woman Creek Report Card	2012	Ohio, USA	Y	20/03/2013	Contemporary
397	Pipe Creek Report Card	2012	Ohio, USA	Y	20/03/2013	Contemporary
399	Report Card - Eastern Bay, Choptank, Miles, and Wye Rivers	2012	Chesapeake Bay, eastern USA	N	12/04/2013	External
401	West & Rhode Rivers Report Card	2013	Chesapeake Bay, eastern USA	N	13/04/2013	External
408	Chester River Report Card	2012	Chesapeake Bay, eastern USA	N	30/04/2013	External

RC code	Report card title	Year (on cover)	Region	Produced by IAN?	Date online	Type (Ch 7 analysis)
411	Baltimore Healthy Harbor Report Card	2012	Chesapeake Bay, eastern USA	N	3/06/2013	External
414	Maryland Coastal Bays report card	2012	Chesapeake Bay, eastern USA	Y	27/06/2013	Historical/ legacy
415	Chesapeake Bay Report Card	2012	Chesapeake Bay, eastern USA	Y	3/07/2013	Contemporary
425	Chilika Lake ecosystem health report card	2012	India	Y	28/08/2013	Contemporary
440	Old Woman Creek Report Card	2013	Ohio, USA	Y	20/03/2014	Contemporary
441	Pipe Creek Report Card	2013	Ohio, USA	Y	20/03/2014	Contemporary
442	Mills Creek Report Card	2013	Ohio, USA	Y	20/03/2014	Contemporary
447	Chesapeake Bay Report Card	2013	Chesapeake Bay, eastern USA	Y	23/05/2014	Contemporary
448	Baltimore's Annual Healthy Harbor report card	2013	Chesapeake Bay, eastern USA	N	28/05/2014	External
451	Maryland Coastal Bays report card	2013	Chesapeake Bay, eastern USA	Y	18/08/2014	Historical/ legacy
454	America's Watershed Initiative Mississippi River Watershed report card—preliminary results	2014	Mississippi Watershed, USA	Y	1/10/2014	Contemporary
457	Marine National Park and Sanctuary, Jamnagar: 2015 Ecosystem Health Report	2015	India	Y	1/01/2015	Contemporary

RC code	Report card title	Year (on cover)	Region	Produced by IAN?	Date online	Type (Ch 7 analysis)
460	State of the South Atlantic	2015	Southern Atlantic coast, USA	Y	2/03/2015	Contemporary
462	Long Island Sound report card	2015	Long Island Sound, eastern USA	Y	8/06/2015	Contemporary
463	Inner Hempstead Harbor report card	2015	Long Island Sound, eastern USA	Y	8/06/2015	Contemporary
464	Norwalk Harbor report card	2015	Long Island Sound, eastern USA	Y	8/06/2015	Contemporary
468	Chesapeake Bay Report Card	2014	Chesapeake Bay, eastern USA	Y	8/09/2015	Contemporary
478	Mississippi River Watershed Report Card	2015	Mississippi Watershed, USA	Y	14/10/2015	Contemporary
479	Coastal Georgia Ecosystem Report Card	2014	Southern Atlantic coast, USA	Y	13/11/2015	Contemporary
481	South River Watershed Report Card	2014	Chesapeake Bay, eastern USA	N	1/05/2015	External
482	West & Rhode Rivers Report Card	2014	Chesapeake Bay, eastern USA	N	1/07/2015	External
483	Baltimore Healthy Harbor Report Card	2014	Chesapeake Bay, eastern USA	N	12/06/2015	External
484	Nanticoke River Report Card	2014	Chesapeake Bay, eastern USA	N	1/05/2015	External
485	Midshore Rivers Report Card	2014	Chesapeake Bay, eastern USA	N	1/04/2015	External

RC code	Report card title	Year (on cover)	Region	Produced by IAN?	Date online	Type (Ch 7 analysis)
486	Chester River Report Card	2014	Chesapeake Bay, eastern USA	N	1/04/2015	External
487	Sassafras River Report Card	2015	Chesapeake Bay, eastern USA	N	1/06/2015	External
489	Willamette River Report Card	2015	Oregon, USA	Y	2/12/2015	Contemporary
492	Maryland Coastal Bays report card	2014	Chesapeake Bay, eastern USA	Y	8/12/2015	Historical/ legacy
494	Upper Potomac Headwaters Report Card	2015	Chesapeake Bay, eastern USA	Y	10/12/2015	Technical
500	Laguna De Bay Ecosystem Health Report Card	2013	Philippines, southeast Asia	Y	5/02/2016	Contemporary
506	Chester River report card	2015	Chesapeake Bay, eastern USA	N	22/04/2016	External
509	Chesapeake Bay report card	2015	Chesapeake Bay, eastern USA	Y	17/05/2016	Contemporary