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Continuity Through Change:

Sustainability, Resilience and the Vocabulary of Paradox

by

Keith William Gibson

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

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Abstract

Sustainability and resilience face an implementation crisis. To address this I propose a vocabulary of paradox where the price of clarity is either paradoxical theory or thoughtless action. Praxis, understood as reflective practice and practical reflection, occurs in the 'muddled middle' as researchers and practitioners resolve experience into generalised paradox and dissolve it into specific action. In the vocabulary of paradox this is the paradox of praxis: knowledge gives action meaning and action gives knowledge meaning. Applying the vocabulary to sustainability and resilience, I propose that both can be understood as articulations of a paradoxical desire for both continuity and change in human social-ecological circumstances. I define sustainability as the continuity of valued attributes of human circumstances both by means of and in the midst of change. Sustainability is continuity through change. This definition emphasises values (what should continue and change), understanding (what does continue and change) and human agency (what can be influenced to continue and change). All three merge in the muddled middle of implementation and are paradoxical in theory; continuity requires change and change requires continuity. Implementation of sustainability and resilience initiatives necessarily invokes a first person perspective. Here I propose a third paradox, the paradox of people, whereby people both constrain and enable each other. I argue that paradoxical agency for sustainability and resilience can be articulated in terms of these three paradoxes of praxis, people and sustainability: knowing and doing, together and apart for continuity and change. Finally, I propose the role of a sustainability agent, understood as both a change agent and a continuity agent, to support the paradoxical agency of individuals and small groups as they implement sustainability and resilience initiatives. I argue that this approach to sustainability and resilience dissolves the implementation gap and provides a practical and empowering vocabulary to make sense of sustainability praxis. I support these arguments with examples drawn from experiential research and interviews with conservation and sustainability practitioners in the North East region of the small Caribbean island of Tobago, West Indies.

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List of Abbreviations

CRP	Theory of Complex Responsive Processes
SEMPR	Speyside Eco-Marine Park Rangers

Epigraph

The art of progress is to preserve order amid change and to preserve change amid order.

- Alfred North Whitehead, Process and Reality

Chapter 1: Sustainability, Resilience and the Implementation Gap

Sustainability, *sustainable development* and *resilience* are powerful concepts in the international discourse. They are aspirational ideals that represent an approach to humanity's circumstances wherein significant advantages and advances are retained or improved while growing inequalities and uncertainties are minimised or reversed. As interrelated environmental, economic and social inequalities and uncertainties both cascade and amplify, the concepts are being adopted and supported across a surprising range of sectors including conservation (e.g., Curtin & Parker, 2014), development (e.g., Smith, 2011), management (e.g., Macagno, 2013) and planning (e.g., Innes & Booher, 2010).

Although widely invoked, these concepts have proven difficult to implement. This *implementation gap* between theory and practice must be addressed. If the concepts cannot coherently inform and inspire meaningful action then they are not legitimate responses to humanity's increasingly challenging circumstances.

In this thesis, I propose a paradoxical interpretation of sustainability that dissolves the implementation gap. The gap becomes a *muddled middle* of uncertainty and conviction through which progress is made. I then explore the implications of this perspective for the agency of individuals and small groups seeking to implement sustainability initiatives. I maintain that a paradoxical perspective allows for a powerful alternative conversation that has surprising implications for the theory and practice of sustainability. Notably, it 'deproblematizes' implementation and suggests a role for individual researchers and practitioners to support sustainability and resilience initiatives, empowering individuals in face of global challenges. I propose that this perspective provides substantial scope for further, meaningful research and practice. In the remainder of this chapter I introduce the concepts of sustainability, sustainable development, resilience and the implementation gap, and explain the structure of the thesis.

1.1 Sustainability & Sustainable Development

Sustainability has become a banner term representing a reasonable, responsible and comprehensive approach to humanity's circumstances. Sustainability and the related concept

of sustainable development have entered the international discourse and currently permeate the policy environment of many institutions, businesses, governments and non-government organisations from the international to the local (Drexhage & Murphy, 2010). Although there is consensus around the concepts generally, an immense amount of literature, theory, practice and disagreement is associated with their more detailed interpretation.

Sustainability and sustainable development came to prominence through their global institutionalisation associated with a series of international initiatives and conventions including: the 1972 United Nations Conference on the Human Environment (Handl, 2012), the Brundtland Commission's report, 'Our Common Future' (World Commission on Environment and Development, 1987), the Millennium Development Goals (United Nations General Assembly, 2000), the Rio Summit (Handl, 2012), the World Summit on Sustainable Development (2002), the Millennium Ecosystem Assessment (2005), Rio+20 (United Nations General Assembly, 2012) and the forthcoming United Nations Sustainable Development Goals (Open Working Group of the General Assembly on Sustainable Development Goals, 2013). For reviews see Gibson et al. (2005), Drexhage and Murphy (2010) and Quental et al. (2011). Sustainability and sustainable development are also associated with significant international initiatives addressing climate change (e.g., Intergovernmental Panel on Climate Change, 2013) as well as equality and well-being, particularly for developing nations and the poor and disenfranchised (United Nations General Assembly, 2012). The concepts have been adopted in the private sector, often under the auspices of corporate responsibility (Macagno, 2013). They are also reflected in the policies and practices of governments from national through municipal (Happaerts, 2012) as well as the policies and practices of international, regional and local non-government organisations (Watkins et al., 2012).

This widespread endorsement is matched by concomitant ambiguity. In spite of substantial scholarly effort accompanying two and a half decades of active use in the international discourse, sustainability and sustainable development resist rigorous definition (Waas et al., 2011). The definition most commonly associated with both terms is that of the Brundtland Commission. In the report 'Our Common Future', sustainable development is

defined as: “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p. 45). Although many definitions and alternative formulations have subsequently been proposed (e.g., Agyeman et al., 2003; AtKisson, 2010), none has received broad support or use (Hopwood et al., 2005; Robinson, 2004; Waas et al., 2011). Many discussions of sustainability and sustainable development first quote the Bruntdland Commission definition and then qualify or refute it with a series of comments reflecting the particular perspective being advocated (e.g., Frye-Levine, 2012).

Arguably, it is the ambiguity of the terms that in part explains their broad appeal. "The nearly universal adoption of sustainable development as a guiding principle is, in part, due to its flexibility. It allows various stakeholders to adapt the concept to their own purposes" (Drexhage & Murphy, 2010, p.9). Their ambiguity allows their use to represent a wide range of interests and concerns which in turn results in substantial critique and conflict. It is unsurprising then that these concepts are also associated with significant controversy. As Hopwood et al. express it:

> The concept of sustainable development represents a shift in understanding of humanity’s place on the planet, but it is open to interpretation of being anything from almost meaningless to of extreme importance to humanity. Whatever view is taken, it is clearly an area of contention. (2005, p. 40)

In their review of the concept of sustainable development Waas et al. (2011) explore interrelated uses of the terms ‘sustainability’ and ‘sustainable development’. They conclude that the terms are broadly synonymous although distinctions can be valuable for particular, contingent purposes. For example, some authors use ‘sustainability’ as a goal and ‘sustainable development’ as a process to achieve that goal (e.g., AtKisson 2010; Lozano, 2008). Following from Waas et al. (2011), I use the terms interchangeably until chapter 6, where I propose that they can both be understood as articulations of a paradoxical desire for continuity and change in human circumstances.

Although broadly ambiguous, the terms 'sustainability' and 'sustainable development' do reflect some common themes: a sense of persistence, a concern with human well-being, the importance of the natural environment, interrelationships and integration, and the challenge of collective action.

1.1.1 A Sense of Persistence

First, in general parlance, sustainability evokes a sense of persistence; the capacity to last or continue. For example, in the business literature sustainability is associated with sustained, elevated levels of performance (Smith & Lewis, 2011). Similarly, research into planetary boundaries addresses the sustained provision of ecosystem services (Rockström et al., 2009).

In the international discourse, sustainability is associated with two additional themes: human well-being and the natural environment (Gibson et al., 2005; Waas et al., 2011). As an example, Hopwood et al. (2005) map sustainable development along two dimensions of socio-economic well-being and equality concerns versus environmental concerns.

1.1.2 Human Well-Being

The interrelated concepts of human well-being, equality and justice form a second recurring theme in discussions of sustainable development. In the Brundtland report for example, human well-being is expressed as basic human needs and aspirations:

> The satisfaction of human needs and aspirations is the major objective of development. The essential needs of vast numbers of people in developing countries for food, clothing, shelter, jobs - are not being met, and beyond their basic needs these people have legitimate aspirations for an improved quality of life. (World Commission on Environment and Development, 1987, p. 41)

Similarly, the Millennium Ecosystem Assessment is structured relative to a conceptualisation of human well-being (Millennium Ecosystem Assessment, 2003). A concern with equality, particularly in social and economic terms, became a dominant theme in sustainable development at the World Summit on Sustainable Development in Johannesburg in 2002 (Drexhage & Murphy, 2010). Sustainable development reflects a general concern with the

welfare of the poor and disenfranchised and the global disparity between rich and poor (United Nations General Assembly, 2012). Inter-generational equality is also an explicit component of the Brundtland definition (World Commission on Environment and Development, 1987). Equality as a moral concern is reflected in the work of many mission driven organisations in the non-government organisation sector, advocating for people, ecosystems and species unable to advocate for themselves (Robinson, 2011). Equality is also reflected in the private sector through the concept of corporate responsibility where businesses acknowledge their role in society beyond monetary profit (Macagno, 2013). The related concept of justice is reflected in the Earth Charter (Earth Charter Initiative, 2000), as well as in concepts such as 'just sustainability'; "the need to ensure a better quality of life for all, now and into the future, in a just and equitable manner, whilst living within the limits of supporting ecosystems" (Agyeman et al., 2003, p. 5). Concerns with equality and justice remain an area of significant contention, for example regarding the relative obligations of developing and developed nations for global environmental issues such as climate change (Dellink et al., 2009).

1.1.3 The Natural Environment

The natural environment forms a third theme in discussions of sustainability. It is often invoked as a pre-condition for well-being. For example, the Brundtland report states "At a minimum, sustainable development must not endanger the natural systems that support life on Earth: the atmosphere, the waters, the soils, and the living beings" (World Commission on Environment and Development, 1987, p. 42). Whether valued as preconditions for well-being or for their own sake (Robinson, 2011) the degradation of natural systems is well-documented. It forms a significant focus for research, practice and concerns associated with sustainability. As Frye-Levine puts it; "Through near-exhaustive analyses of biophysical data, scientific understanding of ecological decline is in its heyday" (2012, p. 167). For example, the Millennium Ecosystem Assessment (2005) and the study of planetary boundaries (Rockström et al., 2009) quantify the decreasing reliability of ecosystem services to support human well-being.

1.1.4 Interrelationships & Collective Action

In addition to persistence, well-being and natural systems, two further themes associated with sustainability are relevant to this discussion: interrelationships and integration, and the challenge of coherent, collective action. Sustainability encompasses social, economic and ecological perspectives and their interrelationships (Lozano, 2008). Waas et al. (2011) refer to this as a 'principle of integration' that requires a systemic or holistic perspective. Robinson (2004) similarly speaks of sustainable development as an integrative concept. The behaviour of such systems is often unpredictable and consequently sustainability is increasingly associated with the complexity sciences (e.g., Norberg & Cumming, 2008). Finally, many discussions of sustainable development address the challenge of concerted collective action and the failure to implement significant positive change in face of continuing negative trends (e.g., Matthew & Hammill, 2009; United Nations Environment Programme, 2012). I refer to this as the implementation gap.

In this thesis, I explore a particular perspective on sustainability that interweaves these themes and, most importantly, explicitly addresses the latter two, integration and the implementation gap.

1.2 Resilience

Resilience, sometimes called resilience thinking, is the emblematic term for a framework to understand and guide engagement with complex adaptive social-ecological systems (Anderies & Norberg, 2008; Norberg & Cumming, 2008). Stemming from pioneering work on the dynamics of ecological systems (Holling, 1973), its scope was later expanded to address the dynamics of linked social-ecological systems (Gunderson & Holling, 2002). In the last decade it has interwoven with other antecedents of the term, notably in psychology and security (Walker & Salt, 2012) and is increasingly invoked to make sense of and structure approaches to interrelated challenges of environmental degradation, global and inter-generational inequality and systemic unpredictability in human circumstances. The concept is now entering the

international lexicon and permeating the policy environment of many institutions, businesses, governments and non-government organisations from global to local (Walker & Salt, 2012).

Resilience generally connotes the capacity of a system to maintain its identity in face of internal change and external disturbances (Cumming et al., 2005). As with sustainability, the term evokes a sense of persistence. Holling's seminal definition in fact explicitly refers to it: “Resilience determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables, and parameters, and still persist” (1973, p. 17). Similarly, Walker and Salt quote Carpenter as saying that “resilience thinking is really about changing in order not to change” (2012, p. 24). Change is acknowledged, but persistence, expressed by Carpenter with the phrase ‘not to change’, is the general goal. As Holling's definition emphasises, resilience also includes the concept of perturbations (Beisner, 2012; Walker & Salt, 2012).

The framework centers on the cyclical nature of change in human, ecological and linked social-ecological systems. This is captured in the metaphor of the ‘adaptive cycle’ which posits that human systems, ecological systems, and social-ecological systems can move through a series of phases. These are: ‘growth’, such as early succession in a forest or a boom in an economy, ‘conservation’, where resources are locked into increasingly rigid structures such as an old-growth forest or a large bureaucracy, ‘release’, where a perturbation causes a release of resources such as a forest fire burning an old-growth forest or a housing market collapse causing an economic down-turn and ‘reorganisation’ where the resources freed in the release are creatively exploited in novel ways (Holling & Gunderson, 2002). The metaphor is further extended to describe adaptive cycles nested in a hierarchy across temporal and spatial scales; stands of trees cycle within forests which in turn cycle within landscapes (Holling et al., 2002b). Neighbourhoods cycle within cities which cycle within provinces which cycle within countries. Holling et al. (2002b) refer to this hierarchy as a ‘panarchy’. The adaptive cycle highlights the episodic nature of change in complex adaptive systems and panarchy describes how such change can be influenced from higher and lower scales. Although other metaphors and tools

have been applied to resilience, such as the concept of stability landscapes (Walker et al., 2004), panarchy remains the central concept.

In spite of the coherence of the core metaphor, ambiguity has come to the concept as it has been adapted and applied to an increasingly broad range of contexts (Brand & Jax, 2007). Consequently, like sustainability, a rigorous definition has proven elusive (Brand & Jax, 2007; Myers-Smith et al., 2012). The Stockholm Resilience Centre provides a concise definition that is representative of the many in use (Starzomski, 2012). Resilience is "the capacity of a system to continually change and adapt yet remain within critical thresholds" (Stockholm Resilience Centre, 2007).

Sustainability, sustainable development and resilience thinking have become powerful themes in the global discourse. They acknowledge the dramatic degradation of human circumstances and represent an alternative approach to those circumstances, however vague. They are reflected in the thinking, policy and practice of a wide variety of institutions. In general, they represent a way of being in the world that embraces respect for self, others, the living environment, and humanity’s immediate and intermediate future. They are invested with a utopian, aspirational hope for a world that retains humanity's incredible advances while minimizing their substantial and growing costs. All three terms represent broad frameworks, or ways of thinking, that connote a series of related themes which must be particularised to apply to specific circumstances. As Gibson et al. explain: "The concept of sustainability is perhaps best conceived as a substantively important but minimal framework requiring specification in and for particular places" (2006, p. 62). It is this specification that has proven problematic.

1.3 The Implementation Gap

Although sustainability and resilience thinking continue to be associated with substantial theoretical and practical effort, there is international consensus that such effort has not substantially or systemically altered well-documented inequalities and worrying trends. “Despite the many past commitments at the highest international political level, and despite various environmental and development measures taken since, sustainability scholars agree

that the implementation of sustainable development falls short" (Waas et al., 2011, p. 1643). According to Drexhage and Murphy, "The concept and idea of sustainable development is widely accepted, and good progress has been made on sustainable development metrics; yet the implementation of sustainable development has been largely unsuccessful" (2010, p. 12). Mathew and Hammill also provide an explanation of the implementation gap:

> The grand problem faced over the last two decades has come in designing the move from theory to practice … Almost no one is opposed to these perennially attractive ideas; almost no one regards them as trivial; and almost no one believes that current conditions are perfect and hence no further progress or improvement is required. Moreover, there are clearly times when these abstract ideas receive powerful and unqualified real world affirmation … But these are exceptional moments. On countless real and important issues, one finds deep divisions within and among societies, and change can take generations to emerge and become the new norm. (2009, p. 1119)

The move from theory to practice is challenging. The concepts of sustainability and resilience provide a broad framework to make sense of these issues and extensive, rigorous scientific research has demonstrated the need for action. Numerous global assessments, including the Global Environment Outlook assessments (United Nations Environment Programme, 2012), the Millennium Ecosystem Assessment (2005), and Rockström et al.'s (2009) planetary boundaries assessments have quantified broad and worrying patterns. An editorial in the journal Nature described this as the *cartography of crisis* (Editor, 2007). However, such cartography has been of limited value in guiding specific initiatives.

Focusing on conservation initiatives as an example, Knight et al. (2008) demonstrate in a survey of authors of peer-reviewed papers on conservation assessments that the majority of such assessments are not associated with a plan for implementation. In the field of invasion biology, Esler et al. demonstrate that the knowledge base "is comprised largely of research oriented towards 'knowing', while research aimed at strategically applying or implementing that knowledge is poorly represented in the scientific literature, and the scale of its emphasis is not local" (2010, p. 4065). In the preface to the 2012 Global Environment Outlook report, the executive director of the United Nations Environment Programme summarises this as follows:

> science must underpin policy making, but as five GEO assessments and reports have shown, it is not enough. Realizing and implementing science-based policies is where the real gap resides, and this can be bridged not by more satellite observations, field monitoring, computations and scenario modeling but by courage, decisiveness and political leadership that matches the reality that GEO-5 confirms. (2012, p. xvii)

Terms such as courage, decisiveness and leadership speak to a more experiential implementation environment that is not readily susceptible to rigorously prescriptive interventions. Pullin et al. (2004) for example demonstrate that conservation decision-makers and practitioners rarely use research when making decisions. Instead, they make decisions based on experience and conventional institutional wisdom. Fields such as social innovation articulate the nuanced, intricate, intuitive and politicised nature of practice in such circumstances (Westley, 2002; Westley et al., 2006). Consequently, although sustainability and resilience provide broad frameworks and the cartography of crisis provides a pressing context, "no set of principles can be more than a part of the solution and should always be applied and interpreted within a particular context of implementation. This context is at least as important as the principles themselves" (Waas et al., 2011, p. 1647).

Implementation of sustainability and resilience requires the particularisation of these ambiguous concepts into specific, unique circumstances in the context of change and uncertainty quantified by the cartography of crisis. This is the implementation gap. If it is not bridged, the concepts of sustainability and resilience, although widely invoked, are of limited practical value.

The implementation gap is notably evident at the North East end of the small Caribbean island of Tobago. As a brief example, in spite of ample evidence of the compromised status of local coral reef ecosystems (Alemu I & Clement, 2014; Mallela et al, 2010; van Bochove & McVee, 2012), several informed proposals for marine protected areas (d'Abadie, 2011; van Bochove & McVee, 2012), and numerous capacity-building initiatives (Alkins & Mason-Alkins, 2012; Armstrong et al., 2009; Armstrong, 2012; van Bochove & McVee, 2012) all undertaken in recent years, as of this writing, the local coral reef ecosystems are not formally managed or protected. My experience supporting local community-based and non-government

organisations attempting to bridge this gap in North East Tobago both informs and inspires the ideas proposed in this thesis.

1.4 Structure of the Thesis

Although sustainability, sustainable development and resilience are often invoked as responses to many of humanity's pressing challenges, the concepts have proven difficult to implement. Addressing this implementation gap between theory and practice is critical if the concepts are to legitimately inform and inspire coherent, collective action to address humanity's increasingly tenuous circumstances.

In this thesis, I use chapters 3 to 7 to develop a *vocabulary of paradox* and use it to propose an alternative conceptualisation of sustainability that dissolves the implementation gap. I propose that sustainability and resilience can be understood as a paradoxical desire for both continuity and change in human circumstances. Framing sustainability as a paradox has surprising implications for both theory and practice. Notably, it allows the exploration of what I call *paradoxical agency*: the scope for intention and control by individual researchers and practitioners engaging with sustainability in particular, unique circumstances. In chapters 8 to 10, I propose the role of a *sustainability agent* to support the paradoxical agency of individuals and small groups implementing sustainability and resilience initiatives.

I developed these ideas based on nearly two and a half years of field work with organisations implementing sustainability initiatives in the rural North East of Tobago. Although superficially pristine and idyllic, the social-ecological system of North East Tobago is a microcosm of pressing global issues such as degrading ecosystems, particularly coral reefs, declining fish stocks, and the social changes that accompany rapid modernisation with limited planning, regulation or enforcement. This work is both a source and a context for the vocabulary I propose in this thesis.

The thesis draws on three sources of information: a review of a wide range of literature, field experience in North East Tobago, and interviews with practitioners in Tobago. My approach was to synthesise these sources to achieve a *wide reflective equilibrium* (Harper &

Stein, 2006); coherence relative to both theory and experience. In the text I reference and quote from these three sources to both support and illustrate the ideas I propose, including quotations and descriptions of situations from North East Tobago. I elaborate on this approach in chapter 2. Although the thesis addresses sustainability, sustainable development and resilience, it is not a comprehensive or critical review of the concepts. Rather, it is an exploration of an alternative perspective that emphasises how the concepts can be productively implemented.

The thesis can be understood using either of two structures. Following a conventional structure, chapter 1 is an introduction of the challenge and approach. Chapter 2 presents the methods. Chapters 3 to 6 are a review and discussion of relevant theory, establishing a framework for analysis. Chapter 7 is a case study based on field research. Chapters 8 to 10 are a discussion, focusing on the implications of the research for individual researchers and practitioners who are engaging with sustainability and resilience. Chapter 11 synthesises the concepts and findings.

Alternatively, the thesis is also structured as three paradoxes and their synthesis (Figure 1.1). As above, chapters 1 and 2 are the introduction and methods respectively. Chapters 3, 4 and 5 introduce the vocabulary of paradox, a framework for analysis. Chapter 5 presents the *paradox of praxis*, the paradoxical interdependence of knowing and doing. Chapter 6 presents the *paradox of sustainability*, the paradoxical interdependence of continuity and change. Chapter 7 is a case study applying the vocabulary of paradox to field research. Chapter 8 introduces the *paradox of people*, the paradoxical interdependence of inclusion and exclusion. Chapter 9 introduces the concept of paradoxical agency which captures all three paradoxes: knowing and doing, together and apart, for continuity and change. Chapter 10 proposes the role of a sustainability agent for individuals engaging with sustainability under paradoxical agency. Finally, chapter 11 synthesises these ideas to emphasise the significant conclusions.

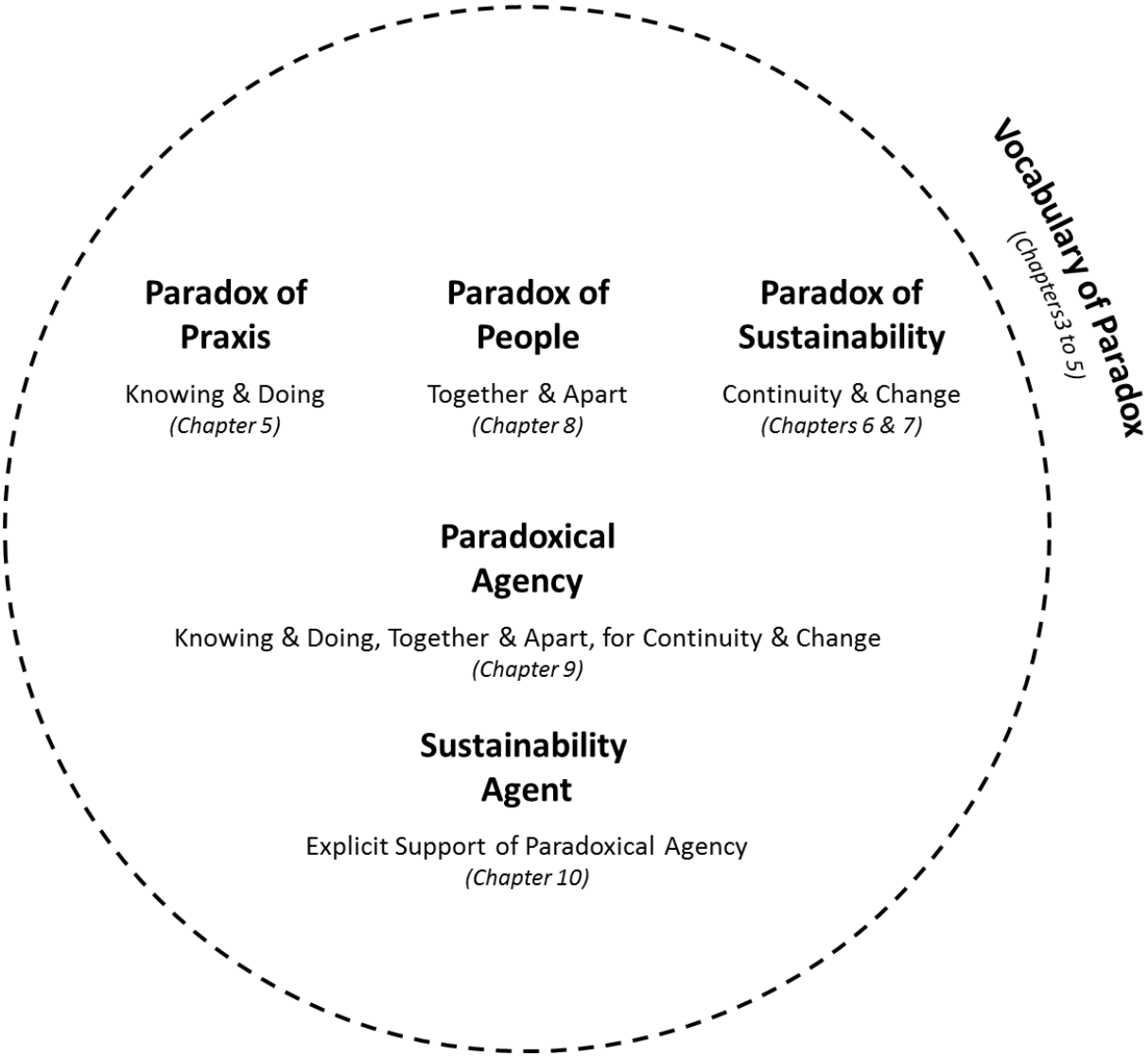

Figure 1.1 A diagram of the core concepts proposed in the thesis. To address the implementation gap for sustainability and resilience, I propose three paradoxes that are captured in a paradoxical understanding of human agency. Such paradoxical agency can be explicitly supported by a sustainability agent. These concepts are articulated using a vocabulary of paradox.

Chapter 2: Methods: Theory, Experience & Interviews

The thesis is broadly comprised of two interrelated efforts: a theoretical component and an experiential component. Although they are parsed in this thesis, in practice they were intimately entwined. Frustration and confusion implementing ideas would lead me to search for new ideas that I would in turn apply. These would result in intermingled concordance and dissonance with my experience and understanding, inspiring a renewed search for other perspectives. This thesis is my attempt to articulate both theory and experience in a mutually supportive, coherent form.

I draw on three sources of information for the thesis: published literature, personal experience, and interviews with local practitioners. In this chapter, I present my methods for exploring each source and end with a discussion of my analytical approach to synthesising my findings into a vocabulary.

2.1 Methods for Theory

The ideas expressed in this thesis are informed by an extensive review of a wide range of literature. Although my initial approach involved exploring resilience thinking literature, in retrospect it is clear that I progressed by reading a series of seminal scholarly works, each representing the accumulated wisdom of leading intellectuals and practitioners. In the order that I read them these works were: Gunderson and Holling (2000), Westley et al. (2006), Harper and Stein (2006), AtKisson (2010, 2011), Meadows (2008), Innes and Booher (2010), Patton (2011) and Stacey (2009). Although not all of them are equally reflected in the thesis, each significantly influenced my thinking and practice. Exploring these works and their associated literature led me through a wide range of disciplinary domains. The results of this research informed the entire thesis although the vocabulary of paradox in chapters 3 to 6 emphasises the natural and complexity sciences whereas the discussion, or implications for practice in chapters 8 to 10, draws more substantially on the social and business literature, particularly the work of Stacey (2009). This theoretical component of the thesis is an explicitly interdisciplinary

undertaking, understood in the broadest sense of the term. I have drawn on a diverse range of disciplinary literature to synthesise novel theory and discuss its implications for practice.

My approach to the literature was pragmatic. I was guided not by the bounds of a particular discipline but instead by congruence with previously encountered ideas and ongoing experience. I was searching for a language that would allow me to explain and value both the intimate daily experience of implementation and the powerful influences of broad generalisations. Harper and Stein (2006) describe this using Rawls' concept of *wide reflective equilibrium* which involves "seeking coherence among (1) our considered judgements; (2) normative theories, or principles; and (3) other background theories. 'Background theories' include all the relevant information and knowledge available to us" (Harper & Stein, 2006, p. xx). Elsewhere they explain:

> It includes reflection on one's own judgements and intuitions, ethical principles and theories, and background theories, critiquing and justifying intuitions by reference to principles; generating and critiquing principles that reflect intuitions; and using background theories to justify both judgments and principles. (Harper & Stein 2006, p. 105)

The goal is temporary coherence between knowledge, beliefs and practice. My exploration of published literature was guided by an attempt to articulate such a wide reflective equilibrium.

Harper and Stein maintain that a pragmatic approach to seeking a wide reflective equilibrium involves starting from "where we are" (2006, p. 102). This includes acknowledging the disciplinary traditions that have shaped the thinking of the individual or individuals doing the 'reflecting'. To that end, I briefly outline my academic training and experience to provide a context for the ideas presented in this thesis. I trained initially as a behavioural ecologist, predicting the behaviour of foraging animals using optimal foraging theory (e.g., Gibson et al., 2006). I then moved into the field of endangered species conservation, using quantitative assessments of biological and ecological data to inform and support the effective implementation of endangered species conservation initiatives (e.g., Smith et al., 2011). Finally, my experiences with the implementation of community-based conservation initiatives led me to more comprehensive approaches to conservation, resilience and subsequently sustainability.

This thesis is my attempt to articulate a wide reflective equilibrium that incorporates a diversity of intellectual traditions to which I have been exposed, outlined by the list of works and authors presented above. I maintain that these works and the traditions they represent enrich a wide reflective equilibrium that addresses the implementation of sustainability and resilience initiatives.

Although disciplinary traditions shaped my approach to these issues, seeking a wide reflective equilibrium requires that the inquirer be open to changing his or her perspective. Consequently, the progression of the inquiry can only become clear *a posteriori* and necessarily remains open to further reflection and critique. Therefore, although this thesis is an attempt to articulate a wide reflective equilibrium, it is in no way a 'widest' reflective equilibrium. Many relevant and extensive traditions are not included. If the wide reflective equilibrium is effective it should provide enough clarity to allow productive comparisons and contrasts with other perspectives and traditions that will in turn suggest further avenues for both research and practice. The result cannot be comprehensive. The work's most important characteristic should be its coherence.

My method in reviewing the literature can also be understood within the tradition of *integrative research* which van Kerkhoff describes as "Research in the context of complexity, with an action imperative" (2014, p. 146). van Kerkhoff (2014) incorporates in this approach the widely used concept of *transdisciplinarity* (Jahn, 2012; Lang et al., 2012), another term that invokes the integration of theory and practice relative to a particular challenge. Although my approach to the literature can be described in these terms, I have found it easier to express as an attempt to articulate a vocabulary that integrates theory, beliefs and experience. I explain this process of synthesis in more detail at the end of this chapter.

I end with two brief comments on this approach to reviewing literature. First, such a programme is greatly facilitated by access to comprehensive databases of peer-reviewed literature allowing for keyword and citation searches across disciplines, largely independent of the publication in which the material appears. I relied heavily on such databases to explore the often interconnected etymology of many terms and the ideas with which they are associated.

Second, the method is intellectually challenging because it involves continually learning new terminology and the particular disciplinary nuances associated with previously encountered terminology. Perpetually engaging with new terminology is challenging because it can lead to a sense of incompetence on the part of the researcher (e.g., Knight & Clarke, 2013) who is by definition never competently fluent in a constituent jargon. This intellectual challenge speaks to a particular skill required to achieve a wide reflective equilibrium.

2.2 Methods for Experience

The goal of this research is to address the implementation gap in sustainability and resilience initiatives. I maintain that personal experience supporting a group in its implementation of sustainability initiatives constitutes a valid source to inform scholarly discourse on the subject. My approach to this aspect of the research is best expressed as an application of the theory of *complex responsive processes* (CRP) to research as outlined by Stacey (2009). I describe CRP in detail in chapters 4 and 8. As Stacey explains "the method is that of giving an account, telling a story, of what I think and feel that I and others are doing in our interaction with each other in particular contexts over particular periods of time and what sense we are together making of the much wider emergent patterns across populations" (Stacey, 2009, p. 221). He goes on to explain that:

> the insights/findings of the research must arise in the researcher's reflection on the microdetail of his or her own experience of interactions with others. It follows that the research method is subjective, or rather, a paradox of immersing in and abstracting from experience. (Stacey, 2009, p. 226)

This research took place at the relatively isolated North East end of the Caribbean island of Tobago. A more detailed description of the site is provided in chapter 7. Briefly, North East Tobago is a rural region dominated by the Main Ridge Forest Reserve, the oldest conventionally protected area of tropical forest in the world (Woodcock, 2010). The reserve protects the hilly spine of the island. It is nearly 4,000 hectares, covering roughly one seventh of the island's total area. A population of approximately 3,000 people (Central Statistical Office of Trinidad & Tobago, 2012) lives in six villages along the coast, several of which are located along beaches at

the base of steep valleys descending from the reserve. Many of the beaches are active nesting sites for endangered sea turtle species (Walker & Gibson, in press). The coastal waters host extensive coral reefs (van Bochove & McVee, 2012) and near-shore small islands classed as important birding areas for nesting pelagic bird species (White, 2009).

From the 10th of April, 2010 to the 30th of August 2012, a period of roughly two years and five months, I worked closely with a small, volunteer, community-based organisation, the Speyside Eco-Marine Park Rangers (SEMPR) and a variety of other individuals and organisations with which they interacted. The group was formed in November of 2009 by residents of the rural, coastal village of Speyside with support from a regional non-government organisation and an international non-government organisation. SEMPR's purpose is to promote community-based management and sustainable use of Speyside's rich natural heritage. While this research took place, the group was the implementing organisation in Tobago for a multi-island Caribbean project titled 'My Island, My Community' (Armstrong, 2012). The project involved the multi-island broadcast of a radio edutainment drama that addressed environmental and social issues, and a Tobago-wide environmental outreach campaign. SEMPR was predominantly responsible for the latter while the former was implemented by collaborating organisations. The project was funded in Tobago by the United Nations Development Programme Global Environment Facility Small Grants Programme of Trinidad and Tobago. For the period of research, the group's efforts were divided between growing their new organisation, undertaking activities associated with the obligations of the 'My Island, My Community' project, and pursuing other mission-oriented activities where possible.

My role during this time was often described as that of a mentor (e.g., Armstrong, 2012). In practice, I supported the group in a wide variety of ways including logistical support, facilitation, training, mediation, and record keeping. More explicit details on my role are included throughout the thesis with a concise description at the end of chapter 10. This approach involved intimate immersion in the daily struggles and successes of the group and its individual members.

During the research period I recorded notes and reflections on my daily interactions with members of SEMPR and other individuals with whom they interacted. I compiled these notes into a database of 347 records including 50 formal SEMPR group meetings, 239 less formal meetings, interactions and phone conversations, 25 activities, such as beach cleanups and 33 workshops and presentations. In the database, each record includes the people involved, the organisations involved, and the projects implicated. The notes for each interaction also include reflections on phone texts and emails but these forms of communication are not included in the database. I roughly coded each record with the topics discussed or implicated so as to facilitate subsequent analysis. This research involved 17 individuals from whom informed consent was obtained.

I developed the ideas presented in this thesis to make sense of my intimate daily experiences of implementation. Consequently, the experiential research both informed and inspired my search for theoretical coherence, for a wide reflective equilibrium. Metaphorically, the experiential research can be understood as the soil out of which my ideas grew. In this manuscript however, I have used the experiential research as a source of examples, drawn from the database, to illustrate various ideas. References to the database are indicated in the manuscript with the code 'DB', a reference number to the database, and a date. To summarise, although it may appear in the thesis that my ideas supersede my experience, in practice, as the CRP approach to research expresses, the two are inextricably interrelated.

2.3 Methods for Interviews

Although my research was dominated by an interwoven exploration of theory and experience, I also learned a great deal by interviewing local practitioners. Interviews were critical for at least two reasons. First, they provide the reflective perspective of practitioners. In this way, interviews are a step closer to practice than the broadly theoretical perspectives drawn from published literature. They are also an alternative perspective on theory and practice that is one step removed from my individual, intimate experience in North East Tobago. Second, there is limited published material on the local and regional realities of sustainability implementation in the Caribbean. Consequently, interviews provide critical regional and local context that is not

readily available elsewhere. In this way, interviews provide a middle perspective between general theory and my more intimate daily implementation experience.

From 2010 to 2012 I interviewed 12 practitioners in Trinidad and Tobago concerning how they understood their skills and their role in promoting resilience, conservation and sustainability. I interviewed between one and three practitioners from seven of the organisations with which I interacted most throughout my experiential research. These interviews included two with members of SEMPR and three with other practitioners who were also involved in the experiential research. The total number of people involved in both components of the research was 24. The 12 people I interviewed represented the majority of practitioners directing the implementation of conservation and sustainability initiatives in North East Tobago during the research period. Interviews were semi-structured around a series of questions that encouraged a multi-scalar, social-ecological perspective on the role of a practitioner in sustainability praxis. Interviews lasted between one and two hours. Quotes and information from interviews are referenced in the manuscript with the word 'Interview' followed by the date. I draw on quotes from these interviews throughout the thesis.

2.4 Synthesis: Light Dawns Gradually

My purpose with the concepts expressed in this thesis is to articulate a complementary vocabulary that will support the wise and humane implementation of sustainability and resilience initiatives. This is not easy to do. An alternative vocabulary is difficult to explain using a linear, incremental series of arguments because any starting point requires not one, but a series of justifications, all of which are themselves inter-related. Wittgenstein captures how such understanding comes. "When we first begin to believe anything, what we believe is not a single proposition; it is a whole system of propositions (light dawns gradually over the whole)" (1974, §141).

Articulating a vocabulary involves giving a new or modified sense to existing words and concepts, combining them in different ways to invoke new implications and considerations. In the thesis this manifests as loosely defined concepts and associated terms which I repeatedly

revisit, refining and revising to increase both clarity and nuance. This involves taking some liberties with terms that often have one or more explicitly technical definitions. Although I explore some of these technical definitions, and even propose some myself, I use terms predominantly for their varying connotations. Consequently, the manuscript is full of deliberately vague descriptors such as: 'invoke', 'evoke', 'reflect', 'tradition', 'manifest', and 'sense'. This approach contrasts with attempts to articulate clear, rigid, specific, technical definitions of terms. The result is a thesis that should be read not as a linear explication but instead as an iterative and expanding web of thought (Figure 1.1).

There is a risk that such an approach is simply a mask for intellectual sloppiness. However, if I have done my job well, the meaning associated with terms and concepts should *resolve*; it should become clearer as the manuscript progresses. As Rorty explains (1980, p. 58) "bad arguments for brilliant hunches must necessarily precede the normalization of a new vocabulary which incorporates the hunch". Throughout the thesis, a complementary vocabulary should gradually resolve, suggesting new interpretations and ideas. In Wittgenstein's more elegant terms, light should dawn gradually over the whole.

With this approach in mind, the vocabulary proposed in this thesis is not explicitly set up relative to other approaches or perspectives. For example, I do not explicitly critique modernism or adopt postmodernism. I do not proceed by comparing and contrasting. Such comparison and critique has been effectively accomplished elsewhere (e.g., Harper & Stein, 2006). Instead, my approach involves laying out a series of plausible propositions and their implications in an 'if/then' structure. My aim is to propose a complementary vocabulary and associated perspective. Instead of comparison and contrast with alternative perspectives, the 'if/then' structure is explicitly set up relative to my normative perspective and practical experience. In this case, rigour and veracity are ensured not through exhaustive scholarship of one particular domain, but through aggressive practicality. My approach is explicitly pragmatic as opposed to disciplinary or doctrinal. To this end, I have tried to follow the approach advocated by Harper and Stein:

> we begin with a normative basis and then use writers and ideas that we find useful or helpful. We believe that the most robust and useful approach can be developed by drawing ideas from a variety of sources as appropriate to our purposes. (2006, p. xix)

The vocabulary is informed and justified by interviews and experience. In chapter 5, I propose a concept that I call 'praxis' that involves moving back and forth between theory and experience. Theories are used to make sense of experience, and experience is used to test and modify theories. This analytical approach is ultimately a search for coherence between knowledge, beliefs and practice; Rawls' wide reflective equilibrium (Harper & Stein, 2006). This also integrates with Stacey's (2009) CRP approach described above and in more detail in chapters 4 and 8. I used these approaches to synthesise theory, interviews and experience.

To summarise, the thesis is written as a series of propositions that repeatedly refine a vocabulary centered on a particular perspective. The propositions are supported by interwoven references to published literature, interviews with practitioners, and personal experience supporting the implementation of sustainability and resilience initiatives in North East Tobago.

Chapter 3: Convergence, Systems & Complexity

The real trouble with this world of ours is [that it] … looks just a little more mathematical and regular than it is; its exactitude is obvious, but its inexactitude is hidden; its wildness lies in wait.

- G.K. Chesterton (2008, p.70)

3.1 Convergence

The concepts of *sustainability* and *resilience* capture a significant swath of human experience. For example, *sustainable development* initiatives often appeal to the integration of three pillars of environment, society and economy (e.g., Lozano, 2008; United Nations General Assembly, 2005). Other frameworks add elements such as culture (e.g., Hawkes, 2001), politics (e.g., O'Connor, 2006), institutions (e.g., Spangenberg, 2004) or well-being (e.g., AtKisson, 2010). Likewise, resilience thinking stresses that human and natural systems are not separate and can be more productively understood as combined social-ecological systems (Folke et al., 2005) or coupled human and natural systems (Liu et al., 2007).

This broad scope reflects the kinds of challenges sustainability and resilience researchers and practitioners address. Issues such as climate change (Intergovernmental Panel on Climate Change, 2013) or coral reef decline (Burke et al., 2011) do not readily align with disciplinary boundaries (e.g., Kunz et al., 2013). In these circumstances, the challenge becomes to "connect and integrate useful knowledge from the arts and sciences alike, but in ways that are suited to the problems and purposes of the present" (Buchanan, 1992, p. 6). This challenge is reflected in the extensive sustainability literature addressing integration between and across disciplines (e.g., Bennett & Jessani, 2011; Pohl et al., 2008; van Kerkhoff, 2014).

Meaningfully addressing sustainability and resilience challenges also requires integrating knowledge and perspectives from outside the disciplinary tradition. As Kay explains:

> Greater multi- and interdisciplinarity in the research into and management of complex socioecological situations is necessary but not sufficient. Left to themselves, researchers will inquire into those aspects of the system that they, for their own personal, disciplinary, or political reasons, deem to be important. (2008b, p. 30)

Disciplinary explanations "tell a tale which purports to have universal applicability, yet requires exterior inputs of non-disciplinary knowledge in order to address concrete practical problems" (Horlick-Jones & Sime, 2004, p. 445). Sustainability and resilience invoke not only disciplinary knowledge, but other forms of knowledge and experience. These may include alternative world views and an experiential component strongly tied to context (van Kerkhoff, 2014). As Berkes and Davidson-Hunt (2008, p. 121) express it, any "group of people who dwell in an ecosystem have potential contributions to make". Put another way the disciplinary tradition, with its associated knowledge, is not sufficient to address real-world sustainability and resilience challenges. "Because no perspective encompasses the whole, then all perspectives are partial, and each one is affected by ignorance of some aspects of the situation" (Funtowicz & Ravetz, 2008, p. 316).

Consequently, researchers and practitioners face a challenge of *convergence*. They must integrate knowledge across disciplines. They must also integrate disciplinary knowledge with other forms of knowledge, concerns, values and priorities relative to particular and dynamic circumstances. This is what van Kerkhoff calls "the multi-faceted nature of integration in sustainability science: across disciplines, sectors, scales and between knowledge and action" (2014, p. 144). Researchers and practitioners must act:

> in response to the new leading problems for science, characterized by high levels of uncertainty (both measurable and unmeasurable), epistemological conflicts (whose knowledge counts), arguments over facts (which facts are relevant) and values (which goals are legitimate), and a sense of urgency that decisions with possible major consequences need to be made quickly (e.g., climate change). (Funtowicz & Ravetz, 2008, p. 309).

Instead of taking prescribed action into the known, researchers and practitioners must, using a phrase from Stacey (2009, p. 35), "act into the unknown", where consequences are uncertain.

3.2 Systems Thinking

Systems thinking is commonly used to make sense of the broad range of influences invoked by sustainability and resilience challenges. A system is "an interconnected set of elements that is coherently organized in a way that achieves something" (Meadows 2008, p. 11). As the

definition emphasises, systems are characterised by elements, connections, and a purpose or function. They can range from the simple, such as a bathtub where water flows in and out, through the complicated, such as a telephone network, to the complex, such as a tropical rainforest (e.g., Snowden & Boone, 2007). I revisit these concepts in more detail in chapter 9.

For example, in the experiential data, as part of a workshop I designed and facilitated for members of the community-based organisation, the Speyside Eco-Marine Park Rangers (SEMPR) in September 2011, participants undertook an exercise called 'Whys and Sos' (DB269, 17/09/2011). I developed 'Whys and Sos' as a modification of the widely used 'five whys' approach to problem analysis (Hewitt-Taylor, 2012). At the time, the group was implementing the 'My Island, My Community' climate change adaptation, education and awareness initiative (Armstrong, 2012) for which they had prioritised environmental issues of concern in Tobago (DB, 21/06/2010). For the exercise, groups of three or four participants selected two issues. They were given an aerial photograph map of the village and surrounding area. For each issue, they were asked to write on a sticky tab an example of the issue that applied in their village. They placed the sticky tab on the map. They were then asked to articulate sequential causal connections by asking 'why' of the issue up to five times. Each answer was written on a sticky tab, placed on the map and connected by an arrow drawn in marker. They were also asked to look at the effects of an issue by asking 'so' up to five times; likewise writing the answers on sticky tabs to be placed on the map and connected with arrows. As more elements were added to the map participants were encouraged to look for and ask questions of potential interrelationships.

Figure 3.1a is a photograph of one of the resulting maps and figure 3.1b is a transcribed version. The group had selected the issues of 'marine habitat destruction' and 'invasive species' (DB269, 17/09/2011). Two examples of causal chains discussed in the workshop are: overgrowth of coral by algae; why; because of deforestation; why; because of farming; why; because of increased food production; why; because of more people (DB269, 17/09/2011). Another example is: bleaching; so; corals die; so; less fish; so; unemployment; so; crime (DB269, 17/09/2011).

Maps are not rigorously factual. They are models representing the collective understanding, values and experience of the participants. In this case (Figure 3.1), the map provides an example of both convergence and systems thinking. The participants were practitioners implementing a sustainability initiative. Their understanding of the challenge they sought to influence, marine habitat destruction, touched on social (crime), terrestrial (deforestation), marine (overgrowth of coral by algae), and economic (unemployment) issues. They saw their initiative at the convergence of a wide swath of human experience in their village. Similarly, the map demonstrates the highly interconnected nature of their understanding of their circumstances. For example, as expressed by a group member:

> The people who take folks out to SCUBA dive don't know the names of the fish. They actually look for their tips by showing you a lobster and … after the reef tour they dive down and take the lobster. So this is the kind of thing we trying to avoid. You can make more money with it alive than if it's dead. (Interview, 22/08/2012)

Group members understand the interrelationships between the local ecosystem and social system. This perspective is neatly summarised in a quote from a practitioner: "Having a broader perspective on a small island becomes more important. You don't have the luxury of specialising your thinking. You need to think in connections" (Interview, 18/10/2011). As the example illustrates, systems thinking, interpreted broadly as elements, connections and a purpose, provides a way to convey the interconnected nature of sustainability and resilience challenges.

Systems thinking includes a tradition of robust, technical analysis that is amenable to mathematical and computer modelling (Meadows, 2008). System dynamics draws on concepts such as stocks, flows, feedbacks and delays to examine how systems behave (Meadows 2008). The related concept of networks, including social and ecological networks, similarly looks at elements and their relationships using concepts such as nodes and links, or edges (e.g., Bascompte, 2007; Hahn et al., 2008). Systems thinking is useful for making sense of convergence because it allows for and formalises the consideration of multiple elements and the ways they relate.

When applied to sustainability or resilience, systems thinking involves positing a model of human circumstances as a system. This approach has provided great scope for description and prediction. For example, the seminal project 'Limits to Growth', first published in 1972, models potential scenarios for the global system when exponential human population and economic growth are limited by finite supplies of resources (Meadows et al., 2005). Systems thinking has also been applied extensively in the practice of sustainability (e.g. AtKisson, 2010; Senge, 2010).

Systems thinking is most helpful in articulating the sometimes counter-intuitive behaviour of systems. For example, in North East Tobago, sea turtle is a traditional local culinary delicacy (Interview, 13/08/2012). Although sea turtle hunting had recently been banned, formal enforcement in 2012 was limited and poaching and consumption remained locally accepted (Interview, 13/08/2012). During the 2012 hawksbill (*Eretmochelys imbricata*) sea turtle nesting season of May to August, regular nighttime beach patrols by volunteer university students and members of the local community-based organisation North East Sea Turtles Tobago reduced poaching of nesting female sea turtles from beaches (Walker & Gibson, in press). However, the presence of gill nets in the adjacent near-shore waters and anecdotal accounts suggested that, by making beach poaching problematic, beach patrol efforts had likely increased poaching efforts at sea (Interview, 13/08/2012). Poaching at sea is more difficult to both document and prevent. In this way, beach patrol efforts may have increased overall poaching pressure on the sea turtle population. From a systems perspective, conservation actions were based on a simple model: increased beach patrol effort decreases beach poaching, thereby increasing sea turtle nesting success. However, the addition of increased poaching effort at sea may have instead yielded an overall negligible or even counterproductive outcome of conservation actions, a counter-intuitive result.

As more elements are added to a system model and the nature of their relationships is made more complicated, the overall behaviour of the system quickly becomes confusing (Meadows, 2008). The resulting often counter-intuitive behaviour of such system models is increasingly associated with the concept of complexity.

3.3 Complexity

Systems thinking is closely associated with the concept of complexity. Complexity is a revelatory way of thinking about the world. It is one articulation of a substantial paradigm shift taking place in the Western intellectual tradition (Harper & Stein, 2006) that hinges on the recognition that humanity's circumstances are at times irreducibly unpredictable but none-the-less exhibit patterns that can at times be intentionally influenced. Systems thinking provides a language and formal structure in which complexity is commonly expressed and examined.

Complexity within the contemporary scientific tradition centers on a concern with nonlinear interactions (Stacey, 2009). Expressed in systems terms, a nonlinear interaction occurs when the relationship between an entity understood as a cause and an entity understood as an effect is not proportional. As Stacey explains, "doubling of a cause could more than double the effect or less than double it and there could be more than one cause for an effect and more than one effect from a cause" (2009, p. 56). Complexity therefore involves examining the nature of causality.

Traditional science is founded on linear causality, where a single cause, such as depressing one side of a balance, has a proportional effect, raising the other side of the balance. Such causality can be represented by linear equations, which are solvable. Models based on linear interactions yield predictable results (Stacey, 2009). They provide certainty.

Non-linear equations cannot be solved, but they can be modeled. Such models can then be iterated on computers to generate numerous scenarios. By looking at the patterns of many scenarios, researchers can draw conclusions about the behaviour of such systems. Critically, where linear models invariably yield certainty, some non-linear models yield uncertainty (Stacey, 2009).

Issues and initiatives associated with sustainability and resilience are commonly modeled as *complex adaptive systems* (Liu et al., 2007; Norberg & Cumming, 2008). Levin (1999) identifies three essential features of complex adaptive systems: diversity and individuality of components, localized interactions among components and an autonomous

process for replication or enhancement. Complex adaptive systems have a heterogeneous distribution of components which interact, often in non-linear ways to generate hierarchical structures (Levin 1999). Taking the example of a coral reef ecosystem, individuals of diverse fish and invertebrate species (components) interact locally through a series of ecological processes such as predator prey dynamics, and replicate and enhance through a process of natural selection to yield the hierarchical structures that constitute a coral reef ecosystem. Complex adaptive systems exhibit a series of properties, including self-organisation, nonlinearity and emergence; all of which contribute to irreducible uncertainty in their behaviour.

Self-organisation refers to the local interactions of individual components or agents in a system where no agent or group of agents determines the interaction principles of others (Stacey, 2009). Each agent pursues its own path and interacts with other agents pursuing their own paths when those paths intersect (Patton, 2011). In responding to each other and their locally shared conditions agents adapt to each other and their conditions (Patton, 2011). They simultaneously influence and are influenced by each other and their environment (Stacey, 2009). An example is the individual behaviour of schooling fish. Each fish both reacts to and influences the behaviour of other fish. Each fish also both responds to and at times influences the environment, such as the behaviour of a predator (Lopez et al., 2012).

Nonlinearity emphasises the possibility for small local interactions to scale up unpredictably to significant system-wide effects. Discussing human actions, Arendt describes "a medium where every action becomes a chain reaction and where every process is the cause of new processes … the smallest act in the most limited circumstances bears the seed of the same boundlessness, because one deed, and sometimes one word, suffices to change every constellation" (1998, p. 190). This is sometimes referred to as the butterfly effect or a sensitivity to initial conditions (Patton, 2011; Stacey, 2009). Non-linearity also relates to concepts such as 'black swan events' where sudden, unexpected and improbable events amplify and lead to significant system-wide change (Taleb, 2010), 'tipping points' (Gladwell, 2006) or 'critical thresholds' (Walker et al., 2004) where small changes can lead a system to shift to a new basin of attraction. For example, coral reef ecosystems can tip into an alternative

algal reef ecosystem that is very stable. The coral reef ecosystem can absorb ongoing disturbance, such as a high nutrient input from land, but eventually reaches a critical threshold where change from one system to another occurs rapidly. This rapid change from a coral to an algal dominated state can be difficult to reverse (often expressed with the concept of hysteresis) and difficult to predict when many other factors, such as increased ocean temperature or nuanced ecological interactions between algae and coral, are involved (Nyström et al., 2008).

Emergence follows from self-organisation and non-linearity. What emerges from nonlinear local interactions are patterns that, despite being coherent, are independent of any centralised control or direction (Stacey, 2009). Patterns emerge that are independent of the choice of any individual agent or group of agents (Meadows, 2008). Critically, coherent patterns in such systems do not reflect fixed laws, but instead the aggregate of many local interactions. For example, the schooling behaviour of fish is independent of centralised control. No single fish controls the behaviour of other fish. However, coherent patterns of behaviour emerge at the level of the school, such as avoiding predators (Handegard et al., 20120). Emergence has profound implications for human agency in sustainability initiatives that I explore in detail in chapters 9 and 10.

Self-organisation, nonlinearity and emergence all contribute to irreducible *uncertainty* in complex adaptive systems. Put simply, the past and current states of a system cannot perfectly predict future states of the system. Such uncertainty means that patterns in complex adaptive systems are dynamical, in that they can include oscillations, apparent rest, directional movement, random movement and bifurcations as the system responds to external influences and interdependent internal interactions (Kelso & Engstrøm, 2007; Patton, 2011). As Wittgenstein explains: “If we think of the world’s future, we always mean the place it will get to if it keeps going as we see it going now and it doesn’t occur to us that it is not going in a straight line but in a curve and that its direction is constantly changing” (1998, p. 5). Wittgenstein’s point was nicely expressed by a SEMPR group member:

> It have a big difference [in the social-ecological system] but the only people to tell that story is the elderly people. History is important, because I say you can be lost without history. If you born in 2001, you come here telling yourself it always used to have cars on the road, when it used to be donkey. You always would think, well, cellphone was always there; where cellphone just recently came out, you know. That is to tell you the big difference. You can see that the world is going somewhere, but not one way all the time. (Interview, 22/08/2012)

3.4 Uncertainty

This type of uncertainty can be difficult to conceptualise. Several frameworks have been developed to make it easier to understand. In Snowden and Boone's (2007) *Cynefin framework*, *simple* situations are characterised by a linear relationship between cause and effect. Cause-effect relationships are perceivable, replicable and predictable (Paton, 2011). Westley et al. (2006) describe a similar category of simple situations. Kay (2008a) draws on Weinberg's (1975) typology to describe these as 'small-number problems', susceptible to simple solvable equations. Using Gomory's (1995) framework, I refer to knowledge here as 'known' in that it either is, or can easily become known.

In the *complicated* domain of the *Cynefin* framework cause and effect relationships are broadly replicable and predictable with quantified error, but are not readily perceivable. Cause and effect are separated in time and/or space (Patton, 2011). Consequently, analysis and expertise are required to generate explanations and predictions. Again, Westley et al. (2006) describe a similar category. This roughly equates with what Kay (2008a) describes as 'large-number problems' which can be reliably described with frequentist statistics of central tendency and variation. Using Gomory's (1995) framework, I refer to knowledge here as 'knowable' because although it is not readily apparent, certainty can be quantified.

Complexity is the domain of uncertainty inherent in complex adaptive systems (Snowden & Boone, 2007). Cause-effect relationships are not replicable or precisely predictable and are only coherent in retrospect (Patton, 2011). Westley et al. (2006) once again describe a similar category. Kay (2008a) describes such situations as 'middle-number problems' where averages are not helpful and equations are not uniquely solvable. Returning to Gomory's (1995)

framework, I refer to the inherent uncertainty in these situations as the ‘unknowable’. Although these frameworks help to make complexity tractable, in chapter 9, I explore yet another framework for causality, developed by Stacey (2009), that is particularly applicable to human agency.

I have argued that the convergence represented by research and practice in sustainability and resilience can be modeled as a complex adaptive system. Such systems include an inherently unknowable component which means that researchers and practitioners must take action into the unknown.

3.5 Tension

Systems models are a type of abstraction or generalisation from specific circumstances (Stacey, 2009). The uncertainty inherent in complex adaptive systems models, the unknowable, means that no model can perfectly describe or predict particular circumstances. Any model will bear the possibility for discrepancy relative to a particular situation. Critically, unlike risk (Knight, 1921) or a statistical error term in a large-number problem (Kay, 2008), this discrepancy cannot be quantified. This is captured by Gödel’s ‘incompleteness theorem’ where he demonstrated that no logical system can be proven to be both consistent and complete (Sorensen, 2013). No model can ‘capture’ reality. As Meadows explains: “Everything we think we know about the world is a model. Our models have a strong congruence with the world [but] fall far short of representing the real world fully” (2008, p. 87).

3.5.1 Metaphorical Tension

I use the concept of *tension* as a metaphor for this potential for discrepancy; the degree to which a model could 'fall short' in particular circumstances. I use it in a metaphorical as opposed to a technical sense to emphasise that there is no scope for quantification. *Metaphorical tension* captures the sense of a potential for discrepancy between a fluid and immersive reality and general statements about that reality.

The implementation of sustainability or resilience necessarily invokes a first person perspective. In so doing it invokes the immersive and ongoing nature of human experience. This

is what Chia calls “the inherent fluidity of life situations, and the acute sense of transience and temporality accompanying the profusion of events encountered in the moment-to-moment heterogeneous becoming of our lives” (1998, p. 348). As Stacey expresses it:

> Human experience is continuous in time, with the past, present and future flowing seamlessly into each other as undifferentiated flux and flow. Raw, lived human experience is irreducibly dynamic and complex, an amorphous, vague, unwieldy, shapeless mass and unorganized process of continuously becoming. (2009, p. 90)

Generalisation such as a systems model must simplify this fluid and immersive reality into discrete elements and relations between them. As Chia explains however, such elements

> are not discrete, isolatable and stabilized entities, but perpetually changing configurations of relations which are continuously transforming themselves. This implies that the current established system of symbolic expressions cannot adequately capture the sense of fluent indeterminacy and temporality intrinsic to life. (1998, p. 350)

There is an inevitable gap between immersive experience and accounts of that experience. Metaphorical tension is the sense of tension between what is expected based on models or generalisations, and what actually happens in the unknowable future.

In the experiential data, SEMPR is a small, volunteer community-based organisation. SEMPR can be interpreted, in Chia’s terms, as ‘a discrete, isolatable and stabilised entity’. The group received funding (DB119, 08/10/2010), and implemented a series of sustainability and conservation initiatives in North East Tobago from 2010 to 2012 such as beach cleanups and school outreach programmes (e.g., DB097, 21/08/2010; DB412, 06/06/2012). It delivered reports on its activities (Armstrong, 2012). However, organising a group meeting or event could be challenging. Members had other commitments and priorities, and it could be difficult to determine in advance who would be present at what time for an event (e.g., DB023, 21/06/2010).

Returning to Chia, from this perspective the group was not a ‘discrete, isolatable and stabilised entity’. It was a generalisation or model of ‘perpetually changing configurations of relations’ within and between people. Members were experiencing perpetually changing configurations of relations in their own lives; dealing with running a small business, the health

of a family member, or raising a child (DB394, 18/07/2012). They were also experiencing perpetually changing configurations of relations with other members in the group, both in group activities and through other interactions in the community. As one member put it:

> We start appreciating people more than how we used to in the sense of none of we are perfect. Sometimes we make mistakes. Sometimes we choose to get angry. But we put all those stuff behind our back and we look more ahead of what we want to achieve. (DB268, 16/09/2011)

The fluidity of these influences meant that it was difficult to determine ahead of time whether individuals would attend an event. Put simply, a scheduled SEMPR meeting did not guarantee attendance (e.g., DB219, 24/06/2011). The apparently discrete, isolatable and stabilised entity of SEMPR, understood as a generalisation or model, did not, as Chia says, adequately capture the 'sense of fluent indeterminacy and temporality intrinsic to life'. In this case, it did not capture exactly who would attend a particular event. Metaphorical tension is the potential for discrepancy between the expectation that members of the organisation would attend an event and the actual attendance at a particular meeting.

Critically, ascribing a percentage likelihood that a group member would attend based on a model incorporating past attendance and other factors could diminish the metaphorical tension, but would not dispel it. Only lived experience, attending the meeting, Chia's 'continuous becoming', dispels the tension between an expectation based on the generalisation (the group), and the actual experience of the meeting. Metaphorical tension stems from the irreducible uncertainty of the unknowable future.

Metaphorical tension can also be understood using the concept of *ceteris paribus*. *Ceteris paribus* means 'all else being equal or held constant'. It is an often implicit assumption in most statements in the sciences (Reutlinger et al., 2014). Models and generalisations can be understood as having an implicit *ceteris paribus* assumption. For example, in section 3.2, I presented a simple model that guides sea turtle conservation actions: increased beach patrol effort decreases beach poaching, thereby increasing sea turtle nesting success. This model holds true if all else is equal. Critically, in North East Tobago, all else is not equal. Increased

beach patrols may increase poaching at sea, which is difficult to quantify and prevent. The overall effect of beach patrols on sea turtle nesting success is therefore unclear.

This model of sea turtle conservation could be made more complicated by adding more elements, for example by quantifying poaching at sea. However, returning to Meadows (2008), no model can represent the world fully. The model cannot capture Chia's 'fluent indeterminacy and temporality intrinsic to life'. Applied to sea turtle poaching, it would not capture the nuanced and interrelated social and cultural influences that motivate poaching by maintaining a demand for sea turtle meat and by limiting enforcement (DB409, 14/04/2012).

Sustainability and resilience initiatives take place in complex, dynamic circumstances where all else is not equal. *Ceteris paribus* rarely applies. In such circumstances, there is an unpredictable effect on a generalisation when the assumption of *ceteris paribus* is removed. This unpredictable effect is metaphorical tension.

There is a second element to the metaphor of tension here. Understood in this way, broader generalisations, models that purport to apply to a wider range of particular circumstances, will bear greater metaphorical tension relative to any particular circumstance. As generalisation increases, so does metaphorical tension between the system model and any particular circumstance it purports to describe. I explore this concept of increased metaphorical tension in more detail in chapter 4.

In this way, metaphorical tension is like an elastic band pinned to a board (Figure 3.2a). At one end is a pin representing particular contingent circumstances, at the other is a pin representing a general statement about those circumstances. The more general the statement, the further apart the pins are and the more metaphorical tension the elastic band bears.

3.5.2 Conventional Tension

The act of entifying a fluid and immersive reality involves stabilising and spatializing it into discrete elements distinguished by rigid conceptual boundaries (Chia, 1998). Stacey explains this process with respect to human experience:

> The act of naming or categorizing an experience is an act of breaking that experience up into different parts and relating those parts to each other. To categorize is to place experience in one category rather than another, thereby identifying a difference from other experiences not placed in that category. The effect is to locate similarity within the category, so obliterating differences between experiences in that category, and locate difference between categories while obliterating any similarity between them. In this way, experience is unconsciously polarized into similarity and difference and the paradox of simultaneous similarity and difference within and between categories is lost sight of. (2009, p. 188)

Although Stacey (2009) is describing human experience, this effect also applies to entifying a fluid and immersive reality. Systems are models of circumstances expressed in terms of elements and relationships. Creating elements involves creating boundaries. These boundaries create distinctions which in turn create tension between categories (Ford & Backoff, 1998). Consequently, creating boundaries not only invokes metaphorical tension by virtue of simplification of a fluid and immersive reality, but also creates *conventional tension*, understood as a relation between opposing elements (Oxford English Dictionary Online, 2013).

Returning to the experiential data, the creation of SEMPR defined a category. The group is associated with particular positions, such as the illegality of out-of-season hunting (DB210, 14/06/2011). In a simplistic social model of North East Tobago, this will create conventional tension with other groups in North East Tobago that hunt all year round. For example, SEMPR members were concerned about unrestricted hunting on the near-shore Goat Island (DB210, 14/06/2011) and with hunters coming into their area from other parts of the island or from Trinidad (DB397, 22/07/2012; Interview, 13/08/2012).

In this way, metaphorical tension in a model is manifested as conventional tension between categories within the model. This conventional tension also increases as the model is simplified and generalised. Conceptual boundaries that are permeable in a fluid and immersive reality become increasingly rigid as they are generalised, increasing conventional tension between fewer and fewer categories. I explore this concept in more detail in chapter 4.

3.5.3 Metaphorical & Conventional Tension

Returning to the elastic band, metaphorical tension is tension in the band between one pin representing particular, contingent circumstances, and a second pin representing a general statement about those circumstances. If the generalisation is simplified as only two categories, it can be understood instead as two pins which pull the elastic band outwards into an equilateral triangle (Figure 3.2b). Conventional tension becomes the tension between the two pins representing the two categories of the generalisation. Metaphorical tension remains in the perpendicular tension between particular contingent circumstances and the two categories. In this way, a space of intermingled metaphorical and conventional tension is created between the generalisation and any particular situation.

For example, the simple sea turtle conservation model proposed above has two categories of people: patrollers and poachers. There is conventional tension between patrollers and poachers in the model. One group seeks to allow sea turtles to nest undisturbed while the other seeks to harvest those same sea turtles. This conventional tension will manifest in a particular result for a particular sea turtle when a particular patroller encounters a particular poacher. The interaction between that patroller and poacher, however, could be influenced by a host of other factors; for example their past experience together, whether other people are present, or the time of day or night. *Ceteris paribus* does not apply. The tension between what is expected based on the model, that patrollers will deter poaching, and what actually happens during a particular encounter is metaphorical tension. Implementation of a conservation initiative based on this model, such as was implemented in 2012 in North East Tobago (Alkins & Mason-Alkins, 2012), will therefore take place in an atmosphere or space of combined metaphorical and conventional tension. I explore this idea further in chapter 5.

Implementation forces sustainability and resilience researchers and practitioners to apply system models in the particular, contingent circumstances of a fluid and immersive reality. It means abandoning *ceteris paribus*. I propose a particular interpretation of tension to help articulate the sense of uncertainty associated with implementation. Intermingled metaphorical and conventional tension creates an unquantifiable atmosphere of uncertainty,

an unknowable potential for success or failure. I use the term tension alone to refer to intermingled metaphorical and conventional tension. The remainder of the thesis is an attempt to articulate a language to make sense of the atmosphere or space of tension that implementation unavoidably creates.

Tension is a recurring theme in both the theory and practice associated with sustainability and resilience. For example, Holling's (1973) paper on resilience highlights the tensions between efficiency and persistence, constancy and change, and predictability and unpredictability. Funtowicz and Ravetz (2008), in their discussions of post-normal science, identify three types of tension: complementary, destructive and creative, where the latter appeals to a Hegelian integration of contradictions through a transformation of the system. Kahane (2010) captures extensive experience facilitating seemingly intractable challenges using the tension between power and love. AtKisson (2011) treats the tension between optimism and pessimism in the practice of sustainability. Gross (2010) address the paradoxical relationship between certainty and uncertainty in science and society through the perspective of ecological design. In chapter 6, I propose that the principal tension dominating the theory and practice of sustainability and resilience is between continuity and change. In the subsequent chapters, I propose a series of concepts that provides a language that renders many of these tensions tractable.

3.6 Conclusion

By addressing humanity's ecological and social circumstances, sustainability and resilience thinking invoke broad swathes of human experience. Research and practice to address sustainability and resilience therefore face a challenge of convergence. Researchers and practitioners must integrate not only disciplinary knowledge, but also other forms of knowledge, as well as experience and a wide range of concerns, values and priorities relevant to particular and dynamic circumstances. Systems thinking is frequently used to make sense of the diversity of relevant influences. System models formalise elements and their relationships allowing quantitative analysis of patterns of system behaviour. Complex systems models based on non-linear equations yield unpredictable patterns that none-the-less adhere to certain

characteristics such as self-organisation, non-linearity and emergence. These characteristics resonate with the observed behaviour of social, ecological and social-ecological systems. They also resonate with the experience of researchers and practitioners engaging with such systems. However, any system model is a simplification of a fluid and immersive reality. No model can 'capture' reality. I propose the concept of metaphorical tension to describe the unquantifiable potential for discrepancy between a system model and the range of unique, contextual circumstances it purports to represent. The broader the generalisation, the greater the metaphorical tension relative to a specific situation. Further, models inevitably involve creating boundaries in the continuum of a fluid, immersive reality; aggregating difference at the boundary and dismissing it within the category. In so doing, categories become contrasts which bear conventional tension relative to each other as opposing elements distinguished by their difference. In this way, metaphorical tension between a model and the range of circumstances it can represent is reflected in conventional tension between elements within the model, creating an atmosphere of tension for the implementation of sustainability and resilience initiatives (Figure 3.2b). In chapter 4, I explore the implications of increasing tension for increasingly general conceptualisations relevant to sustainability and resilience theory and practice.

(a)

(b)

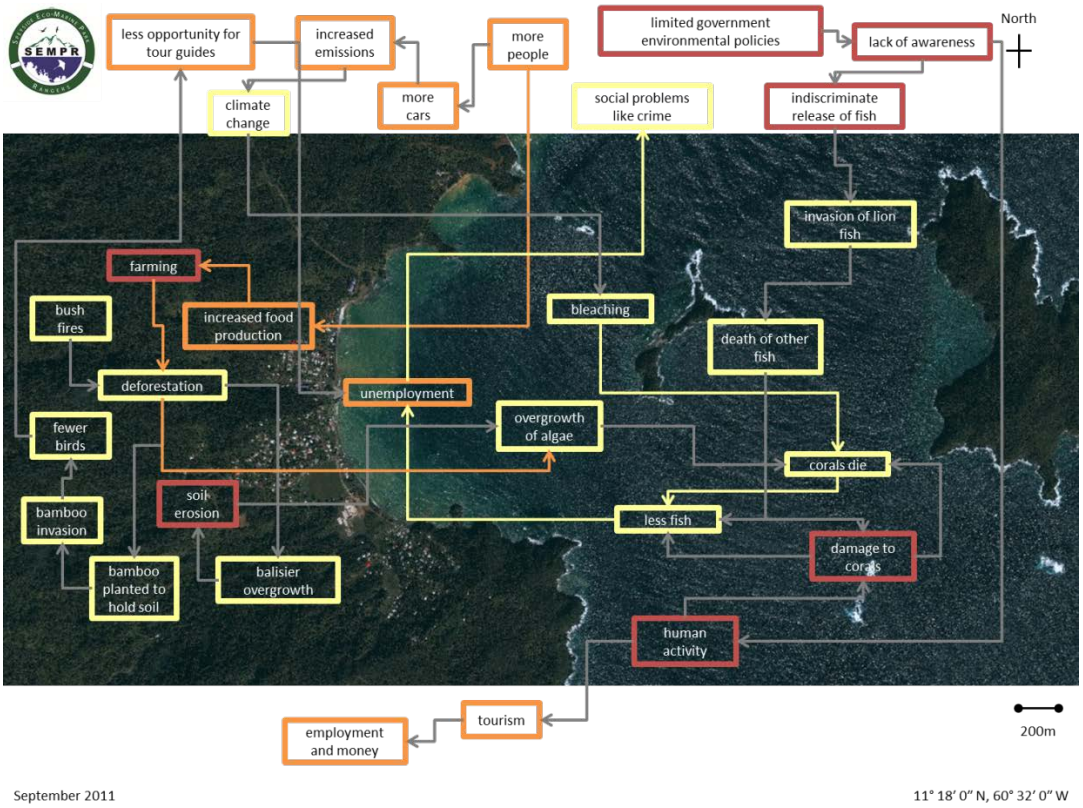

Figure 3.1. A map (a) and its transcription (b) from a workshop undertaken as part of experiential data collection (DB268, 16/09/2011). In the transcription (b), causal connections that were discussed in the workshop are illustrated with lines and arrows. The two causal chains discussed in the text are illustrated with orange and yellow arrowed lines respectively. Box colours in (b) correspond to their equivalent colour in (a).

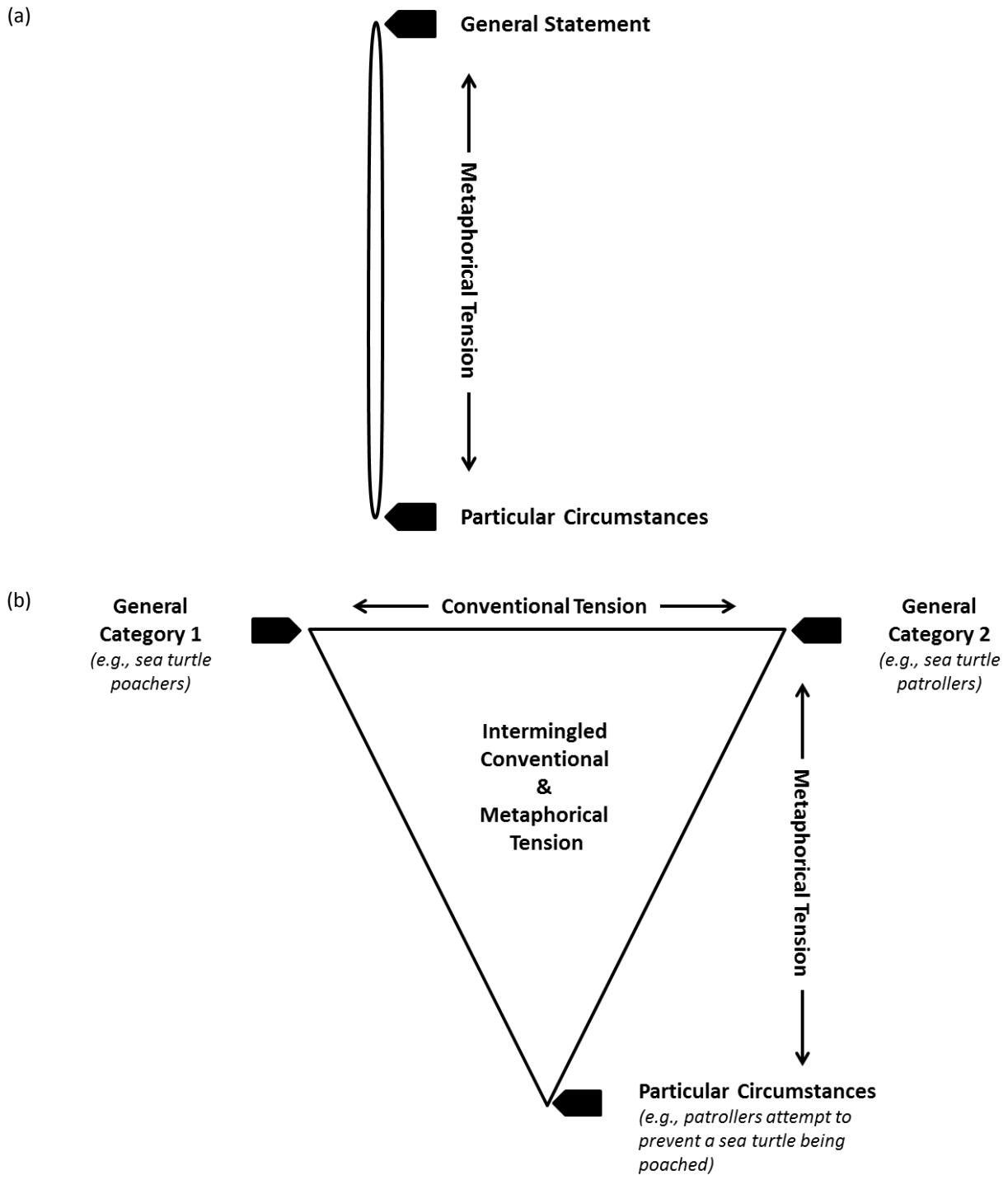

Figure 3.2. An elastic band metaphor for (a) metaphorical tension and (b) intermingled metaphorical and conventional tension. Explanations are provided in the text.

Chapter 4: Resolving, Paradox & Dissolving

We think in generalities but we live in details.

- Alfred North Whitehead (1926, p. 192)

In the previous chapter I used systems thinking and the associated language of complexity to begin discussing how researchers and practitioners can structure the confusing confluence of knowledge, experience and expectations that converge in the implementation of a sustainability or resilience initiative. I introduced the concepts of *metaphorical* and *conventional tension* to express the sense that a fluid and immersive implementation environment differs unpredictably from the models, narratives and metaphors that are used to inform, explain, predict and justify implementation. In this chapter, I take a closer look at how theory and experience can be understood to interrelate.

4.1 Generalisations

Complex adaptive systems models are only one way to make sense of a fluid and immersive reality. Models are structured expressions of theories (Eckstein, 2003). Harper and Stein define theory as: "the attempt to provide abstract, general, or universal principles that are generalizations from particular cases" (2006, p. 254). Theories, in turn, are specific expressions of broader generalisations such as frameworks (Klimoski, 1991), or paradigms (Harper & Stein, 2006). Such generalisations are an integral part of how humans cope with their environment. They allow for description and explanation, contribute to predictions, are critical for extrapolation and are also invoked in critique and justification (Ehnert, 2009; Harper & Stein 2006; Patton, 2011). The adaptive cycle presented in chapter 1, for example, is a theory about the cyclical nature of change in linked social-ecological systems (Holling & Gunderson, 2002a) which is in turn an element of the broader framework or paradigm of resilience thinking (Walker & Salt, 2006). As Starbuck puts it: "People need theories to simplify their worlds as well as to represent them" (2004, p. 1238). These forms of generalisations provide coherence through categorization, helping to make human circumstances tractable.

Although necessary, generalisation comes at a cost. Valéry stated: “Ce qui est simple est toujours faux. Ce qui ne l’est pas est inutilisable” (1942, p. 143). Everything that is simple is false. Everything that is not is unusable. This is a precursor to what has been called *Bonini’s paradox* (Starbuck, 2004) wherein simplified models of complex systems do not correspond usefully to the system but more complex models, although they correspond better to the system, are no easier to understand than the system itself. Applied more generally to science, Midgley states that “Science always oscillates between two magnets, two equally important ideals. On the one hand it aims to represent the hugely complex facts of the world. On the other, it aims at clarity, and for that it needs formal simplicity” (2004, p. 129). Here, I address the first side of the paradox; what is simple is false. This expresses the danger of simplification for clarity. Boundaries draw distinctions which are necessarily simplifications of a fluid and immersive reality. As models become simpler and more general, they lose their correspondence with the unique circumstances which they purport to represent.

Although the probability of correspondence with a particular unique circumstance is unknowable, there is still a sense in which it meaningfully decreases. As Søgaard explains:

> Obviously, the fact that scientific interpretations (e.g. in terms of models) are simplified means that there can be no one truth to which we have access. What is the ‘best’ model normally depends upon the purpose at hand. Nevertheless, it is misleading to dispense with the ideal of correspondence (in relevant dimensions) on this account. Many different maps of Chicago may be drawn, including with or without markings to indicate bus lines, museums or bicycle paths. All such ‘subjective’ maps are gross simplifications which miss a wealth of detail—but surely more useful to the visitor to Chicago than any map of Pittsburgh. To the visitor, correspondence in relevant respects remains decisive. (2012, p. 25)

The same point can be made about correspondence over time. As expressed by Cronbach: “Generalizations decay. At one time a conclusion describes the existing situation well, at a later time it accounts for rather little variance, and ultimately is valid only as history” (1975, p. 122).

At the extreme of simplification, Valéry (1942) holds that a generalisation is so distant from any particular circumstance that it can best be evaluated as false. Similarly, Wittgenstein

famously claims that "…philosophical problems arise when language 'goes on holiday'" (2009, §38), meaning that language that is detached from context no longer has any useful meaning. As articulated by Poole & Van de Ven, since "theories attempt to capture a multifaceted reality with a finite, internally consistent statement, they are essentially incomplete. A good theory is, by definition, a limited and fairly precise picture" (1989, p. 562). Holling et al. express this as follows:

> Generality is desired - but also to be feared. It is to be feared because once a theory is formed, once it seems to resolve paradoxes, and once it passes some empirical tests, proponents are sorely tempted to extend its application beyond its natural context. (2002b, p. 19)

As with complex adaptive systems, I use *metaphorical tension* to express the increasing scope for discrepancy between a general statement and the many unique circumstances to which it purports to apply. In this way, what Holling et al. (2002b) call 'natural context', I understand to be a continuum of increasing metaphorical tension.

A final critical point about generalisation is that it includes an inevitable normative component. It is inherently subjective (Harper & Stein, 2006). Since the currency of the unknowable cannot be quantitative, meaning must come from interpretation relative to values, which may be articulated as a purpose. Returning to Søgaard's (2012) quote above, correspondence is important in 'relevant dimensions'. The decision as to what is relevant is relative to a purpose. Similarly, returning to Meadows' (2008) definition of a system, this addresses the 'purpose' of a system. This view speaks to a pragmatic, and more specifically neopragmatic orientation (Harper & Stein, 2006). The implications of neopragmatism for research and practice in sustainability and resilience are treated in chapter 6. The salient point here is that generalisation invokes a purpose and therefore values.

To summarise, as Lincoln and Guba explain: "The trouble with generalizations is that they don't apply to particulars" (1985, p. 110). Because the future is unknowable, general statements will not apply perfectly to specific circumstances. I use the concept of metaphorical tension to describe this discrepancy in applicability.

4.2 Abstracting

Stacey (2009) proposes another way to describe such sense-making. Based on several decades of work in the field of organisational dynamics, he and colleagues have developed a theory of *complex responsive processes* (CRP). The theory posits that independent but interrelated people function in a medium of continuous everyday local interactions with each other. By integrating ideas from process sociology and philosophy with concepts from the complexity sciences, Stacey proposes that these processes of everyday local interaction can be used to make sense not only of the behaviour of individuals, but of broader social institutions as well.

I introduce and explore CRP in detail in chapter 8. Of relevance here is that Stacey explains a process of generalisation that he calls *abstracting*:

> The activity of abstracting is basically a form of interaction between people in which they simplify the complexity of their own ordinary, everyday interactions and also that of others some distance from them, in an effort to make meaning of what they are doing and also of what more distant others are doing. This involves generalizing across many unique experiences through forming categories and so constitutes abstracting, because it is taking away the micro diversity, the specific context, of ordinary local interaction in ordinary, local physical situations. (2009, p. 111)

Stacey maintains that abstracting can take place through narrative, where the aim is both simplicity and elaboration; an exploration of accounts of experience to promote deeper understanding (Stacey, 2009). It can also take place through categorisation, where humans assign experiences to categories. For example, a fish is understood not just as 'this' fish, but as an example of the category of fish in general. Stacey argues that in modern times, such categories are further abstracted from everyday local experience when they are assigned relationships and manipulated in the form of models or systems. Complex adaptive system models of social-ecological systems are examples of such models.

Stacey explains that these abstractions can take the form of entities, for example a large business, a city, or a marine protected area. He draws on Mead's concept of a *social object* to describe these entities which are generalised tendencies of many individuals to act in similar ways (Stacey, 2009). He then points to a tendency of humans to treat such social objects as

physical objects. As he explains, such abstracting "necessarily involves the postulating of an entity outside of our local experience and we easily come to believe that it actually exists, that we can be outside of it, observe it and then 'move' it around" (Stacey, 2009, p. 114). This is what Whitehead (1925) has called the *fallacy of misplaced concreteness*, the error of mistaking the abstract for the concrete.

Stacey is concerned with the leadership and management of large organisations but this view has implications for the management for sustainability or resilience of social-ecological systems. Such systems, for example a coral reef marine protected area, represent at the same time a physical reality and a social object, understood as generalised tendencies of individual humans to act in particular ways. In this view, any prescription, plan or design associated with management of such a system takes the form of an abstraction which must be interpreted in many individual everyday local actions and interactions. For example, a no-fishing zone in a marine protected area, understood as a social object, will represent the generalised tendency of many individuals to not fish in that area. Although each decision to fish or not fish may be influenced by the zoning regulation, the fallacy of misplaced concreteness renders "rationally invisible the disorder, diversity, deviance, conflict, compromise, manipulation, cheating, trickery, power plays, concealing and revealing of ordinary everyday experience which also change the world and so also need to be understood" (Stacey, 2009, p. 112).

Returning to the concepts of metaphorical and conventional tension, abstractions such as a no-fishing zone bear metaphorical tension relative to the myriad of specific circumstances in which they might be applied. This metaphorical tension can in turn manifest as conventional tension between actors within the system where, for example, fishermen and park managers might disagree over the ongoing interpretation of the no-fishing zone. I explore this concept of a social object in more detail below.

4.3 Resolving

I use the metaphor of *resolving* to describe how metaphorical tensions clarify as generalisations are broadened. Metaphorical tension is the possibility for discrepancy between a generalisation

and a particular unique circumstance that stems from the unknowable in complex systems or situations. Expressed in systems thinking terms, when a model is made of a fluid and immersive reality, conventional tension is created when elements and connections are defined by distinctions, or boundaries. These distinctions are permeable relative to a fluid and immersive reality but remain rigid in the model. As categories and relationships are aggregated to articulate more general models, or more general statements about a model, the model increasingly compresses intermingled conventional and metaphorical tension into the broader categories and relationships. "Compression involves taking complicated phenomena, focusing on essential aspects of interest to conceive of them as whole to make them available as an entity to think about" (Gray & Tall, 2007, p. 25). Broader models bear more compressed conventional and metaphorical tension as distinctions aggregate.

I use the metaphor of resolving to make sense of this process of compression and reification of tension. I use resolve here in the sense of making elements of an image more distinct. It is synonymous with clarification. Through various forms of analysis and/or critical reflection, tension is resolved into increasingly clear and general statements about some aspect of sustainability or resilience.

I also use the term 'resolving' to invoke its definitive meaning of making a firm decision. Returning to Meadows' (2008) definition of a system, in addition to elements and relationships, systems must have a purpose. Modelling and generalising involve making choices about what is relevant. From this perspective, there is intentionality in the process of resolving. As Rorty explains it: "Is the hammer or the saw or the scissors better – in general? Questions about usefulness can only be answered, … once we give substance to our purposes" (Ramberg, 2009, p. 11). The concept of orienting to a purpose, as opposed to an absolute and quantifiable reality, an all-encompassing consensus, or a rigid ideology speaks to a neopragmatic orientation (Harper & Stein 2006) which I explore in more detail in chapter 6.

Importantly, I do not use the term resolve as a synonym for solve, or in the sense of achieving a successful conclusion (e.g. Smith & Lewis, 2011). Here, resolving tension does not mean dispelling it; quite the opposite. It refers to the process of clarifying tensions in

increasingly concise models. As Sorensen explains: "Although the dull pressure of joint inconsistency is tolerable when diffusely distributed over a large set of propositions, the pain of contradiction becomes unbearable as the set gets smaller" (2013, p. 18).

The compression of dynamic, nuanced relationships and their inherent tensions into more rigid and general frameworks means that those frameworks bear increasing metaphorical tension relative to a particular situation. For example, the daily efforts and interactions of individual members of the Speyside Eco-Marine Park Rangers (SEMPR) to implement some form of marine conservation in North East Tobago (e.g., DB269, 17/09/2011) resolve into a proposal for marine protected area implementation in North East Tobago (e.g., van Bochove & McVee, 2012). Many such initiatives in turn resolve into wider guidelines for marine protected areas, such as those provided by the International Union for the Conservation of Nature (Day et al., 2012). The International Union for the Conservation of Nature categories therefore bear substantial metaphorical tension relative to how they might be applied in the specific circumstances of, for example, North East Tobago. The more general a statement or framework, the further it is from specific context, the more metaphorical tension it bears.

From this perspective, the simplest, most reified and general statements about complex adaptive systems, or more generally unknowable circumstances, will be *paradoxes*. They will be statements, or small series of propositions, that are inherently contradictory but still true. They concisely capture an inherent tension. In this view, generalisations about sustainability or resilience resolve into paradoxes.

This conclusion is profoundly counterintuitive in the contemporary traditions of resilience and sustainability. Both traditions assume that a lack of conceptual clarity is preventing broad and consistent implementation (e.g., Brand & Jax, 2007; Waas et al., 2011). By resolving tension, this perspective suggests that increased conceptual clarity leads not to broad rigour and consistent implementation, but instead to paradox. I elaborate on this conclusion throughout the remainder of the thesis.

4.4 Paradox

Paradox is a term that evokes the surprising complementarity of contrary concepts. As Poole & Van de Ven explain: "In general parlance, many writers use the term loosely, as an informal umbrella for interesting and thought-provoking contradictions of all sorts" (1989, p. 563). Paradoxes have been discussed by distinguished thinkers in the Western intellectual tradition since at least Plato, 2,500 years ago (Sorensen, 2013). More recently, they have been used in the development of *paradox theory* in the organisational management literature to explore the interrelated tensions and challenges of organisational life (Ehnert, 2009; Smith & Lewis, 2011).

Smith and Lewis define paradox as "contradictory yet interrelated elements that exist simultaneously and persist over time" (2011, p. 382). Similarly, Ehnert speaks of the "co-existence of contradictory forces … which operate simultaneously" (2009, p. 135). Paradoxes are commonly understood as "a set of propositions that are individually plausible but jointly inconsistent" (Sorensen, 2013, p. 17). Importantly, none of these definitions limits the number of interrelated elements. However, paradoxes are often presented as dualities. For example; the more things change, the more they stay the same. At their most elegant they are expressed in a single statement that is both self-contradictory and true. An example is the liar's paradox: I always tell lies (Poole & Van de Ven, 1989). Smith and Lewis (2011) and Ehnert (2009) distinguish between paradox and related concepts of dualities, dilemmas and dialectics. I use the term paradox in the broadest sense to capture the surprising co-existence of interdependent contraries as a heuristic to emphasise the importance of tension in sustainability initiatives.

I have argued that sustainability requires general statements to describe, explain, predict, extrapolate, critique and justify action. I have argued that, in the complex convergence that sustainability represents, general statements bear an increasing burden of metaphorical tension relative to the unknowable, specific contextual details of a particular situation. As the number of elements in the generalisation is reduced, this tension is expressed as both complement and contradiction in their interrelationships. When paradox is understood as the persistent interrelation of contradictory elements it becomes clear that general statements

about sustainability will often be paradoxical. In contrast to Valéry (1942) then, I place paradox, not falsity, at the extreme of generalisation. At its most elegant, two contradictory statements about sustainability or resilience will be equally true. As an example, Holling, in his 1973 paper on resilience highlighted the tension in ecological systems between constancy and change. Ecological systems involve and require both constancy and change. I treat the paradox of continuity and change in sustainability and resilience in detail in chapter 6.

4.5 Dualities & Continua

This understanding of paradox means that any theoretical concept, taken as an ideal at its most general and abstract, invokes its opposite in a paradoxical relationship of complement and contradiction. Concepts become *mutually inclusive* (Kelso & Engstrøm, 2010). The concept of a paradox as compressed metaphorical tension, understood as the scope for discrepancy relative to a particular, unique and unpredictable circumstance, emphasises the relationship between ideal concepts; the 'space between'. There is a continuum between poles of a duality. Continuing with Holling's (1973) resilience from above, it encourages researchers and practitioners to ask: what is the space between constancy and change in ecological, or social-ecological systems?

Kelso and Engstrøm (2010) call this a 'both/and' understanding, in contrast with 'either/or'. This view emphasises that distinctions are not absolute. Returning to Holling's (1973) resilience again, resilience is not about 'either' constancy 'or' change; it is about 'both' constancy 'and' change. As Harper and Stein explain:

> the pragmatist views dualities (contrasts) as continua, as distinctions made for particular (if temporary) purposes, and tied to particular interests.... Once we recognize that contrasts need not be absolute, we can continue to use them in a pragmatic way to make useful ordinary decisions. (2006, p. 68)

Funtowicz and Ravetz express a similar view in their discussion of contradiction in post-normal science. They maintain that an appreciation of contradiction

> provides a perspective that prevents oversimplified analyses of situations and problems. Within this style, one cannot envisage a beneficial progress without looking for its costs,

> the growth of knowledge without its interaction with ignorance, or the achievement of good without some production of evil. (2008, p.313)

This view does not deny the usefulness of theoretical ideals. However, ideals are treated as notional points related by a continuum of tension, not as absolutes to be applied absolutely. Returning to Harper and Stein, this can be understood as an emphasis on adjectives over nouns:

> If pragmatists wish to eschew anything (and this is the closest they come to positivism) they eschew the tendency toward nominalization and reification of abstract nouns like *truth* and *reality*. They are quite satisfied with the adjectives (*true* and *real*) and believe that anything worth saying can be said with the adjectives. They are perfectly happy to distinguish between true statements and false ones, real ducks and decoys. But the quest for TRUTH and REALITY as abstract nouns just gets you into trouble. (2006, p. 292)

As Putnam (1987, p. 27) dryly states "we often take perfectly sensible continua and get in trouble by converting them into dichotomies".

One more distinction is important here. In this view of tensions inherent in generalisations about complex adaptive systems the concept of a *whole* is not necessary, although it can be useful for particular, contingent purposes. As Stacey expresses it, in a complex adaptive system "the 'whole' is not there until it has emerged and since it is always evolving, it is never complete" (2009, p. 133). It is tempting to view a paradoxical duality as an interrelated whole. For example, Smith and Lewis (2011) use the symbol of yin and yang to describe a paradox of organisational tensions where opposites coexist within a united whole. However, relative to a particular, unique context, the boundaries of the whole are just as much a penumbra as is the space between the poles of the duality. As Stanley explains, "when we look for the boundary of the extension of a vague expression in its penumbra, our very looking has the effect of changing the interpretation of the vague expression so that the boundary is not where we are looking" (2003, p. 269). The boundaries of the whole that encompass any given paradox will change as the perspective or purpose shifts. Stacey paraphrases Elias: "using the term 'whole' simply created a mystery in order to solve a mystery" (2009, p. 171).

In the view I propose, paradox represents condensed metaphorical tension of a generalisation relative to the suite of unique contextual circumstances it purports to

encompass. Instead of ending in a whole, it ends in the extreme of useful generalisation. It is the point where, returning to Wittgenstein, "language goes on holiday" (2009, §38). Language cannot be used to usefully articulate anything more general. General statements are paradoxically both profound and meaningless. For example, returning to the quote from chapter 1 that Walker and Salt attribute to Carpenter: "resilience thinking is really about changing in order not to change" (2012, p. 24).

If generalisations end in paradox representing condensed metaphorical tension, this yields a surprising conclusion. In face of calls for clear statements of purpose, clear definitions, and clear precepts regarding sustainability and resilience (e.g., Brand & Jax, 2007; Waas et al. 2011), from this perspective, such statements, definitions, distinctions and precepts will almost invariably bear a burden of paradox. The clearest statements about complex circumstances will be paradoxical dualities. What to do?

In chapter 6, I argue that both sustainability and resilience can be understood, at their most general, as articulations of a paradoxical desire for both continuity and change in human circumstances. If sustainability and resilience are, at their clearest and most general, paradoxical concepts, what are the implications for implementation?

4.6 Responses to Paradox

Paradoxes have inspired a wide range of responses. Traditionally, they are a concise way of expressing a difficult or intractable problem. As such, they often represent the start or end of an inquiry. For example, Raudsepp-Hearne et al. propose an 'environmentalist's paradox' where they ask: "How is it that human well-being continues to improve as ecosystem services decline" (2010, p.577)? They use this incongruity as a point of departure to explore the distinctions and interdependencies between the effects of human activity on the biosphere, and the impact of the biosphere on human well-being. Similarly, sustainability researchers and practitioners struggle with a persistent tension between economic development and environmental sustainability (Ramirez, 2012). This is sometimes expressed in terms of the 'Lauderdale paradox' (Daly, 1998; Foster & Clark, 2009) where an economic system that

associates value with scarcity necessarily erodes the conditions of abundance that allow it to persist. For example potable water increases in value as it becomes scarce, thereby both ignoring and eroding the value of its abundance. Although many researchers and practitioners advocate or pursue alternative economic systems (e.g., AtKisson, 2013), much of the sustainability and resilience discourse, particularly regarding implementation, takes place in the context of the dominant economic system (Hopwood et al., 2005) thereby implicitly accepting or ignoring the paradox. In summary, one approach to paradoxes is to attempt to solve them and, in cases where they cannot be solved, to deny or ignore and work around them (Ehnert, 2009). As Sorensen says; "Calling a problem a paradox tends to quarantine it from the rest of our inquiries" (2013, p.4).

A more moderate approach involves coping with paradox. Paradox theory in organisational management recognises that conflicting tensions are an integral part of organisations (Lewis, 2000). Proponents have developed a series of strategies to cope with the resulting paradoxes. Smith and Lewis (2011) propose a 'dynamic equilibrium' framework where latent tensions become salient and are managed to avoid vicious cycles and promote virtuous ones through acceptance followed by iterative splitting and integration of extremes which in turn renders tensions latent again, renewing the cycle. This approach integrates temporal separation, spatial separation and synthesis of the elements of a paradox.

Drawing on Poole and Van de Ven (1989) and others Ehnert (2009) identifies five strategies for coping with paradox: opposition, temporal separation, spatial separation, synthesis and psychological coping. *Opposition* involves learning to live with a paradox. As an example, Hopwood et al.'s (2005) category of 'reform' in sustainable development theory and practice describes those who acknowledge the cartography of crisis but maintain that challenges can be met by adjustments, possibly substantial, within present social and economic structures. From a paradox perspective, they acknowledge the paradoxical tensions of sustainable development, such as Lauderdale's paradox, and work around them.

As an example from the experiential data in North East Tobago, the 'My Island My Community' project used strategic outreach initiatives and a radio soap opera to encourage

Tobago residents to alter their behaviour and undertake activities that did not exacerbate negative environmental trends on the island such as erosion and poor solid waste disposal (DB117, 06/10/2010). The project did not attempt to directly alter the broader socio-economic system that forms the context for the ongoing behaviour of Tobago residents, such as land use policies or island-wide solid waste management processes (Kairi, 2012a).

More practically, the implementation environment of sustainability and resilience initiatives, where *ceteris paribus* does not apply, is rife with paradoxical tensions and contradictions. For example, drawing on the experiential data, when SEMPR organised beach cleanups in North East Tobago, it was socially expected, and courteous, to provide water and sweet drinks to volunteers who participated, often in the hot sun (e.g., DB097, 21/08/2010). However, this led to volunteers paradoxically both picking up and producing the same kind of waste: disposable beverage containers. Such paradoxes cannot be avoided and, if made explicit, are in fact integral to implementation as I explain in chapter 5.

Temporal separation involves some form of iteration where contraries alternate. For example, Holling & Gunderson's (2002) adaptive cycle, presented in chapter 1, posits that ecosystems and social-ecological systems cycle through four sequential states of growth, conservation, release and reorganisation. When resilience is understood as encapsulating a tension between constancy and change (Holling & Gunderson, 2002), the adaptive cycle can be understood as separating periods of constancy with periods of change; separating the paradox of constancy and change in time. Another example of temporal separation is when a paradox is separated into short-term and long-term categories. For example, in the experiential data, SEMPR worked through initiatives such as outreach activities in local schools (e.g., DB412, 06/06/2012) to urgently change the behaviour of individuals in their community, behaviour such as sea turtle poaching (e.g., DB228, 02/07/2011). This effort at short-term change in community behaviour was an attempt to ensure long-term constancy in the social fabric of the community and its ongoing relationship with the surrounding ecosystems. Continuing with the sea turtle example, at a workshop for the North East Sea Turtles Tobago community group that

SEMPR members attended, the facilitators passed around a preserved sea turtle skull and asked participants what it meant to them. One SEMPR member explained:

> This is the first time I ever seen a turtle skeleton. It sort of remind me of dinosaur days. You know like right now you can't see a dinosaur but you can see a skull of it. And, if we don't really work towards saving these turtles, this is all we'll be seeing in the future; a skeleton. Right? (DB409, 14/04/2012)

In this case, the paradox of constancy and change is separated between short-term change and long-term constancy. Such temporal separation is a common feature of paradox theory in the organisational management literature where practitioners can face a tension between, for example, short term profit and long-term organisational viability (Ehnert, 2009).

Spatial separation involves separating a paradox to different levels of analysis in some form of hierarchy. Continuing with resilience and the paradoxical tension between constancy and change, Holling et al. (2002b) propose that adaptive cycles can be nested on a spatial gradient. Smaller, faster systems, such as stands of trees, cycle within larger, slower systems such as forests which in turn cycle within landscapes. This concept of a panarchy was introduced in chapter 1. In this way, the paradox between constancy and change is separated across scales when, for example, constancy is maintained at broader scales while change occurs at smaller scales (Brown, 2014). The example presented above of SEMPR separating change in the short-term from constancy in the long-term also applies here. Constancy at the spatial scale of the community is separated from behavioural change at the spatial scale of the individual.

Critically, for both temporal and spatial separation, the tensions and their associated paradox remain (Ehnert, 2009). In the case of resilience as an example, elements of constancy and change remain simultaneously present throughout the system. Temporal or spatial separation can help to make them tractable, but cannot dispel them.

Synthesis involves solving the paradox by reframing the challenge. In North East Tobago in 2012, SEMPR was involved with North East Sea Turtles Tobago in a project to promote sea turtle nesting tours as an income-generating ecotourism alternative to sea turtle poaching (Alkins & Mason-Alkins, 2012). The project was an attempt to reframe sea turtle poaching from

a conservation challenge to a livelihood challenge. Interpreted in terms of constancy and change, it was an attempt to ensure the constancy of community livelihoods without a concomitant change in the ecosystem, namely the local extirpation of sea turtle populations through poaching. Ehnert (2009) points out that such a synthesis is only a temporary solution because although tensions are alleviated, they are inherent properties of organisational life, or in this case, of the implementation environment of sustainability and resilience initiatives, and will therefore necessarily resurface.

Finally, *psychological coping* involves addressing the emotions that accompany paradoxical tensions and ambiguity (Ehnert, 2009). Psychological coping strategies are particularly critical for practice in sustainability and resilience. The implementation of sustainability and resilience initiatives requires that researchers and practitioners function in an environment replete with ambiguity and paradoxical tensions, and this elicits strong emotions. In the experiential data, SEMPR members struggled with the many interrelated demands of running a volunteer-based organisation and implementing a sustainability project. These included personality conflicts and logistical frustrations such as collecting appropriate signatures and documentation to set up a bank account (e.g., DB242, 28/07/2011). As one SEMPR member explained:

> I know it's not easy. The people who are doing these things are not normal people. They are people who, they know how to take pressure, you know? Because it's not an easy road. (Interview, 22/08/2012)

Discourse was a critical tool in alleviating these tensions. Learning how to respectfully listen to others and share grievances was particularly valuable. As the same SEMPR member expressed it:

> We get our struggles [but] we actually hold on as a team. It don't matter how heavy it is. We hold on and we go with it. You know sometimes we even argue. Sometimes we go through a lot of stuff. But I know I have a strong team … all of them have a passion inside. (Interview, 22/08/2012)

My role as a facilitator was important in supporting psychological coping, including team dynamics (Interview, 26/08/2012). I explore this role in more detail in chapter 10.

I have argued that paradoxes resolve or clarify from aggregated tension as generalisations are made about the specifics of complex situations in a fluid and immersive reality. I argue that an alternative to treating paradox as an intractable problem or as the failure of an inquiry is to treat it as one necessary and desirable pole of an inquiry or initiative. As Niels Bohr expressed it: “How wonderful that we have met with a paradox. Now we have some hope of making progress" (Moore, 1985, p. 196).

I propose that all of the strategies presented above to respond to paradox can be productively framed in terms of metaphorical tension. Specifically I maintain that, once resolved into their clearest, simplest and most general form, paradoxes can *dissolve*, using strategies including those from the growing field of paradox theory described above, into deliberate actions in specific circumstances.

4.7 Dissolving

I have argued that concise, coherent statements regarding a complex system representing a fluid and immersive reality will be paradoxical. Such generalisations will bear the aggregated metaphorical tension of the possibility for discrepancy relative to the unpredictable, specific circumstances the generalisation purports to address. Returning to the quote from Sorensen: "Although the dull pressure of joint inconsistency is tolerable when diffusely distributed over a large set of propositions, the pain of contradiction becomes unbearable as the set gets smaller” (2013, p.17). Above, I used the example of tension between constancy and change in Holling and Gunderson’s (2002) articulation of resilience. In chapter 6, I elaborate on that interpretation to argue that sustainability and resilience bear the extreme pressure of tension between continuity and change in human circumstances. If sustainability and resilience are to be implemented, how can such tension be alleviated?

Here, I appeal to a tradition in philosophy stemming from Wittgenstein and continuing with Rorty whereby "progress in philosophy is gained less from constructive solutions to problems than through therapeutic dissolution of their causes” (Ramberg, 2009, p. 19). I propose that paradoxes can be understood to dissolve as they are applied to an increasingly

specific set of unique and unpredictable circumstances, ultimately disappearing in the clarity and coherence of immediate action or interaction. I use 'dissolve' here in the sense of passing into solution, or disappearing. I use *solution* here in the sense of a homogenous mixture, not as the answer to a problem. Paradoxes dissolve as they are interpreted and applied relative to particular circumstances, adding qualifications and context. The tensions they embody become diffuse as they are absorbed by the increasing number of specific and nuanced relationships that apply under particular circumstances. They are dissolved as they are interpreted relative to an increasingly specific system of interest. In the immediate context of a fluid and immersive reality, the paradox disappears in the clarity of action or interaction. Critically, in keeping with the unknowable component of complex adaptive systems, the way in which tensions are absorbed, the nuanced relationships that become relevant, will be unique in each separate initiative or inquiry.

'Dissolve' can be interpreted in another useful sense. Paradoxes are often treated as intractable problems. Using the word 'problem' implies that there is a 'solution', defined as an answer to the problem or a decisive way of disposing of it. In complex adaptive systems, such solutions are rare. Appealing to the *Cynefin* framework, sustainability initiatives are generally complex challenges, whereas the problem-solution paradigm is more appropriate to simple and complicated challenges (Snowden & Boone, 2007). Bohm expresses this clearly:

> We have been looking at the vast range of problems facing humanity. These go on proliferating indefinitely, eventually leading on toward disorders of world-wide scope. On contemplating this general situation, one may even sometimes have a sense of being confronted by difficulties beyond the possibility of resolution by human intelligence and co-operative endeavor. In this mass of contradiction and confusion, one finds a very curious common denominator: i.e., that everyone appears to agree that what is actually confronting us is a set of problems. Generally speaking, one does not find that people have considered the question of whether the word 'problem', with all that it signifies, provides an adequate description of what is going wrong in human affairs. Yet, if one goes into the meaning of the word, one can see good reason to raise such a question, and to suspect that the attempt to treat our current difficulties as 'problems' may be one of the more important factors preventing these difficulties from being properly brought to an end. (1996, p. 61)

If the Latin prefix ‘dis’, meaning opposing or reversing, is added to the root ‘solve’ in the sense of a definitive answer to a problem, ‘dis-solve’ can be interpreted as an alternative process to ‘solve’. Problems in a complex adaptive system, are not solved, but instead are dissolved. Dissolving means interpreting, contextualizing and applying a paradox to a specific situation and acting on it.

Continuing with the theme of constancy and change, in the social-ecological system of North East Tobago, there are interwoven elements of constancy and change. For example, a severe coral reef bleaching event in October 2010 was associated with the warmest recorded sea surface temperatures in Tobago in the last decade (Alemu I & Clement, 2014). Such elevated sea surface temperatures are associated with global climate change (Hoegh-Guldberg & Bruno, 2010). The ‘My Island, My Community’ project implemented by SEMPR was an attempt to promote constancy in ecological systems in face of such global climate change by changing human behaviour in Tobago, for example by encouraging different solid waste disposal practices to reduce damage to the coastal marine environment (DB023, 21/06/2010). In this case, the complex and interwoven tensions between constancy and change in the global social-ecological system were dissolved, through the social-ecological system of North East Tobago, and through the design of the ‘My Island, My Community’ project, into specific initiatives, such as a beach cleanup where litter was removed from the beach in the village (e.g., DB281, 01/10/2011). The beach cleanup was not associated with tension between constancy and change. The implications for global and regional climate change were negligible. It was simply an initiative where litter was removed. The paradoxical tensions were dissolved. I explore this in more detail in chapters 5 and 7.

Considered from another perspective, I propose that successful sustainability practitioners are keenly aware of the process of dissolving. For example, in Tobago a natural resource manager expressed it as follows:

> You don't adopt full-scale technology or practices from one place to another place without considering the context and the difference. So I draw upon that in terms of Trinidad and Tobago. There are many differences ... between Trinidad and Tobago. And we tend to pay a lot of attention to that in terms of our management. What are the

> differences that Trinidad will overlook that we need to tell them about that are appropriate for Tobago that they should consider. So even in natural resource or forest management, those are important to think about.… not adopting full-scale from abroad or what Trinidad is doing, but looking at our context to see what has worked, and looking at some other places to see what has worked. (Interview, 15/08/2012)

4.8 Immersing

Stacey's (2009) theory of CRP includes an analogous process of human interaction that he calls *immersing*. He defines immersing as "what we are doing as we act locally in ways which unconsciously reflect the generalisations and idealizations … of our society" (Stacey 2009, p. 108). It is "An activity of bringing together, filling in, expanding, elaborating, complexifying and taking into account greater detail and diversity" (Stacey 2009, p. 112). He appeals here to what he calls the *politics of everyday life* including concepts such as: persuasion, manipulation, dynamics of inclusion and exclusion, politeness, resistance, subversion, contradiction, denial, spontaneity, attachment to others, creative imagination and altruism (Stacey, 2009). He also calls this activity *particularising*; immersing in these techniques and dynamics. As mentioned above, these activities are hidden when abstractions are treated as concrete. What is publicly presented is a sequence of planned, rational decisions undertaken by detached individual agents. Although abstractions are important, they are particularised when they are incorporated into the fluid, everyday local actions of the immediate present (Stacey, 2009).

Returning to the concept of 'social objects', abstractions such as social objects are interpreted in the everyday practical activities of people in local contingent situations (Stacey, 2009). "The social object is a generalization which is taken up, or particularized, by all in a group/society in their actions" (Stacey 2009, p. 164). This leads to a consideration of how generalisations are particularised. Prescriptions such as a no fishing zone in a coral reef marine protected area must be particularised in the immersed actions and interactions of many individuals. As Stacey explains: "any intentionally designed change can only ever be a generalization and what that means can only be found in the particularization, that is, in the interplay between the intentions of the designers of the generalization and the intentions of those who are particularizing it" (Stacey 2009, p. 166). What the no fishing zone means in

practice will emerge from the way it is particularised in a myriad of immersed interactions. I explore these ideas in more detail in chapters 7 and 10.

4.9 Action & Interaction

In the metaphor of dissolution, action and interaction are free of metaphorical tension. In the immediate context of a fluid and immersive reality, or at the level of an individual interaction in a complex adaptive system, there is no discrepancy. In this sense, action and interaction represent a kind of clarity. As Wittgenstein explained: “Once I have exhausted the justifications, I have reached bedrock, and my spade is turned. Then I am inclined to say: ‘This is simply what I do’” (2009, §217).

However, action or interaction in the moment, although it represents a kind of clarity, is also free of meaning. Immersion in a fluid reality allows no opportunity for sense-making. Referring to Arendt, d’Entreves explains: "Being absorbed by their immediate aims and concerns, not aware of the full implications of their actions, actors are often not in a position to assess the true significance of their doings, or to be fully aware of their own motives and intentions" (2009, p. 20). This is the other side of Bonini’s paradox. Valéry (1942) claims everything that is simple is false and everything that is not is unusable. Dissolving paradoxical tension involves increasing nuance and complexity. In the immediate circumstances of a unique context action is clear but unusable in that it is not connected to reasons or consequences. Bonini expressed this in the context of complex systems models where, as the complexity of the model increases, it becomes no more helpful to understanding than the reality it represents (Starbuck, 2004).

Returning to the SEMPR beach cleanup, the implications of an afternoon beach cleanup (e.g., DB281, 01/10/2011) on patterns of local coral reef ecosystems or on global climate constancy or change are unclear. As one practitioner explained about a local climate change project:

> [The project] has climate change in it but none of the things is really directly linking [the project] back to climate change. And even if we did make the change, it's not going to

> affect [climate change]. And at the end of the day, we're still stuck trying to get people to change. (Interview, 28/07/2010).

In Bonini's (Starbuck, 2004) or Valéry's (1942) terms, a model that traced the connections between the detailed activities of individuals on a beach cleanup with global patterns of climate change, even if it were technically possible, would be so unwieldy as to be useless.

As with dissolving, Stacey's 'immersing' culminates in a specific, local action or interaction in the immediate present. However, such immediacy is not an ideal to be achieved. As Stacey explains: "to live simply immersed in this way would be to live a life devoid of all thought, reflection or meaning making" (2009, p. 11). The extreme of immersing, particularising, or dissolving, is meaningless action. A beach cleanup is meaningless relative to global climate patterns unless the activity is resolved, through models, analysis, reflection or discussion, towards a more general statement or perspective.

As discussed above, generalisations are necessary to allow humans to cope with their circumstances. Paradoxically, this is particularly true for complex circumstances that are uncertain. Simple or stable circumstances, such as an assembly line, allow for rigid replication with relatively little reflection (Harper & Stein 2006; Snowden & Boone 2007). However, in complex circumstances such as the convergence invoked by the implementation of sustainability and resilience, it is not enough to 'simply do'. Theory and generalisations become both increasingly important and increasingly problematic. Generalisations lead to tension which aggregates as it resolves again towards paradox.

4.10 Conclusion

In chapter 2, I described an implementation gap between the immersive nature of the implementation environment and generalised rationales used to make sense of the implementation of sustainability and resilience initiatives. In chapter 3, I proposed the concepts of metaphorical and conventional tension to replace the sense of a gap with the sense of a continuum from a fluid and immersive reality to general statements or prescriptions about that reality. In chapter 4, I have explored the continuum in more detail. I introduced the concepts of

resolving and dissolving metaphorical tension. These concepts are analogous to Stacey's (2009) concepts of abstracting from and immersing in everyday local interactions between people which is another articulation of a continuous process from the particular to the general and back.

In the language of resolving and dissolving metaphorical tension there are two notional extremes; paradox and action. Both are meaningless. Paradox represents the extreme of metaphorical tension and is meaningless in that it is the point at which 'language goes on holiday'. Conversely, action represents the complete dissolution of metaphorical tension but is also meaningless because, in the instantaneous moment of a fluid and immersive reality, it has no relation to other concepts or experiences. Meaning is made in between these two paradoxically interrelated extremes. Sustainability and resilience researchers and practitioners are caught in between these two poles. Implementation requires action, but such action must be given meaning. In this way, implementation ceases to be a gap and becomes instead a muddle of confusing tension.

In chapter 5, I argue that the ideas I have proposed can form the constituents of a *vocabulary of paradox*. The vocabulary provides a language in which to discuss theory and practice in the space of tension between paradox and action. I argue that this makes the mire not only tractable, but inspirational. Returning to the problem statement of the thesis, the vocabulary of paradox dissolves the implementation gap.

Chapter 5: The Paradox of Praxis: Knowing & Doing

[The] idea that the world decides which descriptions are true can no longer be given a clear sense. It becomes hard to think that [a] vocabulary is somehow already out there in the world, waiting for us to discover it.… [The] fact that Newton's vocabulary lets us predict the world more easily than Aristotle's does not mean that the world speaks Newtonian.… The world does not speak. Only we do.

- Richard Rorty (1989, p. 6)

Sustainability and resilience face an implementation gap. It can be difficult to put theory into practice. In chapters 3 and 4 I introduced a series of concepts that suggest an alternative formulation of the relationship between theory and practice. In this chapter I structure these ideas as the elements of a vocabulary, introducing two additional concepts. I propose that this vocabulary allows for a complementary conversation about the theory and practice of sustainability and resilience. In the remainder of the thesis, I use the vocabulary to explore the role of an individual researcher or practitioner in sustainability and resilience.

5.1 Review

So far, the following concepts have been introduced. The *implementation gap* is a challenge faced by those advocating for and applying the broadly supported and widely invoked concepts of sustainability and resilience. Despite substantial effort, both concepts have resisted rigorous definition and have proven difficult to implement consistently. In North East Tobago for example, despite the implementation of several projects from 2008 to 2012 (e.g., Alkins & Mason-Alkins, 2012; Armstrong, 2010; Armstrong, 2012; Armstrong et al., 2009; Caribbean Natural Resources Institute, 2011; van Bochove & McVee, 2012) the coastal marine ecosystem including coral reefs remains unmanaged and continues to deteriorate (van Bochove & McVee, 2012). Returning to a quote from Gibson et al., sustainability and resilience are "perhaps best conceived as a substantively important but minimal framework requiring specification in and for particular places" (2005, p. 62). This thesis is an attempt to deliberately discuss such processes of specification.

Convergence occurs when sustainability and resilience frameworks are applied to specific initiatives. Because the concepts draw on a wide range of human experience and because implementation involves influencing real people in real circumstances, researchers and practitioners concerned with implementation must integrate a diversity of disciplinary and non-disciplinary knowledge as well as experiences, values, priorities, and concerns relative to a particular issue or initiative. For example, in North East Tobago, members of the Speyside Eco-Marine Park Rangers community group (SEMPR) identified influences as diverse as crime, farming, algal overgrowth of coral reefs, and climate change as relevant to their issue of concern, marine habitat destruction (DB269, 17/09/2011; Figure 3.1).

Systems thinking allows the formal structuring of many interrelated elements and is therefore helpful in making sense of such convergence. It provides a structure in which the sometimes counter-intuitive behaviour of such systems can be explained and quantified. However, *nonlinear interactions* in systems yield system behaviours that are inherently unpredictable. Such *complexity* is an expression of the *unknowable* in observed patterns in the world and in the experience of those implementing sustainability and resilience initiatives. Circumstances, and the consequences of actions, have an element of unpredictability. Researchers and practitioners 'act into the unknown'. For example, in North East Tobago, beach patrols to reduce sea turtle poaching may not have the desired effect because poachers can shift their effort to poaching at sea, as discussed in chapter 3. The consequences of the conservation actions are therefore unclear.

I introduce the concept of *metaphorical tension* to describe this sense of the unknowable. Metaphorical tension describes the potential for discrepancy that a generalisation, such as a system model, bears relative to the range of unique, particular circumstances it purports to represent. The metaphor of tension emphasises a continuum that can increase or decrease, the broader a generalisation, the more metaphorical tension it bears relative to any particular circumstance in a fluid and immersive reality. Critically however, the metaphorical nature of the concept means that there is no scope for quantification. Generalisations bear a 'sense' of increasing tension but the metaphor cannot be fixed.

Generalisations such as system models involve entifying a fluid and immersive reality into categories that are defined by their differences. Such categories therefore bear *conventional tension* relative to each other, understood as a relation between opposing elements. The metaphorical tension borne by broad generalisations relative to the range of specific situations in which they could be applied in this way can manifest as conventional tension between elements in those generalisations. In this view, generalisations bear interrelated metaphorical and conventional tension.

I use the term *resolving* to describe the process of clarifying increasingly general statements about the world. Resolving involves compressing metaphorical tension into fewer and fewer categories, creating increasingly simple and general statements. Such generalisations also bear increasing potential for conventional tension between fewer and fewer categories. In his theory of complex responsive processes (CRP), Stacey (2009) introduces the analogous activity of *abstracting* whereby individuals interact to make sense of their experiences by categorising and generalising them.

I propose that the extreme of resolving metaphorical tension is *paradox*; a small set of propositions that are both contradictory and true. In this view, the clearest and most general statements to be made about sustainability and resilience will be paradoxical. For example, in chapter 6 I argue that the concepts of sustainability and resilience both capture a paradoxical desire for continuity and change in human circumstances.

The metaphorical tension compressed in such paradoxical statements can in turn be *dissolved* by adding nuance and qualifications or, understood another way, by increasing the number and interrelations of categories. In this way, metaphorical tension dissolves ultimately into the particular circumstances of a fluid and immersive reality. For example, a paradoxical desire for continuity and change in human circumstances dissolves into a beach cleanup in North East Tobago (e.g., DB281, 01/10/2011). In the theory of CRP, Stacey (2009) explains an analogous process of *immersing* whereby individuals interact in ways that reflect general concepts and patterns, but in their interactions fill in and elaborate on generalities through the nuanced *politics of everyday life*, the ongoing daily activities of relating which form the social

medium in which humans function. Returning to the concept of dissolving, metaphorical tension dissolves as categorical distinctions become more permeable, shifting from distinctions to continua. Metaphorical tension dissolves completely into a fluid and immersive reality.

In this view, a *fluid and immersive reality* is free of metaphorical tension. There is clarity to an immediate, contextual, 'in the moment' *action or interaction*, such as picking up a discarded beverage container on a beach (e.g., DB370, 08/06/2012). However, such action or interaction is also free of meaning in that it is not related to any reasons or consequences. Paradoxically, by being entirely immersed in context, it is in effect free of context. Put simply, for a given action or interaction, 'it is what it is'. Consequently, although clear, action or interaction in a fluid and immersive reality is also meaningless. Giving an action or interaction meaning involves relating it to other actions and interactions and in so doing, resolving metaphorical tension towards the clarity of paradox.

To summarise, in the uncertain circumstances of convergence faced by sustainability and resilience inquiries and initiatives, there is a price for clarity. Clear generalisations are paradoxical. Clear action or interaction is meaningless. To undertake *thoughtful action and actionable thought*, researchers and practitioners must move in the space between, where assertions bear metaphorical tension relative to their implications for particular actions in particular circumstances. Metaphorical tension can be resolved towards paradox for frameworks that have broad applicability but must be dissolved towards application or practice as the tension dissolves into the nuances of particular, unique, contingent circumstances. I call this space of tension between paradox and practice the *muddled middle*.

5.2 The Muddled Middle

In this view of theory and practice, there is a space of intermingled metaphorical and conventional tension between the clear but meaningless extreme of paradox and the clear but meaningless extreme of a specific action or interaction in a fluid and immersive reality. I call this space of tension the muddled middle. It is the domain where researchers and practitioners engaging with sustainability and resilience must operate. As described by Patton it is a "world

of uncertain beginnings, muddled middles, and unpredictable endings that ripple on and on without end" (2011, p. 9). This echoes concepts such as messiness (Ackoff, 1979) and muddling (Lindblom, 1959; 1979) in management theory and Frame's (2008) messiness and clumsiness in the sustainability literature. Although general patterns are sometimes clear, their implications for immediate circumstances can be unclear or cause conflict (e.g., Gray, 2004). Conversely, where immediate action can be clear, its effect on and implications for larger patterns is often unclear (Dramstad & Fjellstad, 2013).

For example, the cartography of crisis identifies clear patterns of concern related to climate change in the Caribbean (Day, 2009). Some of these patterns were clearly evident in North East Tobago, such as the coral bleaching event in 2010 (Alemu I & Clement, 2014). However, the implications of these patterns for sustainability and resilience implementation are unclear. For example, from 2010 to 2012 SEMPR implemented the 'My Island, My Community' project to lessen the impacts of climate change on the island (Armstrong, 2012). The project used communication, such as special events (e.g., DB029, 19/10/2011) and a radio drama programme to raise awareness and promote behaviour change (DB196, 13/05/2011). In spite of a clear methodology and project structure, the details of how individuals and organisations should be approached to change their behaviour or policies were remarkably nuanced and unclear. The group devoted a great deal of effort to discussing and implementing strategies for building alliances, for example with a government department (DB364, 04/06/2012). They were also particularly concerned with influential sectors of the community, such as fishermen, hunters and other locals who do not take part in community consultations but who influence the social-ecological system of the village. In the words of a SEMPR member:

> You only dealing with the good people, but we need to change those people as well. We need to let them know that everything will be ok, because they don't know better. And this is the problem in the community today. We can't just look for the people who care. We have to try to change the people who don't care. How we gonna make a difference if we keep it to ourself? We don't want to be working hard for people who showing no kind of interest. But still, it worth it to work hard for that. (Interview, 22/08/2012)

Group members devoted substantial effort to discussing how best to approach these sectors of their community (e.g., DB150, 11/01/2011).

Even when groups were engaged, for example through an educational activity at the primary school (DB412, 06/06/2012), the consequences for human behaviour change and vulnerability to climate change in Tobago remained obscure. As one practitioner explained:

> When I look now at this whole 'climate change' thing, why must I link it to climate change? Because climate change is a very broad thing. It's not related to a thing on the ground. So I have to turn around and say, well, poor solid waste management causes this and this and this which should lead to climate change. I have to find some far-flung connection to tag it on. (Interview, 28/07/2010)

In spite of clear patterns such as increased sea surface temperatures and coral bleaching, clear strategies such as the project approach for 'My Island, My Community', and clear activities, such as beach cleanups, the implementation of the sustainability initiative remained muddled.

Considered another way, the muddled middle involves navigating intermingled structure and fluidity. In chapter 3, I discussed how the group, SEMPR, represents at the same time both structure, what Chia (1998) calls a 'discrete, isolatable and stabilised entity', and fluidity, what Chia (1998) calls the 'perpetually changing configurations of relations' within and between people. Similarly, the 'My Island, My Community' project had a clear design to influence the social-ecological system of Tobago which itself can be defined as a whole; a geographically, ecologically and socially discrete, isolatable and stabilised entity (DB117, 06/10/2010). However, the lived experience of implementation also has an unstructured component, a sense of compulsion, limitations, possibilities and uncertainty about actions and consequences. For example, in December of 2010, SEMPR's president passed away suddenly and unexpectedly (DB147, 21/12/2010). The group reorganised and devoted its limited resources of time and finances to commemorating their president's life and subsequently adapting to function without his guiding influence (DB158, 25/01/2011). In this period of trial and transition, the 'perpetually changing configurations of relations' within and between people in the group became more evident. Group members communicated and took actions in the moment to support the president's family and celebrate his life with a video presentation (DB147, 21/12/2010). Through this fluid process, both the structured project and the structured group were adapted to incorporate the new circumstances. Although structure is part of

implementation, there is an unstructured component as well. The muddled middle involves both elements at once; structure and fluidity; wholes and a sense of no obvious boundaries.

Muddle speaks to the lived experience of conviction and confusion. It is reflected in the recurring theme of tension in both the sustainability literature (e.g., Funtowicz & Ravetz, 2008) and management literature (Smith & Lewis, 2011). It speaks to the interdependence of theory and practice, knowing and doing, thought and action. As Harper and Stein argue: "Philosophical reflection, practical reflection, and meaningful action greatly overlap" (2006, p. 12). They draw on thinkers including Wittgenstein, Quine and Schön to make the case that knowledge and action are “intimately and inextricably linked. Each changes the other in a dynamic way, as theory (knowledge) is applied to change practice, and practice (action) is reflected upon to modify theoretical understanding” (Harper & Stein, 2006, p. 14). I argue that this space between theory and practice can be interpreted as being permeated with interrelated metaphorical and conventional tension.

In chapter 3, I used the example of a rubber band pinned to a board to represent interrelated metaphorical and conventional tension associated with sustainability and resilience theory and practice (Figure 3.2a). The muddled middle of tension can be modeled by a rubber band stretched into an equilateral triangle (Figure 3.2b). One pin of the triangle is a particular unique action or interaction in a fluid and immersive reality such as picking up a beverage container on a beach. The other two pins are elements of the system that represent generalisations relative to that particular action or interaction. At the most general, the latter two pins represent a paradoxical duality, mutually inclusive opposites such as continuity and change in the social-ecological system of North East Tobago. There is conventional tension between the two pins of the paradox; continuity and change. There is metaphorical tension between those two pins and the third pin, representing an instant in a fluid and immersive reality such as a beach patrol to deter sea turtle poaching. The space bounded by all three pins is the muddled middle of intermingled metaphorical and conventional tension.

5.3 Muddle & Motivation

The metaphor of tension emphasises an important point about the muddled middle. I use the term tension to capture ideas such as: conflict, confusion, misunderstanding, discrepancy, uncertainty and anxiety. All contribute to a search for new meaning. Understood in this way, tension, both metaphorical and conventional, is critical to concepts such as inquiry, innovation, progress, adaptation and development. Tension is a motive force. This is nicely expressed by Wadsworth:

> Interestingly we don't start with talking about methods or techniques. Or even by going and reading the literature about what others have done or thought. We start in the middle of everyday life by noticing something, stopping, and "experiencing" a question (one that might not yet even be consciously articulated). A kind of question mark appears over the discrepancy like a genie coming out of the friction of rubbing a lamp. (2011, p. 53)

Returning to the concept of paradox discussed in chapter 4, the tension of a paradox can motivate ongoing inquiry; a search for new meaning. In chapter 4, I used the example of Raudsepp-Hearne et al.'s (2010) 'environmentalist's paradox'. They begin with the paradoxical incongruity of improving human well-being in the context of globally decreasing ecosystem function. This motivates their exploration of the interrelationships between human well-being and ecosystem function.

Stacey (2009) draws on the work of Brunner to explore how misunderstanding in communication prompts a search for new meaning through ongoing communication. Returning to an example introduced in chapter 3 from the experiential data, the group SEMPR, understood as a generalisation, led to an expectation that members would attend a proposed meeting (e.g., DB152, 18/01/2011). When individuals did not attend, the discrepancy inspired communication and a search for new meaning. SEMPR group members spent a lot of time at meetings discussing attendance (e.g., DB023, 21/06/2010). Why do individuals not attend meetings? What incentives might encourage subsequent attendance?

Discrepancies between expectations based on generalisations and experience in a fluid and immersive reality lead to ongoing resolving and dissolving of metaphorical tension.

Although either extreme can provide certainty, neither can provide meaning. In this way, meaning, muddle and experience are necessarily interdependent.

5.4 Praxis: Reflective Practice & Practical Reflection

Drawing on the concepts presented thus far, researchers and practitioners implementing sustainability and resilience initiatives must actively resolve knowledge, values and experience towards paradoxical generalisations and, in turn or simultaneously, dissolve the tension of such generalisations into action and interaction in particular, unique circumstances. I use the term *praxis* to describe this activity of navigating the muddled middle. The term was revived in the contemporary Western intellectual tradition from its classical Greek roots by Arendt (1998). Innes and Booher define it as "practice interwoven with theory and theory informed by experience in the spirit of pragmatism" (2010, p. 89). They explain that it involves skills, intuitive knowledge, theory and formal knowledge grounded in extended experience (Innes & Booher 2010).

Fortunately, there are rich traditions available to make sense of such an activity. There are many ways to resolve tension by simplifying, interpreting, clarifying and categorising. There are similarly many approaches to dissolve tension by discussing, interpreting, and applying; increasing nuance. I introduce some briefly here but reserve a more detailed discussion for chapter 10.

Many approaches advocate the combination of theory and practice, often in an iterative form (e.g., Patton, 2011; Snowden & Boone, 2007). For example, Brown (2010) proposes a collective social learning spiral that involves four stages of ideals (what should be), facts (what is), ideas (what could be) and actions (what can be) connected by processes of description, design, action and development. More traditional approaches, such as the rational comprehensive model (Harper & Stein, 2006) involve an extreme separation of knowledge and action in time and/or space, often including institutional separation. This modernist paradigm has been effectively critiqued elsewhere (e.g., Harper & Stein, 2006; Holling & Meffe, 1996;

Innes & Booher, 2010). The emphasis here is on approaches that advocate the integration of theory and practice.

No matter how integrated or iterative the processes however, from the perspective of metaphorical tension all such processes are generalisations. Any iterative process bears metaphorical tension relative to its implementation in particular circumstances. To connect with implementation, it must be dissolved into those circumstances, ending in action or interaction in a fluid and immersive reality. Practitioners must hold in their mind the structure of the generalisation and at the same time act in Chia's "moment-to-moment heterogeneous becoming of our lives" (1998, p.348).

For example, in 2010 SEMPR was implementing the 'My Island, My Community' project which was structured with a logical framework and budget (DB212, 16/06/2011). However, as described above, when circumstances in the group's fluid and immersive reality shifted with the passing of the group's president, the group had to work simultaneously with both their moment-to-moment experience and with the structures of the project and their organisation to navigate their changing circumstances (DB147, 21/12/2010; DB158, 25/01/2011).

Critically then, praxis is a single activity. Action and reflection can be productively separated in time or space according to an iterative process such as the collective social learning spiral (Brown, 2010). However, I maintain that the implementation of sustainability and resilience requires a deliberate appreciation and articulation of how action and reflection are interdependent. It also requires the ability to do both at once. This is captured well by Schön's (1983) *reflective practice* which includes the concept of 'reflection-in-action', the ability to 'think on one's feet' (Patton, 2011). Praxis can draw on methods from developmental evaluation (Patton, 2011), social innovation (Westley et al., 2006), and dialogical planning (Harper & Stein, 2006; Innes & Booher, 2010), where reflective practice and practical reflection take place simultaneously, although one or the other may be emphasised. I explore these ideas further in chapter 10.

In summary, "Theory and practice should be seen as a continuous process of reflecting on action and acting on reflection, a process that can be disentangled only in an artificial

manner, and only for particular purposes" (Harper & Stein 2006, p. 65). This is the activity of praxis; reflective practice and practical reflection.

5.5 Praxis & Paradox

I have argued that implementing sustainability and resilience initiatives involves navigating a muddled middle of tension between two interdependent extremes of paradox and action. The clearest and most general statements about sustainability or resilience will be paradoxical. For example, as I argue in chapter 6, sustainability is about both continuity and change. Conversely, when the metaphorical tension in such statements is dissolved through praxis in the muddled middle into particular contingent circumstances, the corresponding action, such as picking up a bottle from a beach, is similarly clear but also free of meaning in that it is not related to reasons or consequences. Surprisingly, these three elements of paradox, the muddled middle, and action, themselves form a paradox. I call this the *paradox of praxis* where *action gives knowledge meaning and knowledge gives action meaning*. In this view, the implementation of sustainability and resilience invokes a paradox between knowledge and action, between theory and practice. Stacey articulates the same paradox in his CRP theory: “I am trying to point to the paradoxical activity in which there is no meaning without abstraction and nothing for meaning to be about without immersion” (2009, p. 110).

In this view, the most general statement to be made about praxis, about implementing sustainability and resilience initiatives, is that ‘knowledge gives action meaning, and action gives knowledge meaning’. This paradox bears reified metaphorical tension relative to the innumerable circumstances to which it might apply. The paradox will dissolve as it is interpreted through the muddled middle of process and prescriptions, such as the collective social learning cycle, to its implications in specific, unique circumstances, such as a beach cleanup in North East Tobago (e.g., DB281, 01/10/2011). The two extremes are paradoxically interdependent. Praxis is the activity of moving through the muddled middle between these extremes, resolving meaning towards paradox and dissolving it into action. I propose that the paradox of praxis is a critical concept to the implementation of sustainability and resilience.

5.6 A Vocabulary of Paradox

Convergence, complexity, the unknowable, metaphorical tension, conventional tension, resolving, paradox, dissolving, the muddled middle and praxis form the constituents of what I propose as a *vocabulary of paradox* (Figure 5.1). Because sustainability and resilience involve the convergence of wide swaths of human experience, the concepts and their implementation cannot avoid the 'unknowable', an inherently unpredictable component. Generalisations are necessary to make sense of such circumstances, but as they are simplified and broadened, they bear an increasing burden of metaphorical tension, the potential for discrepancy relative to the range of unique, particular circumstances that they purport to encompass. This in turn invokes conventional tension amongst the decreasing number of categories associated with such generalisations. As increasingly simple generalisations compress increasing metaphorical and conventional tension they resolve into paradoxes; small sets of propositions that are both contradictory and true. Consequently, the most general statements about sustainability and resilience will be paradoxical. Such paradoxes in turn dissolve as the metaphorical tension they represent is absorbed into the increasing nuance of particular circumstances, ending in decisive action. Action, however, although clear, is not meaningful. Generalisation is required to inform and justify further thought and action. Consequently, researchers and practitioners navigate a muddled middle of tension between the paradoxical clarity of theory and the meaningless clarity of action. The process of navigating this tension is praxis, which involves thinking-in-action, simultaneous reflective practice and practical reflection.

I propose that these concepts can be usefully understood as a *vocabulary*. Rorty (1980; 1989) uses the term 'vocabulary' to describe the language and rationale used by people to make sense of their world. Vocabularies are "segments of linguistic practice that carry with them their own concepts, standards of evaluation, possibilities and criteria that tell us when particular statements are true or false" (Harper & Stein, 2006, p. 59). They are clusters of concepts, terms and reasons that evolve organically over time and place.

The concept of vocabularies is similar to other concepts that address themes in human thought, including Wittgenstein's language games, Davidson's webs of belief, Fouault's

discourses and Kuhn's paradigms (Harper & Stein, 2006). Other related concepts include mental models (Biggs et al., 2011; Jones et al., 2011) and frameworks (Gray, 2004).

Rorty's concept is appealing for several reasons. First, the concept of a vocabulary implies communication, which involves individuals relating. In so doing, it invokes a rich intellectual tradition of dialogical process including language, conversation, story-telling, narrative and discourse. For example, in chapter 4, I introduced Ehnert's (2009) 'psychological coping' and the importance of discourse as a response to paradox. Drawing on the experiential data, I cited the frustration of SEMPR members as they struggled to implement a sustainability project and grow a small, volunteer-based community organisation. I emphasised that productive dialogue was helpful in alleviating such frustrations, for example in a facilitated team-building workshop (DB268, 16/09/2011). One member expressed it as follows:

> The fun part, actually, is when my team come together, you know, and we have the same sort of vision when we talk about what we want to do. It give me a joy in my heart when we still have that kind of togetherness thinking about to do good things. Because out there, you know, most of my friends out there they don't see what I am seeing. On a daily basis, I try to show them that. So with my team, knowing that they are seeing what I am seeing, it bring a joy. (Interview, 22/08/2012)

Bohm and Peat describe a kind of dialogue where:

> fixed and rigid frames dissolve in the creative free flow … as a new kind of microculture emerges. People who have taken part in such a dialogue will be able to carry its spirit beyond the particular group into all their activities and relationships and ultimately into the general society. (2000, p. 247)

To their credit, in spite of significant challenges, SEMPR members undertook such dialogue and used their experience, not only in their own group, but also in their interactions with other groups and in the wider community, for example in working with the North East Sea Turtles Tobago group (DB409, 14/04/2012). As a facilitator who worked with the SEMPR group explained:

> For me I remember after the first workshop we did. I remember clearly when I met them again and they could tell me about their application of some of the things we

> talked about … and how they translated that into their own life and their own environment. (Interview, 26/08/2012)

Rorty's concept of vocabulary synergises with concepts such as Harper & Stein's (2006) 'dialogical planning', Innes' (1995) 'communicative action planning', Stacey's (2009) CRP, and Bohm's 'dialogue' (Bohm & Peat, 2000). All of these concepts emphasise communication and provide rich material to make sense of the implementation of sustainability and resilience initiatives. I explore these ideas in more detail in chapters 8 and 10.

Second, Rorty's concept of vocabulary is appealing because it does not call on a structured, mechanistic metaphor in the way that frameworks or models do. There is no implicit spatial or hierarchical component. Both 'frameworks' and 'models' invoke a structural metaphor, a physical frame or a physical model. Returning to Mead's 'social object' (Stacey, 2009), there is an implicit temptation to conceive of a framework or model as somehow being 'out there' in the world, that it has an existence independent of human interaction. This is Whitehead's (1925) 'fallacy of misplaced concreteness', discussed in chapter 4. However, as Rorty expresses it in the quote that leads this chapter: "...the idea that the world decides which descriptions are true can no longer be given a clear sense. It becomes hard to think that that vocabulary is somehow already out there in the world, waiting for us to discover it" (1989, p. 6). Rorty's concept of a vocabulary, by contrast, has no connotation of physical structure, hierarchy, or existence beyond human interaction. Vocabularies are a way for humans to make sense of their circumstances.

Third, by appealing to communication and humans relating, the concept of a vocabulary emphasises the fluid, ongoing, evolving nature of how humans interact with and make sense of their circumstances. Vocabularies grow, change and fade. There is no sharp line distinguishing one from another and in this sense, they are a continuum. As Rorty (1989) explains, speakers gradually lose the habit of using some words and meanings, and gradually gain the habit of using others. This synergises with the concept of the muddled middle as a continuum of tension and contrasts with metaphors of frameworks, systems or models, which imply distinct entities

and boundaries. Finally, Rorty's concept of vocabulary is appealing because it opens the possibility for a conversation.

5.7 A Complementary Conversation

Rorty's concept of a vocabulary implies the possibility of using that vocabulary to undertake a conversation. I propose that the concepts I have presented can form the constituents of a vocabulary of paradox. I propose that this vocabulary allows for a conversation about research and practice for sustainability and resilience. I propose that such a conversation using the vocabulary of paradox suggests surprising and helpful insights into the praxis of sustainability and resilience. Notably, it addresses the two challenges of this thesis: it dissolves the implementation gap, replacing it with the muddled middle, and it suggests a role for individuals and groups to productively engage with sustainability and resilience initiatives.

The dominant discourse remains a powerful and necessary perspective on sustainability and resilience. In spite of its admitted shortcomings which have been perceptively assessed elsewhere (e.g., Harper & Stein, 2006; Innes & Booher, 2010; Stacey, 2009), it continues to be used to effectively articulate what I have called the cartography of crisis: the patterns of social-ecological continuity and change that are structuring human circumstances globally, regionally and locally. These patterns such as climate change, biodiversity loss (Rockström et al., 2009), or income inequality (Chin & Culotta, 2014; United Nations Department of Economic and Social Affairs, 2013), form the context for sustainability and resilience initiatives. Consequently, I do not envisage the vocabulary of paradox as a replacement for the dominant discourse. There is no need to throw the baby out with the bath water.

Instead, I propose that the vocabulary of paradox can be used to structure a *complementary conversation* about the concepts and implementation of sustainability and resilience. A complementary conversation allows for comparison, contrast, contention, confusion and synthesis. As Rorty (1989) explains, there is no objectively 'best' vocabulary. However, some vocabularies are better suited to particular purposes (Rorty, 1989). I maintain that the vocabulary of paradox articulates and values elements of the concepts of sustainability

and resilience that are often fragmented and/or undervalued in the dominant discourse. Notably, it addresses one of the principle shortcomings of the dominant discourse, the implementation gap introduced in chapter 1.

5.8 Dissolving the Implementation Gap

In chapter 1, I argued that the concepts of sustainability and resilience face an implementation gap. I argued that if this gap is not bridged, the concepts, though widely invoked, are of limited practical value and of dubious legitimacy. The vocabulary of paradox suggests an alternative perspective on the implementation gap for sustainability and resilience. The metaphor of a gap between theory and practice is replaced with the metaphor of a muddle. The muddle is a continuum of tension bound by the paradox of praxis. At one extreme is clear but paradoxically meaningless theory. At the other is clear but meaningless action. Each requires the other for meaning. Put simply, knowledge gives action meaning and action gives knowledge meaning. Researchers and practitioners must therefore function in the muddle in between (Figure 5.1). The implementation gap is not bridged, nor is it solved. It dissolves and resolves through the muddled middle. In chapters 6 and 7, I propose a paradox that dominates the praxis of sustainability and resilience and provide an example of how it dissolves and resolves in North East Tobago. In chapters 8, 9 and 10, I explore praxis and its relation to agency for individuals and small groups engaging with sustainability and resilience.

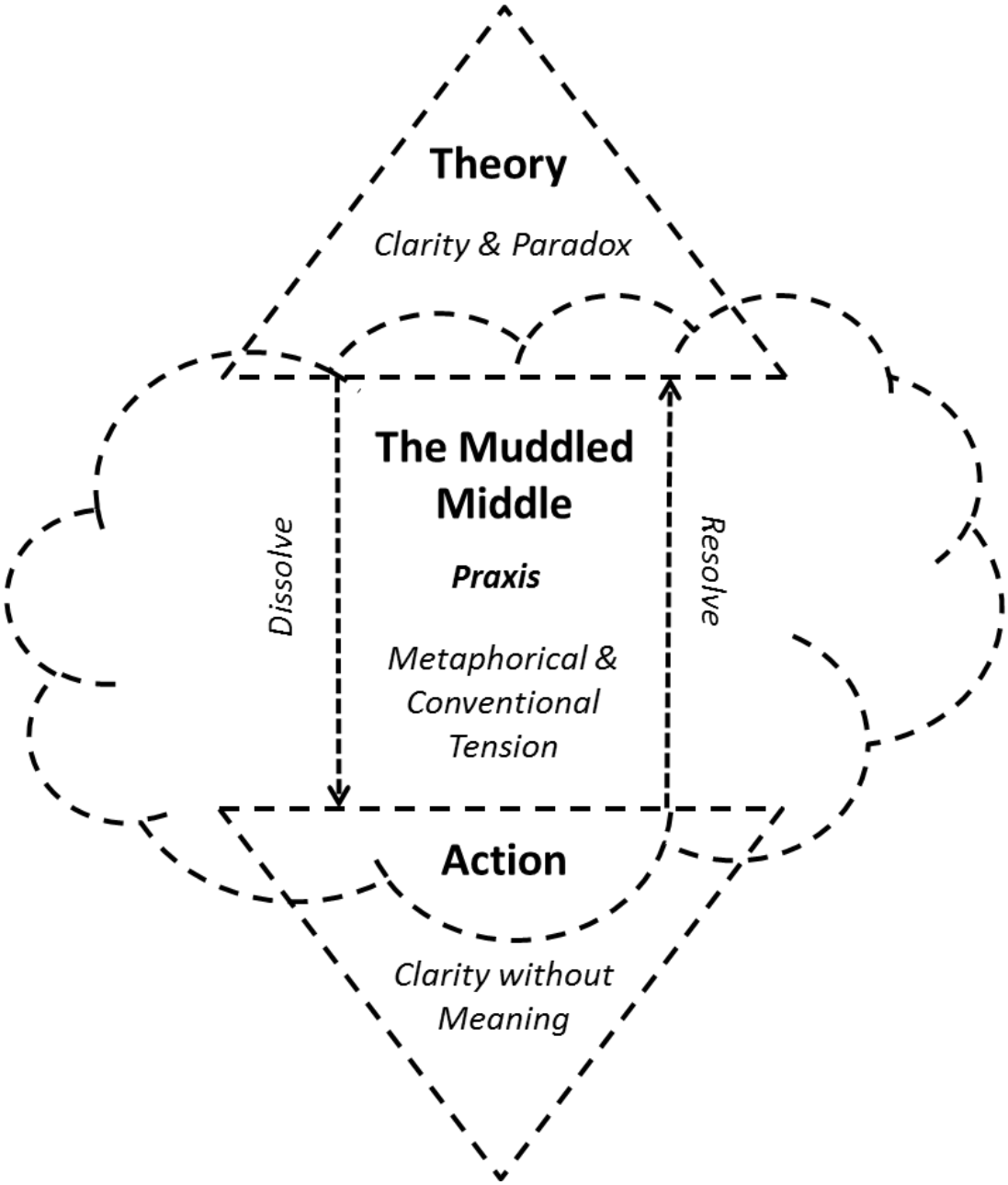

Figure 5.1. The paradox of praxis in the vocabulary of paradox. The price of clarity is paradoxical theory or meaningless action. Researchers and practitioners undertake praxis by resolving and dissolving metaphorical and conventional tension through the muddled middle.

Chapter 6: The Paradox of Sustainability: Continuity & Change

In chapter 5 I presented a *vocabulary of paradox* to make sense of the diverse, relevant influences that are invoked by the concepts and implementation of sustainability and resilience. In this chapter, I use the vocabulary of paradox to discuss how sustainability and resilience can be understood as articulations of the tension between continuity and change in human circumstances. I maintain that this complementary conversation helps to clarify theory and practice relating to sustainability and resilience.

6.1 Sustainability as a Paradox

Sustainability invokes continuity, however vaguely or implicitly. In general parlance, it speaks to persistence, something that continues or can be maintained. It is used in this sense in the business literature. For example, Smith and Lewis define sustainability as "peak performance in the present that enables success in the future" (2011, p. 382). The added dimensions of human well-being and the environment in the international discourse, introduced in chapter 1, specify more particularly what should continue or be maintained. For example, returning to the Brundtland Commission (World Commission on Environment and Development, 1987), sustainability is concerned with the continuity of human well-being and the systems, particularly ecosystems, that support it (Waas et al., 2011). The latter are often conceived as ecosystems services; benefits that people obtain from ecosystems (e.g., Millennium Ecosystem Assessment, 2003). Another example is the related field of conservation that is structured around the continuity of biodiversity and the ecosystems that support it (Dyke, 2008).

However, it is difficult to discuss sustainability without invoking some form of change. The patterns that dominate sustainability discussions are those of the cartography of crisis; patterns of often worrying change associated with both human well-being (e.g., United Nations Department of Economic and Social Affairs, 2013) and related environmental systems (e.g. Rockström et al., 2009). Change is also associated in a positive sense with the practice of sustainability through concepts such as change agentry (e.g., AtKisson, 2010) and transformation (e.g., Kahane, 2012).

In this way, although sustainability generally connotes persistence, it necessarily invokes intermingled influences of continuity and change. Superficially in the sustainability discourse, change is a means and continuity is an end. Change in human behaviour should lead to sustained human well-being. However, any application of this ideal immediately invokes a muddle of intermingled values, understanding and agency. For example the Rio+20 document, 'The Future We Want', calls for biodiversity to continue, poverty to be eradicated, and economies to grow (United Nations General Assembly, 2012). This muddle in turn manifests as conventional tension in the sustainability discourse. For example, there is tension between the continuity of ecosystem services and positive change in material human well-being. As Gibson et al. express it, sustainable development is "a term that offers an accommodation of opposing forces - suggesting that responsible stewardship of nature and continuing gains in human material well-being are compatible" (2005, p. 45).

Is sustainability about continuity, or is it about change? The vocabulary of paradox allows it to be understood as both. I therefore define sustainability simply as *continuity through change*. More specifically, sustainability is *the continuity of valued attributes of human circumstances both in the midst of and by means of change* (Figure 6.1). In the vocabulary of paradox, the clearest, most general statement to be made about sustainability will be paradoxical. Sustainability is continuity through change. The paradox can be dissolved through general statements into particular circumstances, but any return to wider generalities will bear a concomitant burden of tension. I use this definition of sustainability to explore the paradoxical interrelationship of continuity and change, emphasising three interrelated themes of understanding, what does continue and change, of values, what should continue and change, and of agency, what can be influenced to continue and change. In the following chapters, I integrate the paradox of sustainability with related paradoxes to discuss a role for individuals and small groups implementing sustainability or resilience initiatives.

6.1.1 Understanding: What Does Continue & Change?

I propose that sustainability can be understood as the continuity of valued attributes of human circumstances both by means of and in the midst of change. The grammatical object in this

definition is 'attributes of human circumstances'. Discussions of sustainability involve making sense of human circumstances by categorising attributes and identifying patterns of continuity and change within and across systems and scales. This is a task of description. It is sustainability understood in this sense that AtKisson describes as "a system state that can be fairly easily defined and even quantitatively described for a vast array of ecological, economic, and social systems" (2013, p. 56).

The choice and quantification of indicators for sustainability and resilience are vibrant areas of research and practice (e.g., Gibson et al., 2005; Nyström et al., 2008, Singh et al., 2012). They are codified in a wide range of frameworks such as the Millennium Ecosystem Assessment (2005), the triple bottom line (Zimmerman, 2005), Ostrom's (2008) multi-tier framework, and AtKisson's (2010) compass. These frameworks include social, ecological, environmental and aggregate measures (Gasparatos et al., 2009). Such frameworks draw largely on a modernist tradition with an emphasis on quantification that allows privileged access to an objective reality (Gasparatos et al., 2009). Although this perspective has limitations (Harper & Stein, 2006), it remains a legitimate and useful undertaking. It allows for description, explanation and prediction (e.g., Rockström et al., 2009), and contributes to extrapolations, critique, evaluation (Patton, 2011) and justification (Ehnert, 2009; Harper & Stein, 2006). Sustainability and resilience initiatives are implemented within a biophysical, economic and social context. Attributes of human circumstances make sense of that context.

For example, in Tobago the Tobago Coastal Ecosystem Mapping Project ran from 2007 to 2011 quantifying a variety of indicators of the state of the island's coastal coral reefs including live hard coral density, commercial fish density, and demersal fish density (van Bochove & McVee, 2012). The degraded and declining state of many of the sites, a pattern of change, and the relative health of others, a pattern of continuity, were used to inform a proposal for a marine protected area (van Bochove & McVee, 2012).

Findings were also used to justify an application for funding for a complementary project, the Speyside Marine Area Community-Based Management Project, which implemented education, training and outreach programmes for local residents in North East Tobago and also

included more detailed quantitative ecosystem assessments (Armstrong et al., 2009). The assessment of attributes of human circumstances, degrading coral reef ecosystems, provided a context for both the aspirations and the efforts of those implementing the Tobago Coastal Ecosystem Mapping Project. Those aspirations and efforts were expressed in the Speyside Marine Area Community-Based Management Project to raise local awareness and capacity in order to mitigate or reverse coral reef decline.

Sustainability and resilience researchers and practitioners operate in a context of global change. As discussed above and in chapter 1, 'change' in the language of sustainability and resilience has negative connotations as a force to be avoided, moderated, or reversed. Climate change is one example, but sustainability's cartography of crisis is replete with problematic patterns of change that threaten, for example, equality (e.g., Dellink et al., 2009), well-being (e.g., Rogers et al., 2012), planetary biophysical processes (Rockström et al., 2009), or specific ecosystems such as coral reefs (Burke et al., 2011). I define sustainability as continuity through change where the term 'through' is used deliberately for its double meaning. It means both 'in the midst of' and 'by means of'. The cartography of crisis is an example of sustainability understood as continuity 'in the midst of' change. It is an example of the quantification of human circumstances. It is these circumstances, given sense as attributes, that researchers and practitioners both seek to influence, and are influenced by. Put simply, researchers and practitioners must understand what is going on around them. What is understood to continue and change? In this sense, sustainability and resilience initiatives take place *in the midst of* change.

To summarise, one aspect of sustainability understood as continuity through change is 'understanding'. What does, or is understood to continue and change? Although understanding is critical to research and practice, the paradox of praxis ties such description to action which raises the question of agency, or sustainability by means of change.

6.1.2 Agency: What Can Continue & Change?

In the descriptive discourse of sustainability, what I have called 'continuity in the midst of change', change has largely negative connotations associated with the cartography of crisis. By contrast, much of the language associated with the practice of sustainability and resilience invokes desired or positive change as a means or tool. Common concepts include change agentry (AtKisson, 2010) and social innovation (Westley et al., 2006). These are approaches to intentional, desired, collective human action. This is a second theme in a paradoxical understanding of sustainability. Sustainability as continuity through change also means sustainability as continuity *by means of* change.

Implementation of sustainability and resilience initiatives requires that researchers and practitioners take action to change circumstances in their system of interest. They must connect observed patterns of change to their ongoing actions in a fluid and immersive reality. In the vocabulary of paradox, sustainability practitioners undertake actions in the inherently uncertain circumstances of the muddled middle. Attributes and their observed patterns reflect frameworks that are simplified models of a fluid and immersive reality. This invokes the *paradox of praxis* whereby action gives knowledge meaning and knowledge gives action meaning. The boundaries of categories required by frameworks are not absolute. They are permeable and to a purpose. Although informative, they are not decisive (Harper & Stein, 2006). They must be interpreted, or dissolved, to apply in particular, contingent circumstances. This involves asking what can be influenced to continue and change. In the uncertain circumstances of the muddled middle, the answer is usually not clear (Funtowicz & Ravetz, 2008).

Continuing with the example from the previous section, the more detailed quantitative ecosystem assessments associated with the Speyside Marine Area Community-Based Management Project (Armstrong et al., 2009), including geographic information systems mapping, were successful. The data were also further analysed using another framework, systematic conservation planning (Margules & Pressey, 2000), to propose more nuanced marine protection possibilities (d'Abadie, 2011). However, the local community initiatives of

the Speyside Marine Area Community-Based Management Project faced challenges including limited and sporadic participation. "The impact of the project on the adult community was … difficult to assess because of their reserved participation in project activities" (Armstrong et al., 2009, p. 22). Returning to the paradox of praxis, the patterns of continuity and change in attributes of human circumstances, such as degraded coral reefs and limited commercial fish stocks, were clear. Proposals for action were also clear. There was an urgent need for marine protected areas. However, these generalisations had to be dissolved, or interpreted, into the fluid and immersive reality of daily interactions between those implementing the project and the intended community beneficiaries. This process of immersion was less clear. Those implementing the project saw it as a challenge (Armstrong et al., 2009). This lack of clarity is yet another articulation of the implementation gap, and it raises the question of *agency*. Although attributes of human circumstances may be clear, what is the scope for researchers and practitioners to influence them?

The relation between intention, action and consequence is the subject of substantial intellectual effort in philosophy (Wilson & Shpall, 2012) and sociology (Calhoun, 2002) with no widely accepted consensus in either discipline. However, the praxis of sustainability and resilience requires at the very least acknowledgement of, and if possible a coherent account of, the scope for human agency in the context of uncertainty. What are the prospects for humans to intentionally and collectively affect their circumstances?

Fortunately, Stacey (2009) has articulated a coherent, paradoxical account of human agency in organisations. His concept of *complex responsive processes* (CRP) draws on the complexity sciences to give an explicitly paradoxical account of human agency wherein wider patterns of human behaviour both emerge from and influence local interactions between interrelated individuals. He maintains that this account of human agency better reflects the lived experience of individuals in organisations. In chapter 8, I explore the implications of CRP for the praxis of sustainability. In chapter 9, I draw on Stacey's (2009) typology of causality to articulate the concept of *paradoxical agency*, which integrates a paradoxical understanding of

praxis, sustainability and people, to capture the limited but at times transformative agency of individuals and groups engaging with sustainability.

I have used the definition of sustainability as continuity through change so far to address a descriptive component. What does continue and change? Appealing to Stacey's (2009) CRP explicitly addresses a component of human agency: what can be influenced to continue and change?

6.1.3 Values: What Should Continue & Change?

I propose that sustainability can be defined as the continuity of valued attributes of human circumstances both in the midst of and by means of change. In this definition, *valued* is the adjective that describes attributes of human circumstances. Some attributes of human circumstances are valued, their promotion and persistence are desired. This invokes the aspirational nature of sustainability (Frye-Levine, 2012). The term incorporates, for example, aspirations for equality (Waas et al., 2011), well-being (Rogers et al., 2012) and the ecological conditions that make these possible (Rockström et al., 2009). Such aspirations emphasise the normative nature of sustainability. It is an articulation of what should be (Ehnert, 2009; United Nations General Assembly, 2012). As Harper and Stein express it, these concepts are "imbued with normative meaning: they have an evaluative and justificatory component beyond the descriptive, explanatory, or predictive" (2006, p. xxi). The term 'valued' in the definition emphasises this normative component and the positive connotations of the term 'sustainability'.

For example, following from the 2008 to 2009 Speyside Marine Area Community-Based Management Project mentioned above (Armstrong et al., 2009), community members who had benefited from SCUBA, marine life identification, and marine survey training came together to form the Speyside Eco-Marine Park Rangers (SEMPR) community group in November of 2009. The clear quantitative findings and recommendations of both projects confirmed group members' extensive experience and long-held concerns. They agreed that the marine

ecosystem was degraded and degrading and that a marine protected area was necessary. As one member explains:

> I used to explore the reef. I had a mask when I was a little boy. We had some turtles there. You used to see many turtles in that small area. Now you don't see it. … Those days, we had nice coral and clean water in Charlotteville down in Bottom Bay. We had a lot of hard coral and thing. We had a bed of gingerbread corals. All those die. We had a bed of star corals. All those die. In Charlotteville, right in front of my mother's house we used to have real fishes. And I get to realise that these corals is a breeding ground for the fishes. Because you know for a fact, the little fish can hide from the bigger fish in the reef. I watch it over and over. And there were some shrimp in Charlotteville so colourful that no man could paint. The most salmon that I ever seen in my life is in Charlotteville just outside Bottom Bay reef, the rainbow runners. As high as you could see, as low as you could see and as broad as you could see was fish. You cannot see the other side, you cannot see above you. And you in the middle of all these fishes. That no joke you know. I talking about thousands of fish. Hear what I tell you. In Charlotteville, when they used to catch fish in Charlotteville, when the seine come in, the seine ground way out for the amount of fish. Now the seine coming right in shore. I telling you we used to catch some jacks, big jacks that could have cooked for a family. What they call a 'big jack' now, you fry that dry, put that in a slice of bread. The head out there and the tail out there and the bread in the middle. (Interview, 13/08/2012)

SEMPR group members' commitment to these concerns and the proposed solution was demonstrated by their choice, in November 2009, to name their group the Speyside Eco-Maine Park Rangers. There was, and as of this writing is, no such park. The name represents their goal.

SEMPR group members value the marine and terrestrial environment of North East Tobago. This value is associated to a certain degree with income and livelihoods as several of the members are eco-tour guides (DB269, 17/09/2012) and saw the group as an important way to help secure their livelihood. For example, in the words of one member: "I always say what sense being a tour guide when it have nothing to tour? What sense being a tour guide if you are taking up all the lobster? You taking away your job from yourself" (Interview, 22/08/2012). However, SEMPR members demonstrated a high degree of unremunerated commitment over two and a half years though a wide range of challenges, including personality differences (DB101, 06/09/2010), procedural challenges such as meeting the accounting obligations for a relatively large project without prior training or experience (DB267, 10/09/2011) and unforeseen events such as the passing of their founding president (DB147, 21/12/2010). This

commitment of voluntary time and effort reflects a sense of place, community and for some members, a calling. "That's the beauty of our group … we don't really watch it for us. We watch it for a better community and around Tobago. Even for the other islands" (Interview, 22/08/2012).

The normative component of sustainability leads to some important considerations which are captured by a neopragmatic philosophical orientation. In their critique of contemporary planning, Harper and Stein (2006) elaborate on Rorty's (1980) interpretation of pragmatism to articulate a perspective that inspired and therefore synergises with the paradoxical understanding of sustainability presented in this chapter. Although I address neopragmatism several times in the thesis, there is significant scope to further explore its implications for the praxis of sustainability. Of relevance here is the scope for a neopragmatic perspective to clarify how values can be understood to justify and orient theory and action relating to sustainability.

The uncertainty and normativity associated with the praxis of sustainability mean that justification cannot orient solely from an objective, quantifiable reality (Harper & Stein, 2006; Innes, 1995; Lindbolm, 1959; 1979). Likewise, the ideal of comprehensive consensus advocated by postmodernism is neither conceptually nor practically feasible. As Harper and Stein explain, "The idea that we should accept everything in every tradition is itself a universal principal, one that would destroy pluralism. It leaves us few options: at best separation; at worst, violence" (2006, p. 253). I discuss this issue in more detail in chapter 8. However, justification remains necessary. Sustainability praxis requires decisions as to what is success or failure, good or bad, right or wrong.

In 'On Certainty', Wittgenstein argues that doubting is only possible because "some propositions are exempt from doubt, are as it were like hinges on which those turn" (1974, §341). In order to be uncertain, one must be standing somewhere certain. As he puts it: "If I want the door to turn, the hinges must stay put" (Wittgenstein, 1974, §343). The metaphor of hinge propositions (Pritchard, 2012; Reed, 2011) emphasises how some values and beliefs can only be justified and given meaning relative to other values or beliefs. There is no absolute

foundation. “Wittgenstein places emphasis on the relationship between language, human action, behavior, and social practice rather than the relationship between language and some transcendental object or some notion of an independent reality that it mirrors or represents" (Harper & Stein, 2006, p. 53). A hinge proposition may be used as indubitable justification for other beliefs, but it itself can only be justified from the perspective of another proposition. In this way, values and beliefs can be envisioned as a mutually supporting web.

Returning to the SEMPR group, the values of members represent an interwoven mix of experience, such as their life growing up in North East Tobago as described above (Interview, 13/08/2012), understanding, such as the information they learned about coral reef ecology and decline (Armstrong, 2009), and values, such as their faith, expressed in prayers before meetings (e.g., DB023, 21/06/2010). Further, these values are always evolving through experience and reflection such as an inspirational school outreach activity (e.g., DB370, 08/06/2012), an inspirational workshop (e.g., DB371, 09/06/2012), the experience of an ecological disaster (e.g., Alemu I & Clement, 2014), or the death of a group member (DB147, 21-12-2010). In the words of one member:

> As a small organisation, I guess we experience a lot. We experienced the good times, like Carnival, the sad times, like the funeral, and the bad times, with all the work coming down on us. I mean, it just shows a lot. (DB268, 16/09/2011)

In this view, analysis or reflection would never yield one, indubitable proposition on which all others would hinge. The values of any SEMPR member do not hinge on a single proposition. This is expressed in yet another quote from Wittgenstein:

> All testing, all confirmation and disconfirmation of a hypothesis takes place already within a system. And this system is not a more or less arbitrary and doubtful point of departure for all our arguments: no, it belongs to the essence of what we call an argument. The system is not so much the point of departure, as the element in which arguments have their life. (1974, §105)

In the vocabulary of paradox that I have been using, the above quote can be read by replacing the word ‘system’ with the word ‘web’.

From a neopragmatic perspective, values are anchored in webs of belief. As Harper and Stein explain; “when we seek to justify a belief or an action (to give reasons for it), we appeal to a ‘web’ of other concepts and beliefs that are shared” (2006, p. 122). As I discussed in chapter 5, Rorty (1980) makes sense of such webs of shared concepts and beliefs as vocabularies: “segments of linguistic practice that carry with them their own concepts, standards of evaluation, possibilities, and criteria that tell us when particular statements are true or false” (Harper & Stein, 2006, p. 59). These vocabularies overlap and are shared to varying degrees by individuals and groups of people. There are no sharp lines. Vocabularies merge and diverge. They also evolve over time as they are applied and negotiated relative to particular circumstances. "Our practices form a web of beliefs and meaning that is complex and ever-changing" (Harper & Stein, 2006, p. 74). The social processes of negotiation can be understood as praxis in the vocabulary of paradox, where general beliefs bear a burden of paradoxical tension which will dissolve as those beliefs are applied to increasingly particular and unique circumstances. Similarly, Stacey’s (2009) CRP addresses the ongoing social process of generalisation and particularisation of values, beliefs and concepts.

Critically, although values in the theory and practice of sustainability cannot be justified relative to a quantifiable objective reality or a comprehensive consensus, shared vocabularies do allow for legitimate decisions. They provide enough context to allow judgement of what is true and false, right and wrong. Harper & Stein (2006) explore Rawls’ concept of a liberal democratic society as the context for contemporary planning and their work is also relevant to the theory and practice of sustainability. A detailed exploration of these ideas is beyond the scope of this thesis, but the political context in which sustainability is understood and practiced is a critical dimension of the concept that warrants further work, particularly regarding the role of Habermas’ critical rationality (Russell, 2010) and emancipation from unrecognized oppression (Harper & Stein, 2006).

When sustainability is understood as continuity through change, ‘attributes of human circumstances in the midst of change’ emphasise the descriptive dimension of the concept. What does continue and change? Continuity ‘by means of change’ emphasises the scope for

human agency. What can be influenced to continue and change? Identifying valued attributes invokes an aspirational, normative dimension. What *should* continue and change? Neopragmatism provides scope to consider both the descriptive and normative components of sustainability praxis judged in particular, unique circumstances against a context of broadly shared vocabularies.

6.1.4 The Implicit Subject

Sustainability defined as the continuity of valued attributes of human circumstance in the midst of and by means of change is explicitly anthropocentric. This reflects the anthropocentric nature of sustainability. For example, the Brundtland definition is centered on human needs (World Commission on Environment and Development, 1987). As Waas et al. emphasise "environmental protection is not the primary objective of sustainable development, but a precondition to achieve it" (2011, p. 1648). Concepts such as human well-being are integral to sustainability in the international discourse (e.g., Millennium Ecosystem Assessment, 2005).

Sustainability however is not merely generally anthropocentric. In the proposed definition where sustainability is the continuity of valued attributes of human circumstances both in the midst of and by means of change, an individual or group must do the valuing. The definition has an implicit grammatical subject. In the vocabulary of paradox, sustainability must dissolve into action. It is inevitably particularised into specific human circumstances. Invoking Rorty's (1980) pragmatism involves conceiving of concepts as rooted in particular social practices (Harper & Stein, 2006). This definition of sustainability therefore involves retaining an explicit connection to the knowledge, values, actions and experiences of individuals and small groups of people situated in particular, unique social and ecological circumstances. In this sense, sustainability requires a grammatical first person: an 'I' or a 'we'.

This element of the definition is critical to dissolving the implementation gap. Sustainability as a concept must be connected to individual and small group experience and actions. The vocabulary of paradox provides a way to make sense of this connection. In the paradox of praxis, action gives knowledge meaning and knowledge gives action meaning. They

are paradoxically interrelated through a muddled middle of uncertainty. Stacey's (2009) concept of CRP gives a coherent and paradoxical articulation of how individuals and groups shape and are shaped by wider circumstances. I explore this connection in chapter 8.

A grammatical first person also raises the challenge of singular and plural; of 'I' and 'we'. In chapter 8, I draw on Stacey (2009) and Kahane (2010) to propose a *paradox of people* that captures the challenge and necessity of collective action for the implementation of sustainability initiatives.

6.2 Sustainability in the Vocabulary of Paradox

Sustainability invokes the paradoxical interrelationship of continuity and change in human circumstances. I propose a definition of sustainability that embraces this paradox. Sustainability is continuity through change. More specifically it is the continuity of valued attributes of human circumstances both in the midst of and by means of change.

In the vocabulary of paradox, at its most general, the concept of sustainability bears the reified tension of a desire for both continuity and change in valued attributes of human circumstances. This tension is dissolved through the muddled middle of intermingled understanding, agency and values into the clarity of decisive action in particular circumstances. This definition calls attention to three interrelated dimensions of tension borne by general statements about sustainability. 'Attributes of human circumstances in the midst of change' speaks to description and understanding. What does, or is understood to continue and change? 'Valued attributes' speaks to the normative component of sustainability. What should continue and change? Continuity 'by means of change' speaks to human agency. What can be influenced to continue and change? All three dimensions merge in the muddled middle. Although they can be parsed for particular purposes, they are not discrete, isolatable categories (Figure 6.1).

In this interpretation, sustainability involves exploring the relation between continuity and change. How is it possible for something, a concept, a system, or a person, to both continue and change? In his discussion of language, Wittgenstein (2009) introduces the concept of *family resemblance*. He uses the metaphor of a rope made of many strands of thread. No

single strand, or even sub-group of strands, runs through the whole rope. However, the rope is still a thing. It can be described and used. As Wittgenstein expresses it:

> we extend our concept ... as in spinning a thread we twist fibre on fibre. And the strength of the thread does not reside in the fact that some one fibre runs through its whole length, but in the overlapping of many fibers. (2009, §67)

Applied to concepts, such as sustainability and resilience, this metaphor suggests that a concept can have continuity without a precise, prescriptive definition (Harper & Stein, 2006). Returning to Rorty's concept of vocabularies from chapter 5, a concept can evolve and change. It does not need to reflect precisely defined categories that are 'out there' in the world. In this view, there is no need to search for a clear, rigorous and universal definition or set of principles for sustainability as some authors suggest (e.g., Kemp & Martens, 2007). Applied to complex adaptive systems and the uncertain circumstances of praxis in the muddled middle, it suggests that language provides scope to make sense of the continuity of valued attributes of a system, even though no single element or group of elements is retained throughout to allow a precise, predictive definition of the whole.

I propose that applying family resemblance to the paradox of sustainability suggests an approach to sustainability praxis. The praxis of sustainability involves navigating the muddled middle; resolving towards paradox and dissolving towards action while negotiating the collective integration of understanding, values and action around a coherent articulation of continuity. Applied to praxis in North East Tobago, I worked with the SEMPR group, facilitating an ongoing discussion of changing understanding, values and experience associated with ecological and social change such as a coral bleaching event (Alemu I & Clement, 2014), delays in the delivery of funding that compromised their major project (Armstrong, 2012), and the death of a group member (DB147, 21/12/2010). Over time, an ongoing narrative, an articulation of continuity through change, emerged out of these discussions. This narrative about the group and the social-ecological system of North East Tobago helped the group orient itself and make decisions about its activities. For example, group members initially felt an obligation to accept any proposal for collaboration or funding that they received (e.g., DB018, 14/06/2010). However, by integrating ongoing knowledge, experience and values into a

narrative about their group and their social-ecological system, they became more confident in their role, goals, needs and mission (DB269, 17/09/2011). They recognised their own value. As one member explained: "Our area is really targeted because of its richness; everyone calling 'Speyside, Speyside', you know" (Interview, 22/08/2012)? This allowed them to have more confidence in declining or negotiating with potential collaborators (e.g., DB372, 10/06/2012). In the words of another group member: “As a small group, I never knew we were so powerful. Even when we are small, we keep together” (DB268, 16/09/2011). This approach in turn suggests a role for individuals and small groups implementing sustainability initiatives. I explore that role in chapter 10.

6.3 Sustainable Development: Desired Continuity Through Desired Change

Thus far I have treated sustainability and sustainable development as interchangeable terms, as what Kemp and Martens (2007) call ‘twin notions’. Cogent arguments have been made for a range of distinctions. For example, some authors treat sustainability as a goal and sustainable development as a process to achieve it (Lozano, 2008). In this view, as defined by AtKisson, sustainability is “a set of conditions and trends in any given system that can continue indefinitely” (2010, p. 111). Sustainable development is “a strategic process of continuous innovation and change in the direction of sustainability” (AtKisson, 2010, p. 111). In this interpretation, development is a kind of change over time. It is a process. Sustainability is a state; the goal to which that process aspires. However, although this and other distinctions have been made, none has been decisive or broadly adopted (Waas et al., 2011).

The vocabulary of paradox suggests an intuitive distinction whereby sustainable development is an initial dissolution of the paradox of sustainability. It is *desired* continuity through *desired* change. The concept of sustainability is aspirational (Frey-Levine, 2012). It invokes a normative dimension with positive connotations. What should continue in human circumstances? In the international discourse, broadly construed, the answer is human well-being and the natural environment. However, in the vocabulary of paradox, sustainability also necessarily invokes change. From a normative perspective, change can be desired or not. As has been previously discussed, much of the sustainability discourse is concerned with patterns of

unwanted change captured in the cartography of crisis. However uncertainty and the muddled middle in the vocabulary of paradox emphasise the intermingled dimensions of values, understanding and agency in a paradoxical definition of sustainability. Consequently, a paradoxical conceptualisation of sustainability provides scope to consider positive normative change; patterns of desired change over time.

In the vocabulary of paradox, 'sustainability' describes desired continuity of attributes of human circumstances, implicitly invoking change. I propose that 'development' can be understood as desired change in attributes of human circumstances. In this way, where the term 'sustainability' specifies the kind of continuity that is desired, the term 'development' simply makes explicit the kind of change that is also desired. Sustainable development is *desired continuity through desired change*.

In this way, the term 'sustainable development' becomes a first step in dissolving the paradox of sustainability. Further dissolution of sustainable development involves specifying what should continue (sustain) and change (develop) in increasingly specific circumstances. Although this dissolves the paradox by adding detail, it increases the muddle, moving away from the theoretical clarity of paradox by invoking, in addition to values, the related dimensions of understanding and agency. Continued dissolution of the paradox into the muddled middle involves negotiating what should, does and can continue and change in increasingly specific human circumstances. Clarity is achieved again in practice, when the paradox dissolves completely in specific actions by specific people in a specific context. However, to give that practice meaning, it must be generalised, moving again into the muddled middle towards paradox. There is substantial scope to explore this interpretation of sustainable development.

6.4 Conclusion

A paradoxical definition of sustainability promotes a complimentary conversation. The concept can remain aspirational (Frye-Levine, 2012). Attempts to distill core themes and calls for more rigorous definitions remain legitimate (e.g., Gibson et al., 2005; Waas et al., 2011). Indicators and frameworks remain important. However, the vocabulary of paradox is an attempt to follow

Rorty's (1989) advice by changing the subject. In the vocabulary of paradox, sustainability ceases to be an answer and instead becomes a question about what should, does and can continue and change in particular circumstances. Sustainability praxis involves deliberately and collaboratively navigating the muddled middle of tension between paradoxical theory and meaningless action (Figure 6.1).

In this view sustainability is confusing and it should be. Not because a clear definition has yet to be articulated, nor because it is conceptually paradoxical, but because it is an aspirational articulation of a core tension of the human condition that hinges on the capacity of individuals and groups to influence their circumstances in an uncertain world. This tension between continuity and change in lived human experience is captured concisely in the 'serenity prayer', attributed to Reinhold Niebuhr:

> God, grant me the serenity to accept the things I cannot change,
> The courage to change the things I can,
> And the wisdom to know the difference.

Serenity, courage and wisdom speak to a complementary conversation about the implementation of sustainability and resilience initiatives, a conversation that emphasises the more nuanced aspects of the muddled middle by contrast with the often alarming and disempowering findings of the cartography of crisis. In the next chapters, I examine the implications of these ideas for the praxis of sustainability.

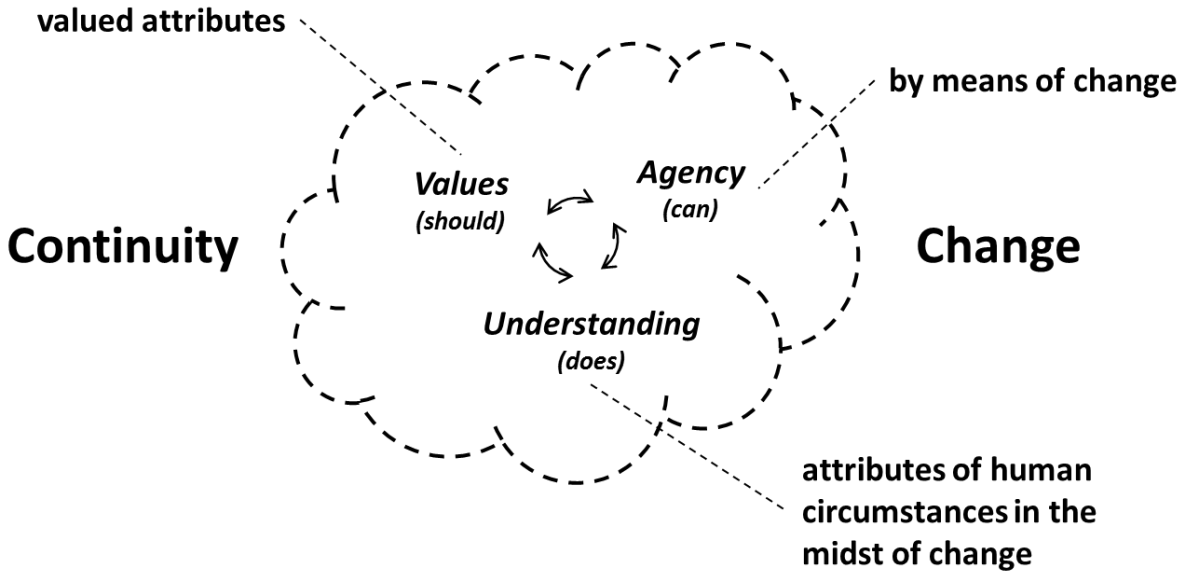

Figure 6.1: A paradoxical definition of sustainability as the continuity of valued attributes of human circumstances through change where 'through' is understood as both 'in the midst of' and 'by means of'.

Chapter 7: Case Study: North East Tobago

In chapter 6, I proposed an explicitly paradoxical definition of sustainability, arguing that it can be dissolved into specific actions and experiences of specific people in particular circumstances through a muddled middle of intermingled values, what should continue and change, understanding, what does continue and change and agency, what can continue and change. To give actions and experience meaning, however, they must be resolved back into the muddle of agency, understanding and values towards paradox. I call this process of resolving and dissolving *praxis*. In this chapter, I illustrate the process of praxis for the paradox of sustainability by drawing on experiential research supporting a small community group undertaking conservation and sustainability initiatives at the North East end of the Caribbean island of Tobago. The purpose of this thesis is to address the implementation gap. Consequently, this case study is explicitly structured from the perspective of a group implementing initiatives in a social-ecological system.

7.1 North East Tobago

The diversity of descriptions of the North East Tobago region reflects the permeability of boundaries in systems where sustainability and resilience initiatives are implemented. Although more than 10 years old, the North East Tobago Management Plan (EDG & Kairi Consultants, 2003) remains the most comprehensive assessments of the region. Prepared for the local Tobago House of Assembly government, the plan delineates the 10,150 north-eastern most hectares, about one third of the island. It includes the four north-eastern most communities on the Caribbean coast, and the two on the Atlantic coast. It also includes the entire 3,958 hectare Main Ridge Forest Reserve that dominates the hilly spine of the island. The reserve is notable as the oldest area of conventionally protected tropical forest in the world (Woodcock, 2010). The North East Tobago Management Plan describes the hydrology, ecology, vegetation, geology, biodiversity and climate of the area as distinct from the South West of the island. Briefly, the area is densely forested with increasingly precipitous topography culminating in a 575m peak above the two north-eastern most communities of Speyside and Charlotteville. The region

receives more rain than the South West. Rivers are predominantly steep and fast-flowing with few wetlands.

Of the villages in the area, three are located along the coast at the base of valleys with an adjacent beach whereas the others are somewhat inland and therefore uphill from the coast. All the villages are near the coast because the forest reserve dominates the interior of the island. Although the reserve remains largely forested, vegetation on the lower slopes and flat coastal areas reflects a legacy of 300 years of cultivation for a plantation economy followed by agriculture and increased human settlement. Agriculture declined in the last half century resulting in regrowth of large areas of secondary bush. These are sporadically burned, sometimes for small agricultural plots or grazing (EDG & Kairi Consultants, 2003).

The soil and geology are prone to landslides (Wharton, 2004) and this propensity is increased by human activity (EDG & Kairi Consultants, 2003). A local government report states that residential landslide damages "were due mainly to limited observance of building standards, with little or no engineering inputs in the design and construction of residences and roadside structures" (Kairi Consultants, 2012, p. 59).

The area encompasses globally relevant terrestrial and marine biodiversity, including an endemic amphibian species and a rookery of the critically endangered hawksbill sea turtle (*Eretmochelys imbricate*; Walker & Gibson, in press). The coastal waters host several relatively healthy Caribbean coral reef systems (van Bochove & McVee, 2012), and near-shore islands that are nesting sites for several pelagic bird species (White, 2009). Finally, the area is notable for its widely recognised, exceptional aesthetic beauty (EDG & Kairi Consultants, 2003).

In 2011, the central government of the Republic of Trinidad and Tobago undertook a national population and housing census (Central Statistical Office of Trinidad and Tobago, 2012). Data for Tobago were aggregated by seven parishes. The area described by the North East Tobago Management Plan encompasses the Parish of St. John and two villages from the Parish of St. Paul as well as largely unpopulated areas of the Parishes of St. Paul and St. Mary encompassed by the forest reserve. The census found that the Parish of St. John had roughly one quarter the population density of the island overall with 51 people per kilometer^2. The

three parishes of St. John, St. Paul and St. Mary were the least populated and least densely populated of the seven on the island. The Parish of St. John, which includes both major villages of Charlotteville and Speyside, had a census population of 2,825 (Central Statistical Office of Trinidad and Tobago, 2012). To summarise, the area is sparsely populated relative to the rest of the island and dominated by the uninhabited forest reserve.

Parish boundaries do not correspond to electoral boundaries. The Tobago House of Assembly constitutes the locally elected government that undertakes local government responsibilities as well as many of the responsibilities of a national government with the exceptions of taxing, legislating and zoning. The assembly consists of 12 elected seats and three appointed councillors. The populated coastal area of the North East Tobago Management Plan falls within the electoral area of Parlatuvier / L'Anse Fourmi / Speyside (Election and Boundaries Commission of Trinidad and Tobago, 2014). The North East Tobago Management Plan however also includes portions of three other electoral areas. For national elections, Tobago is represented through two electoral districts out of 41 in the country: Tobago West and Tobago East. The three parishes mentioned above all fall within the Tobago East district (Election and Boundaries Commission of Trinidad and Tobago, 2014). The official political and regulatory environment is consequently correspondingly nuanced.

In 2011, an initiative of the national government was assigned to the Economic Development Board of Trinidad and Tobago (2011). This initiative identified five 'economic spaces' in the country to promote economic diversification and increase the country's sustainable economic growth (Ministry of Planning and Sustainable Development of Trinidad and Tobago, 2012). One of these spaces, or 'growth poles' was North East Tobago. "In the North East region of Tobago – the area including Speyside and Charlotteville Bay – will be developed for Tourism [and] … development of the diving industry, community events, agriculture and horticulture" (Ministry of Planning and Sustainable Development of Trinidad and Tobago, 2012, p. 65). This emphasis on tourism and sustainable livelihoods corresponds with suggestions in the North East Tobago Management Plan however the area is limited to the two north-

easternmost villages and their immediate surroundings (Economic Development Board of Trinidad and Tobago, 2011).

The coastal marine environment is valued for its biodiversity and ecosystem services. These services support ecosystem-based tourism such as glass-bottom boat tours and SCUBA diving. They also support artisanal fishing livelihoods in the area (Flower, 2011). The local marine environment has inspired a series of different proposals for marine protected areas (d'Abadie, 2011; Institute of Marine Affairs, 2002; van Bochove & McVee, 2012).

Finally, members of the Speyside Eco-Marine Park Rangers (SEMPR) community group identified principally with their own village and their immediate ecological context, both terrestrial and marine. In the experiential data, group members did engage enthusiastically with island-wide initiatives. For example, they collaborated with other environmental organisations to host a booth at the well-attended annual World Food Day festival in South West Tobago in both 2010 (DB410, 20/10/2010) and 2011 (DB029, 19/10/2011). However, when discussing pressing concerns and issues (e.g., DB269, 17/09/2011; Figure 3.1), and when choosing initiatives independently of the requirements of larger projects, they focused on their own village of Speyside. For example, members used a small donation from a government agency to run a sign painting and beach cleanup activity for the local primary school to address poor solid waste disposal in the village; an issue of particular concern to them (DB412, 06/06/2012). Also, each village has a distinct identity to the extent that suggestions or initiatives from other villages are not always welcome. For example, SEMPR group members did not feel it was their place to become involved in an acrimonious dispute over a government-funded beachfront development project in the neighbouring village of Charlotteville (DB269, 17/09/2011; Charles, 2011). To summarise, North East Tobago does not constitute a clear identity or sense of place for those who live there.

This brief review of some of the diverse perspectives on the social-ecological system of North East Tobago illustrates how the area is only tenuously coherent as a social object, as a tendency of people to act in similar ways in similar circumstances, as discussed in chapter 4. Similarly, it does not unambiguously represent a clear physical object. This is expected of a

generalisation in a sustainability initiative. Although the region is often invoked in policy discussions and documents, it encompasses a multitude of sometimes conflicting concepts, facts, opinions, values and experiences. Consequently, to have meaning for sustainability initiatives the social-ecological system of North East Tobago, understood as a generalisation, must be dissolved into particular actions by particular people in particular circumstances.

7.2 The Paradox of Sustainability: Continuity & Change in North East Tobago

At its most general, the concept of sustainability invokes continuity and change. As with any social-ecological system, North East Tobago hosts intermingled patterns of both. For example, between 2010 and 2012 the ecosystems of North East Tobago were subjected to a series of perturbations. In early 2010, Tobago suffered a severe drought (Castillo, 2011). "The drought of 2010 remains one of the harshest in recent times in the memories of Tobagonians and Trinidadians" (Kairi Consultants, 2012b, p. 58). The drought was accompanied by extensive bush fires. As reported in a local newspaper describing North East Tobago: "In one remote area fires raged for five days in the hills of Charlotteville destroying hundreds of acres of forest, gardens, wildlife and all flora and fauna in their path" (Staff, 2011, p.1). Bush fires led to a change in vegetation, increasing the amount of secondary bush which is more amenable to conversion, often unregulated, to agriculture or grazing. It is also more susceptible to landslides with heavy rain on the precipitous slopes (EDG & Kairi Consultants, 2003). As one practitioner explained: "People get away with a lot of things in the watershed; the tragedy of the commons. People just do what they have to do. We have been seeing the impacts of that within recent years" (Interview, 11/11/2010).

The heat of the dry season culminated in a severe bleaching event on the local coral reefs in October of 2010 (Alemu I & Clement, 2014). The bleaching event was accompanied by heat-induced necrosis of sponges, which comprise much of the three-dimensional structure of local reefs (van Bochove & McVee, 2012). Unlike disease and mortality in corals with calcareous skeletons, sponge mortality leaves no lasting trace. Sponges dissolve completely. The consequences for the reef ecosystem were unclear. The bleaching event was followed by an intensive and protracted rainy season that began with an inundation of North East Tobago by

feeder bands from Tropical Storm Tomas (Staff, 2010). As explained in a government report, "in 2010, Tobago was impacted by Tropical Storm Tomas incurring losses of approximately TT$4,231,592. Approximately TT$2,932,957 of this cost was due to clearing landslides and removal of debris" (Kairi Consultants, 2012b, p. 58). This and subsequent ongoing precipitation combined with exposed land from fires resulted in landslides. Continuing with the above report: "There was a rapid growth in the number of residential landslides, increasing from 33 reports in 2008-2009 to 61 reports in 2009-2010" (Kairi Consultants, 2012b, p. 59). It also resulted in extensive, sustained sedimentation that negatively impacted local coral reefs recovering from the bleaching event (van Bochove & McVee, 2012).

From June to September 2011, unprecedented amounts of sargassum (*Sargassum spp.*) washed up on beaches in North East Tobago, as well as on other islands in the Caribbean, causing concerns for tourism that relies on local beaches (Higgins, 2011). This was attributed to strong currents and heavy storms in the region affecting the Sargasso Sea (Institute of Marine Affairs, 2011). The effects on the ecosystem, positive or negative, remain unknown. In early 2012, the first lionfish (*Pterois volitans*) was observed in Tobago at the south end of the island (Boodram, 2012). This invasive reef predator has since become a common site for divers at the North East end of the island. The effects on the marine ecosystem, though presumably negative, remain unquantified.

In spite of these perturbations, the ecosystems of North East Tobago are still considered relatively pristine, representing a pattern of continuity (EDG & Kairi, 2003). In the vocabulary of resilience, although the resilience of the ecosystems may have eroded, the systems have not yet obviously tipped into an alternate basin of attraction (Walker et al., 2004). Quoting from a practitioner:

> We have a wealth of natural amenities, attractions and the services they provide; the oldest protected rainforest on record. Also, it's a condensed package of resources, to go from the reef to the rainforest. We have a relatively rich biodiversity as well, having some association with the South American continent. (Interview, 11/11/2010)

This sense of continuity is evidenced by ongoing efforts to conserve the region's ecosystems through various forms of protection including the Main Ridge Forest Reserve, and proposed marine protected areas (e.g., van Bochove & McVee, 2012).

In the social and economic domains, the period of 2010 to 2012 involved some significant patterns of change. For example, a change of national government in May of 2010 resulted in tensions associated with Tobago's governance and ongoing negotiations for increased autonomy. As expressed in a local government report: "There have been a number of areas of tension over the last two years, as a new administration in the Central Government has sought to define its roles and responsibilities in respect of Tobago" (Kairi Consultants, 2012b, p. 66). At the time, the implications of the change in government for those implementing sustainability initiatives in North East Tobago were not clear (Interview, 11/11/2010).

The island also experienced an ongoing decline in tourism, a significant sector of the local economy. As expressed in the same report: "The economy of Tobago was affected by precipitous decline in tourist arrivals over the period 2006-2010" associated to some degree with the 2008 global economic downturn (Kairi Consultants, 2012b, p. 37). Tobago also experienced the effects of an increasing national violent crime rate (Chawla et al., 2011). Returning to the local government report:

> The total number of serious crimes was quite high - 1,016 per year on average for the period 2006-2010. Inevitably, this has hurt the image of Tobago, already burdened by notoriety that the country Trinidad and Tobago has attracted because of the high rates of murder and violence. (Kairi Consultants, 2012b, p. 54)

The crime rate, combined with a low detection rate (Kairi Consultants, 2012b) affected the tourist industry (Saridakis et al., 2013), and also the sense of security of locals, evidenced by its prioritisation in the local government's current development plan (Kairi Consultants, 2012b).

As with the region's ecosystems however, in spite of these patterns of change, social and economic attributes of local human circumstances showed remarkable continuity. For example, the Tobago House of Assembly is financed principally through an annual entitlement from the central government of between 4 and 5% of the annual national budget (Kairi

Consultants, 2012b). The Tobago House of Assembly is also the principal employer and the principal sector in the local economy. As expressed in a government report:

> With its deceleration in the last half of the last decade, the economy of Tobago has been driven more directly by non-tradables, among which the public services of the THA have been the most significant.... With the THA becoming the prime employer and the source of income for many, its expenditure on goods and services has become the source of the most important flows within the economy of Tobago. (Kairi Consultants, 2012b, p. 32)

This contributed to a pattern of economic and social continuity from 2010 to 2012. Similarly, Tobago has experienced a period of political continuity, with the same party forming the government locally since 2001.

To summarise, the social-ecological system of North East Tobago from 2010 to 2012 exhibited interwoven patterns of continuity and change, the effects of which were often unclear to those immersed in the system at the time. In the vocabulary of paradox, these patterns are not inherently meaningful. They are not the same no matter who is observing them. However, they can be given meaning by resolving towards paradox and/or dissolving towards action in particular circumstances. Patterns of continuity and change only become meaningful when, as Rorty advised, "we give substance to our purposes" (Ramberg, 2009, p. 11).

7.3 What Should Continue & Change: Sustainable Development

In chapter 6 I proposed that, in the vocabulary of paradox, sustainable development can be understood as desired continuity through desired change. This invokes what is valued in human circumstances. What should continue? What should change?

In a series of comprehensive economic development plans (Kairi Consultants, 2006; 2012a), the local Tobago House of Assembly government has articulated patterns of desired continuity and desired change. These have been structured around branding the island as 'Clean, Green, Safe and Serene' (Kairi, 2012a). As with many sustainable development goals, these are largely utopian: good governance and institutional reform, business development and entrepreneurship, human capital development, social development and resilience, improved

infrastructure and utilities, enhanced safety and security, and environmental sustainability (Kairi Consultants, 2012a). Terms such as 'reform', 'development', 'improvement' and 'enhancement' speak to desired change. The terms 'sustainability' and 'resilience' speak to desired continuity. Although the plans and an associated review (Kairi Consultants, 2012b) include frank assessments of challenges and barriers to implementation, the proposed priority areas are non-controversial in their generality.

The slogan 'Clean Green Safe and Serene' itself speaks to an aspirational narrative of continuity. There is an implication that it describes how Tobago has been and how Tobago should continue to be. Woodcock (2010) undertakes a rigorous assessment of this narrative associated with Tobago's branding process. He proposes that it is a manifestation of a particular view of Tobago that is interpreted in a wide variety of ways by particular people in particular circumstances. This parallels the process of dissolving proposed in the vocabulary of paradox. Aspirational patterns of continuity and change must pass through Stacey's (2009) conflictual particularising of generalisations, discussed in more detail in chapter 8.

SEMPR group members were remarkably fluent, congruent and consistent in their articulation of what should continue and change in their social-ecological circumstances. For example when they reassessed their vision and goals after two eventful years, they unanimously reconfirmed their commitment to the purpose and goals of their constitution (DB268, 16/09/2011). "The purpose of the Speyside Eco-Marine Park Rangers is to provide an opportunity for the Speyside community to address the environmental needs and concerns of Speyside and Tobago at large" (DB268, 16/09/2011). They believe that "Speyside people are good people, [that] Speyside's environment deserves a chance [and that] God has given us a gift and it is our duty to take care of it" (DB268, 16/09/2011).

Similarly, as part of the 'My Island, My Community' project, a team of experts had compiled a list of environmental, health and social issues that affect Caribbean islands (DB023, 21/06/2010). For the project, the SEMPR group was required to prioritise the list for Tobago and their area. At a workshop meeting, group members had no difficulty prioritising these issues for their social-ecological circumstances (DB023, 21/06/2010).

In the vocabulary of paradox, ideals bear paradoxical tension. Applied to sustainability, because continuity and change are mutually inclusive it is paradoxical to seek desired continuity and desired change in human circumstances. Aspirational visions must be dissolved towards action and experience to have meaning. As Harper and Stein explain: "participants frequently exhaust their time and energies on preparation of vision and mission statements that are often too general, too abstract, or too ambiguous to be of much practical value" (2006, p. 142). In the vocabulary of paradox, dissolving involves invoking another theme in a paradoxical concept of sustainability, namely understanding. What does continue and change?

7.4 What Does Continue & Change

As discussed in chapter 6, much of the discourse on sustainability and resilience addresses making sense of human circumstances. This is often associated with what I have called the cartography of crisis, the quantification of patterns of worrying change in human circumstances. Sustainability and resilience initiatives require coherent accounts of what is continuing and changing across scales in human circumstances. Panarchy and the adaptive cycle from resilience thinking, for example, provide a framework to help structure such patterns (Westley et al., 2013).

In North East Tobago from 2010 to 2012, patterns of continuity and change in the coral reef ecosystem were quantified by several ongoing monitoring initiatives (Alemu I & Clement, 2014; van Bochove & McVee, 2012). Quantification of sea turtle nesting also took place (Walker & Gibson, in press), as did the population and housing census of 2011 (Central Statistical Office of Trinidad and Tobago, 2012). Critically however, the results of the majority of these initiatives were not available to the SEMPR group except anecdotally through interactions with those who were conducting them. Further, the reported trends largely confirmed the ongoing experience and expectations of group members. Examples of trends were: fewer fish and a degrading marine environment (van Bochove & McVee, 2012), coral bleaching (Alemu I & Clement, 2014) and sea turtle poaching (Walker & Gibson, in press). Other likely important attributes of human circumstances, such as patterns in coastal water quality, remained unknown.

There is no question that knowing more about attributes of human circumstances can inform effective implementation. For example, as mentioned above, a Caribbean-wide assessment of environmental, health and social indicators informed the 'My Island, My Community' project (DB023, 21/06/2010). Similarly, a list of the highest conservation value coral reefs in the area will likely be helpful should a marine protected area be implemented (van Bochove & McVee, 2012). However, such information cannot eliminate uncertainty in a fluid and immersive implementation environment. Returning to Stacey (2009), researchers and practitioners must 'act into the unknown'. Put another way, the SEMPR group did not see a lack of clarity about trends of concern as an impediment to implementation. The majority of their effort was directed towards logistics, reporting, networking, team dynamics, strategy and training.

7.5 What Can Continue & Change: Dissolving Into Action

In the vocabulary of paradox, as values and understanding are integrated, they become muddled. Not all values are shared or understood ahead of time. For example, although many Tobagonians identify with the slogan 'Clean Green Safe and Serene' for the island, the interpretation of what it means in practice, the conflictual particularisation of the generality, leads to substantial conflict (Woodcock, 2010). This transpired in North East Tobago where a local government initiative to redevelop the Charlotteville village waterfront resulted in a passionately acrimonious dispute amongst villagers and with the local government over what 'Clean Green Safe and Serene' means for the village (Charles, 2011).

Similarly, although general patterns such as climate change may be clear, their specific implications for the village of Speyside were both unexpected and unclear. Examples were the sudden and for several months unexplained appearance of large quantities of sargassum on local beaches (Institute of Marine Affairs, 2011) and unexpected sponge necrosis during the coral bleaching event (van Bochove & McVee, 2012). The implications of clear social patterns for the village of Speyside were similarly unclear, such as the change in national government (Rampersad, 2010). Although patterns may be clear, much is unknown and circumstances are

dynamic. *Ceteris paribus* does not apply. In the vocabulary of paradox, this is the muddled middle.

This leads to the theme of agency in the muddled middle of sustainability. What can be influenced to continue and change? For SEMPR group members it was not clear what these events meant for their ability to collectively influence their circumstances. In practice, their actions were largely guided by the requirements of their major funded 'My Island, My Community' project. These included conducting specified activities such as putting up advertising banners around Tobago for the radio edutainment drama (DB413, 15/12/2011). The project also required rigorous financial monitoring and reporting which took a lot of time. I discuss this in more detail below. Working within and around these obligations to the project, group members undertook actions to build their small organisation such as team-building workshops (e.g., DB101, 06/09/2010) and regular meetings (e.g., DB120, 12/10/2010). They also undertook opportunistic small-scale local activities such as beach cleanups, and participated when possible in the initiatives of other organisations (e.g., Alkins & Mason-Alkins, 2012; Caribbean Natural Resources Institute, 2011). SEMPR group members' experience of intermingled values, understanding and agency was not a clearly linear, intentional process of strategic actions and assessments. It was a fluid and immersive experience of uncertainty and conviction.

In this context of intermingled values, understanding and agency, from 2010 to 2012 the SEMPR group did undertake a series of activities. These included several days supporting a local young adult summer camp (DB248, 08/08/2011), a series of beach cleanups on the local beach (e.g., DB097, 21/08/2010; DB281, 01/10/2011), a primary school outreach programme that included a beach cleanup, an educational lecture and painting a mural on the wall of the local primary school (DB370, 08/06/2012), running a booth at an annual festival (DB029, 19/10/2011), and organising a group for the 2011 Tobago Carnival celebration (DB178, 08/03/2011).

Although each of these events was documented with photos and some quantitative assessments such as expenses or the number of individuals participating, the implications for

sustainability or resilience in North East Tobago were not clear. These activities took on meaning relative to sustainability in North East Tobago only when they were related to other perspectives, to other experiences and to wider patterns, and when they were structured into frameworks. In the vocabulary of paradox, this is the activity of resolving.

7.6 Resolving: Back into the Muddle

In North East Tobago, resolving took place in several ways. First, SEMPR group members gave meaning to their experiences through ongoing discussion. Such discussions took place in structured meetings (e.g., DB184, 19/03/2011) and through appreciative inquiry exercises at dedicated workshops (e.g., DB268, 16/09/2011). However, they also took place informally, for example in the course of phone calls and while undertaking other activities such as organising the group's financial accounts (e.g., DB031, 04/02/2012). In chapter 6, I proposed applying Wittgenstein's concept of family resemblance to the praxis of sustainability. In this view, praxis involves weaving together ongoing experience, values and understanding into an ongoing narrative about the group and its circumstances. Paraphrasing Stacey (2009), this helps to identify what is ordinary and what is exceptional in the group's continuing experience. This ongoing discussion helped to create a narrative of continuity through change that made some sense of group members' own experiences and of their social-ecological circumstances. It was a form of resolving. In chapter 10 I propose a role for a researcher or practitioner to explicitly support this kind of praxis in groups implementing sustainability or resilience initiatives.

Resolving also took place in North East Tobago through financial and project reporting, particularly associated with the 'My Island, My Community' project. This was a second way practitioners made sense of their social-ecological circumstances. Given the small size of the SEMPR group and members' limited training and experience with such accounting this requirement took an extraordinary amount of group members' voluntary time and effort, even with support from mentors. Financial reporting was such a significant undertaking that one member identified it as one of the group's achievements of which he was most proud. "[I am] proud of the group accounting. It's a success. It's plenty of work and we need; if we could get some more training" (DB268, 16/09/2011). Financial reports made sense of what activities had

transpired by means of quantifying and demonstrating expenditures. Similarly, project reports summarised the activities and experiences of practitioners, drawing on actions, as well as values and understanding (e.g., Armstrong, 2012).

A third form of resolving took place when SEMPR group members applied their experience to other initiatives. For example, a regionally active non-government organisation, the Caribbean Natural Resources Institute, undertook a series of consultations in Speyside between 2010 and 2012 to identify and prioritise opportunities for sustainable livelihoods (Caribbean Natural Resources Institute, 2011). In these consultations, SEMPR group members resolved their interwoven experience, values and understanding by applying them to the potential for, for example, a centralised booking system for eco-tourism opportunities in and around Speyside (Caribbean Natural Resources Institute, 2011). Similarly, SEMPR group members took part in training, workshops and activities of the North East Sea Turtles Tobago community-based organisation that was implementing a concurrent sea turtle conservation and sustainable livelihoods initiative based in the neighbouring village of Charlotteville (Alkins & Mason-Alkins, 2012). SEMPR group members resolved their interwoven experience, values and understanding by applying them to the challenges and opportunities of that group and initiative (e.g., DB409, 14/04/2012).

Finally, the muddled middle of actions, understanding and values from North East Tobago was resolved further towards paradox through several studies. These connected the circumstances and experiences from North East Tobago to wider frameworks, values and patterns. One example is Syne (2011), who examined the implications of the collaboration between a funder and the SEMPR group for such funding relationships more generally. Another example is this thesis.

In the vocabulary of paradox, the broader the resolution, the more paradoxical tension it bears relative to unique, specific human circumstances. As discussed in chapters 3 to 6, for sustainability and resilience initiatives, such resolving leads ultimately to a concise paradox of continuity through change.

7.7 Implementation & Agency

In chapter 6, I proposed that sustainability and resilience represent a paradoxical desire for both continuity and change in human circumstances. I proposed that the tension resolved in that paradox could be dissolved into particular actions by particular individuals in particular circumstances. In this chapter, I have provided some examples of what paradoxical tension means in praxis and of how it can be understood to dissolve and resolve.

The purpose of this thesis is to address the implementation gap and propose a role to support sustainability and resilience praxis. Implementation necessarily requires actions by an individual or small group. It requires a grammatical 'first person'. Any exploration of implementation should therefore address the question of agency – the capacity of individuals and small groups to intentionally influence their circumstances. In the remainder of the thesis I explore the implications of the vocabulary of paradox for agency in sustainability and resilience initiatives and propose a role for reflective practitioners and practical researchers to support such agency.

Chapter 8: The Paradox of People: Together & Apart

Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has.

- Margaret Meade (attributed in Sommers & Dineen, 1984, p. 158)

As long as we have each other, we'll never run out of problems.

- Despair.com

In chapters 3 to 5 of this thesis I presented the vocabulary of paradox, an attempt to replace the sense of a gap in the implementation of sustainability with a muddled middle of inspirational uncertainty articulated as tension. In chapters 6 and 7, I proposed that sustainability can be understood most generally as a paradoxical desire for continuity and change in human circumstances. When it is particularised, this paradox dissolves into a muddled middle of intermingled values, understanding and agency. Praxis is the process of resolving the muddle of tension towards the clarity of theory and dissolving it towards the clarity of action, engaging in actionable thought and thoughtful action (Figure 5.1).

The process of praxis, of dissolving and resolving, of knowing and doing, is a human one. Implementing sustainability and resilience initiatives requires action and reflection by particular people in particular places. It is a 'first person' activity that requires an 'I' or a 'we'. In the remainder of the thesis, I use the vocabulary of paradox and related concepts to explore the scope for agency of individuals and small groups implementing sustainability or resilience initiatives.

Since praxis is a human activity, it requires a coherent account of human behaviour. In chapter 3, I briefly introduced Stacey's (2009) theory of *complex responsive processes* (CRP) and the constituent concepts of abstracting and immersing. In this chapter, I draw on CRP in more detail. CRP provides a coherent, paradoxical process by which everyday local interactions both create and are shaped by wider patterns of human behaviour. It also points to what I call a *paradox of people* whereby people, through continuous local interaction, both enable and

constrain each other. Stacey's CRP represents a substantial body of work with significant implications for the theory and practice of organisational leadership and management. There is substantial scope to further explore its implications for the praxis of sustainability. For the purposes of this thesis, CRP provides an explicitly paradoxical account of human behaviour that is continuous from the particular to the general. This in turn synergises with the vocabulary of paradox for sustainability.

8.1 Sustainability, Resilience & People

The international discourse on sustainability and resilience is largely concerned with patterns of human behaviour. For example, referring to the field of conservation, Balmford and Cowling state that it "is primarily not about biology but about people and the choices they make" (2006, p.692). Large-scale patterns of human behaviour are having a substantial destabilising impact on global environmental processes and their capacity to sustain what Rockström et al. (2009) call a 'safe operating space' for humanity. The influence of human behaviour on the global environment is so extensive that a new geological era, the antrhopocene, has been proposed which explicitly acknowledges it (Crutzen & Stoermer, 2000). Climate change is one example of an earth system that is influenced by human behaviour (Intergovernmental Pannell on Climate Change, 2013), but other systems, notably biodiversity, are also at risk of crossing planetary boundaries (Rockström et al., 2009). Large-scale patterns of human behaviour likewise both constitute and influence the social and economic dimensions of sustainability and resilience (Boström, 2012; Murphy, 2012). These include unsustainable consumption, energy dependence and urbanization (United Nations Department of Economic and Social Affairs, 2013).

These large-scale patterns of human behaviour have predominantly negative connotations, quantified by the cartography of crisis (e.g., United Nations Department of Economic and Social Affairs, 2013). The aspirational nature of the international sustainability discourse however leads to a concern with alternative patterns of human behaviour that could alleviate such problematic trends. These are associated with concepts such as happiness and a green economy (Helliwell et al., 2013; United Nations General Assembly, 2012). The resilience discourse notably promotes the capacity of humanity to undertake behaviours that allow

adaptation to unexpected change, termed ‘adaptive capacity’ (Brown & Westaway, 2011). In this sense, patterns of human behaviour become an end or a goal, something to be achieved.

Such aspirations for large-scale patterns of sustainable human behaviour are reflected in the discourse at the scale of implementation where individuals and small groups are encouraged to engage in activities such as cooperation (Ziegler & Ott, 2012), collaboration (Kofinas, 2009), innovation (Westley et al., 2011), or change agentry (AtKisson, 2010). In this context, localized patterns of human behaviour become means; the tools by which sustainability can be achieved.

Conversely, some of the major challenges encountered by individuals and groups implementing sustainability initiatives are localized patterns of human behaviour in the form of entrenched ideologies, conflicting legitimate interests in the context of a pluralistic society, intractable conflict, or protracted negotiation (Forester, 2006; Goldstein, 2010; Redpath et al., 2013). In such circumstances, patterns of localized human behaviour and the patterns of behaviour of specific, individual humans, become problems or challenges. As one practitioner explained:

> To me … the fundamental problem in terms of this whole drive and campaign for sustainability, the root of the problem is human selfishness and human greed. For example, if we change to some other form of energy, we might have some little softening of the problem of climate change but some other problem will arise because the basic approach to the world is still there. That's why I often focus more on the person and on the attitude than on the environment in itself. (Interview, 11/11/2010)

CRP provides a coherent account of patterns of human behaviour that emphasises the importance of everyday local interactions and the paradoxical interrelationship they have with wider patterns of human behaviour. In this way, it helps to structure discussions about the processes of praxis for sustainability and resilience.

8.2 Complex Responsive Processes

Over the last decade and a half Stacey (2009) and colleagues have developed an account of the lived experience of individuals working in organisations drawing on the complexity sciences

combined with process sociology and philosophy. Stacey uses this account to articulate and value a reasonable approach to organisational management and leadership. He uses the complexity sciences as a source domain for analogies which he then interprets using concepts from philosophy, sociology and psychology (Stacey, 2009).

Stacey's approach stems from the straight-forward premise that "People in organizations accomplish whatever it is that they accomplish through continually interacting with a relatively small number of others" (2009, p. 160). He calls this the experience of *everyday local interaction*. Interaction is:

> 'everyday' simply because it is what we are doing all the time, and it is local in the sense that we can only do anything in a specific place, at a specific time, with specific people dealing with each other on the basis of our and their life experiences in an evolving community. (Stacey 2009, p. 24)

For example, the experiential data from North East Tobago reflects my regular interaction with members of the SEMPR community group and other groups in the area over nearly two and a half years. We undertook initiatives such as beach cleanups (e.g., DB281, 01/10/2011) and school programmes (e.g., DB412, 06/06/2012), tracked and reported on expenses (e.g., DB267, 10/09/2011), discussed team dynamics and morale (e.g., DB372, 10/06/2012), and discussed strategies for the group to have a greater impact (e.g., DB061, 28/06/2010). This took place through everyday local interaction, predominantly face-to-face conversations with some phone calls, phone texts and, less frequently, emails and voice-over-internet meetings.

In Stacey's CRP, the term *complex* invokes models from the complexity sciences, particularly complex adaptive systems. He argues that everyday local interaction is analogous to self-organisation in complex adaptive systems (Stacey 2009). Self-organisation refers to the ongoing local interaction of individual agents in complex adaptive systems according to evolved local principles where no single agent or group of agents determines the interaction principles of others. When large numbers of agents interact in such a model, coherent patterns of interaction emerge across the population. "Creative-destructive, evolving and repetitively

stuck, surprising and familiar, predictable and unpredictable patterns emerge across a population of agents because of what all the agents are doing and not doing in their local interactions" (Stacey, 2009, p. 65). Critically, such patterns are independent of fixed laws or coordination. The patterns that emerge from this interplay of individual intentions cannot be precisely predicted ahead of time. Such models take on a life of their own (Stacey, 2009).

In chapter 3, I illustrated self-organisation with the example of schooling fish. However here we are concerned with patterns of human behaviour so I will use a human example that was also introduced in chapter 3. In explaining metaphorical tension, I discussed how members of the SEMPR community group sometimes had difficulties organising meetings. In the terms of CRP, meetings are everyday local interactions in a specific place, for example the Speyside community centre, at a specific time, for example 16:30, with specific people, for example the four group members who were able to attend the meeting (DB061, 28/06/2010). I have attendance numbers for 47 of the 50 SEMPR group meetings I recorded. Attendance at meetings varied widely, from two to nine people with a median of five people. This variation demonstrates how no single agent controlled the interaction principles of others. No group member could compel others to attend. However, out of this variation a coherent pattern of consistent meetings over two and a half years emerged that constituted the community group itself. If individuals ceased to meet, the group would cease to be. The group was a coherent pattern of everyday local interactions between members. Returning to Stacey's quote, the SEMPR group occurs "because of what all the agents are doing and not doing in their local interactions" (2009, p. 65).

Responsive refers to the interdependence of individual agents through local interactions. Individual agents continually interact and in so doing, both constrain and enable each other. As Stacey expresses it: "Since I need others, I cannot do whatever I please; and since they need me, neither can they. We constrain each other at the same time as enabling each other" (Stacey, 2009, p. 181). This suggests an interpretation of humans as inherently social. Continuing with the example of the SEMPR community group, the group was defined by the presence, interaction and absence of group members. No one member constituted the

group, and even in cases where one member or another was shouldering much of the effort (e.g., DB380, 21/06/2012), that member's actions in the context of the group were partly defined by the absence of others who were not there, for example to assist with a community activity (e.g., DB414, 11/08/2012).

Processes refers to the ongoing nature of these interactions. Interaction is the medium through which complex adaptive systems function. Processes are both repetitive and infinitely nuanced in that each interaction between interrelated agents bears the potential for variation on a generalised pattern. As discussed in chapter 3, the property of non-linearity in complex adaptive systems means that this variation can scale up to become a new generalised pattern. Stacey calls this potential for variation in individual interactions *transformative causality* (Stacey 2009). It yields patterns of regular irregularity and predictable unpredictability (Stacey 2009). Returning to the SEMPR group meetings, each meeting is a repetition, however the interactions at any given meeting could vary from the pattern. For example, at a meeting group members could decide to undertake a new project (e.g., DB405, 10/08/2012). This variation on the pattern of previous meetings thereby launches a new generalised pattern, the implementation of that project, such as teaching some of the local children how to use a snorkel and mask (DB414, 11/08/2012).

Stacey (2009) argues that these characteristics of complex adaptive systems resonate with the lived experience of individuals in organisations. He explores the implications of these concepts for patterns of human behaviour in organisations by drawing on concepts from pragmatist and process philosophy and sociology, particularly the work of Mead and Elias (Stacey, 2012).

8.3 Complex Responsive Processes & Communicative Interaction

CRP holds that humans function in a medium of everyday local interactions. Through this continuous interaction people both enable and constrain each other and are therefore interdependent. This is an aspect of the responsive component of CRP. Stacey (2009) holds that much of this interacting involves communicating. He draws on Mead's *conversation of gestures*

to articulate a theory of *communicative interaction*. He discusses how meaning in communication emerges from the interaction of a gesture and response as a *social act*, where each party has the intersubjective capacity to intuit the potential responses of the other. This allows people to 'know' what they are doing. The repertoire of expected potential responses reflects an individual's experience and his or her understanding of collective societal expectations, termed the *generalised other*. "It is through ongoing history that people develop some capacity to predict the potential consequences of their gestures to others, and it is through history that people learn to take the attitude of the generalized other" (Stacey, 2009, p. 148). In this way, social acts of meaning making are patterned in narrative-like ways by both specific and general expectations. "Life on this view is an ongoing, richly connected multiplicity of stories and propositional frameworks" (Stacey, 2009, p. 154).

A simple example here continues with the SEMPR community group. At the request of the group at a meeting (e.g., DB191, 05/05/2011), I announced the time and place of the next meeting by phone text (e.g., DB202, 24/05/2011), which constituted a gesture. I had a specific expectation based on past experience as to how each group member might respond. Each member in turn had an expectation of my behaviour based on their past experience with me as to whether I would attend. We all, also, had an expectation about the importance of attendance based on the collective societal expectation that the SEMPR group should be active. This societal expectation is what Stacey calls the 'generalised other'. Members in turn responded to my text with a text and/or by attending the next meeting (e.g., DB202, 24/05/2011). Attendance at the meeting was a manifestation of the meaning of the social act that emerged from my gesture and group members' responses. Meaning emerged from the interaction of the gesture and responses as a social act which both reflected and contributed to the narrative of the SEMPR group as a small, dynamic community-based organisation.

Every social act is unique and holds the potential for novelty as a variation on narrative-like patterns. Drawing on the property of non-linearity from the complexity sciences discussed in chapter 3, any such social act can be the initiation of a new pattern. The narrative of the

SEMPR group as a small, dynamic local group could change to one of the SEMPR group as a struggling organisation.

Paradoxically therefore, each social act is at the same time constrained by expectations as an iteration of historical patterns and is also a potential spontaneous initiation of a novel pattern.

> Conversational themes do not emerge out of nowhere but are iterated and potentially transformed in the very actions of communication; and what is being reproduced, each time with unique variations, is themes that have emerged in the previous history of each individual, in the previous history of the grouping they currently find themselves in, and in the wider communities and societies they are part of. (Stacey, 2009, p. 184)

Critically for the vocabulary of paradox, Stacey's (2009) account of communicative interaction is an explicitly paradoxical account of how humans communicate to make sense of their circumstances. Shared generalities are repeatedly iterated in narrative-like patterns which paradoxically both constrain and are created by novel, local social acts of meaning-making.

8.4 Complex Responsive Processes & Praxis: Knowing & Doing

CRP is useful for articulating the processes by which metaphorical tension resolves and dissolves through the muddled middle. It helps to make sense of the paradox of praxis.

8.4.1 A Continuous Process

In the vocabulary of paradox, the implementation gap for sustainability and resilience is understood as a continuum of metaphorical tension between clear but paradoxical ideas and clear but meaningless action. Dissolving the implementation gap involves discussing how the substantively important but paradoxical frameworks of sustainability and resilience are particularised into unique circumstances.

The metaphor of dissolving suggests a continuous process whereby metaphorical tension is reduced by interpreting a generalisation relative to an increasingly specific context of interest. In chapter 7, I used the example of sustainability in North East Tobago to demonstrate how such dissolving could occur. CRP provides detailed insight into the process of dissolving.

Critically, the theory posits no processes beyond everyday local interaction and the associated *politics of everyday life*. "From a responsive processes point of view there are not levels of operation, only degrees of detail in which the phenomenon of interest is examined" (Stacey, 2009, p. 133). It is an account of human behaviour that is continuous from the local to the global, from the particular to the general, and from the subjective to the objective.

For example, in this view, a marine protected area can be described, considered and prescribed (e.g., van Bochove & McVee, 2012). However, the boundaries of the area are not boundaries in the way a wall is a physical barrier. They are the generalised tendency of many individuals to act or not act in some ways on one side of the boundary and in other ways on the other side. They represent many everyday local interactions. As Stacey explains: "The general is only to be found in the experience of the particular – it has no existence outside of it" (2009, p. 167).

8.4.2 The Importance of Everyday Local Interactions

This leads to a second important implication of CRP for the process of praxis. It emphasises the importance of everyday local interactions and their associated vocabulary, the politics of everyday life. This involves concepts such as trust, betrayal, passion, hope, coercion, or disappointment; the rich and nuanced lived experience of implementation (Fisher & Shapiro, 2005). These concepts and their associated vocabularies are often masked when abstractions are treated as concrete. In the words of a practitioner: "Change doesn't happen through political statements or policy. It happens through people on the ground, exchanging with each other and meeting each other and building trust" (Interview, 18/10/2011).

Stacey (2009) makes sense of this masking using Mead's concept of a social object. According to Stacey (2009), abstractions, understood as generalised tendencies of many people to act in similar ways in similar circumstances, are often treated as real physical objects. This is what Whitehead (1925) called the *fallacy of misplaced concreteness*, introduced in chapter 4. It is a fallacy because it involves treating aggregated tendencies as 'things', and in so doing, ignores the processes of everyday local interaction through which such social objects are particularised.

The boundaries of a marine protected area, for example, depend on many individual decisions to act or not to act made by many different individuals in similar but nonetheless infinitely unique circumstances. Likewise the SEMPR group is not a 'thing' in the sense of a physical object but is instead the aggregated everyday local interactions of group members. The group reflects its members' passions, frustrations, experience, knowledge and beliefs. Stacey (2009) argues that the intimate details of everyday local interactions are critical to working with and making sense of any wider patterns of human behaviour. Although social objects are important, the human processes by which they are resolved and dissolved are also important.

8.4.3 The Importance of Confusion & Conflict

In the vocabulary of paradox, the muddled middle is a space of intermingled metaphorical and conventional tension. This tension manifests as confusion, misunderstanding, conflict and frustration. As discussed in chapter 5, it is this lack of clarity that motivates an ongoing search for meaning. Clarity comes in theory and in action, but each requires the other for meaning, invoking the tension and muddle in between (Figure 5.1).

CRP articulates this tension as well. In CRP, variation, creativity and conflict are critical elements of immersing or particularising, as discussed in chapter 4. Immersion involves variation and novelty. An abstraction is taken up in a different way every time it is particularised. "Individuals act in relation to that which is common to all of them (generalizing) but responded to somewhat differently by each of them in each situation in each present period (particularizing)" (Stacey, 2009, p. 163). Put simply, there are as many responses as there are people.

It is in this particularisation that creativity can create novelty, a new variation on the generality. "The process of particularizing is essentially reflective, reflexive and quite possibly imaginative and spontaneous" (Stacey, 2009, p. 167). Stacey goes on to say: "If humans simply applied generalizations and idealizations in their interactions with each other then there would be no possibility of individual imagination and spontaneity and hence no possibility of creativity" (2009, p.167).

Such variation and creativity is intimately related to conflict. The processes of immersing or particularizing are necessarily conflictual (Stacey, 2009). Interpreting an abstraction into a particular context will involve choices. Different people and groups of people will have different interests and will consequently press for, or make, different choices. This will result in negotiation and raise issues of power and trust. I treat this issue in more detail in the next section.

As an example, dissatisfaction on the part of fishermen with a no fishing zone in a marine protected area might lead to negotiation for a schedule of rotating use. "It is in the essentially conflictual particularizing of the generalizations and idealizations, which have emerged over long periods of human interaction, that socially constructed, interdependent individuals display spontaneity, reflection, reflexivity, imagination and creativity as well as conflict" (Stacey, 2009, p. 167).

8.4.4 Emergence & Control

Finally, returning to the complexity sciences, CRP invokes the property of emergence of complex adaptive systems. Generalised patterns of human behaviour can emerge from many everyday local interactions independently of the intentions of any individual or group of individuals. There is no centralised control.

> Individuals can plan their own actions but they are always in relationship with each other in a group or power figuration and none of them can plan the actions of others and so no one can plan the interplay of plans and actions. (Stacey, 2009, p. 142)

This has important implications for a concept of human agency which I discuss in more detail in chapter 9.

To summarise, CRP provides insights into the processes of human behaviour, interaction and communication by which tension resolves and dissolves in the muddled middle. There is extensive scope to further explore these ideas relative to the implementation of sustainability and resilience. Critically, all four points about generalising and particularising emphasise the interdependence of people. In the following section, I expand on Stacey's (2009) CRP to

propose a third paradox that helps make sense of the implementation of sustainability and resilience.

8.5 Complex Responsive Processes & People: Together & Apart

Stacey argues that much of what humans achieve is through interaction, including communication. He further argues that such interaction invokes issues of power. Returning to the quote used above he concludes: “Since I need others, I cannot do whatever I please; and since they need me, neither can they. We are constraining each other at the same time as enabling each other, and it is this paradoxical activity that constitutes power” (Stacey, 2009, p. 181). Since need and constraint are rarely equal, he sees power in every act of human relating. Here, I expand on Stacey’s theory by looking to the related concept of trust.

In their critique of contemporary planning, Harper and Stein (2006) draw on Wittgenstein and Davidson to argue that trust is also essential to every act of human relating. As Davidson explains regarding his principle of charity in communication; “Charity is forced on us; whether we like it or not, if we want to understand others, we must count them right in most matters” (1973, p. 19). Harper and Stein (2006) argue that as opposed to focusing on power alone, human relating involves intermingled vocabularies of both power and trust. Kahane (2010) has developed a similar perspective. He draws on Tillich’s definitions of power and love as the drive of living things to, respectively, individual realization and unity (Kahane, 2010). In Kahane’s analysis, each has a generative and degenerative side and each requires the other. “Love is what makes power generative instead of degenerative. Power is what makes love generative instead of degenerative.… In order for each to achieve its full potential, it needs the other” (Kahane, 2010, p. 7). Although Kahane does not refer to paradox, this is a paradoxical articulation of the relationship between power and love, or power and trust, in humans relating. For the praxis of sustainability, in the vocabulary of paradox, human agency is bound in a paradox of intermingled power and trust in humans relating through everyday local interactions. There is a paradox between what can be achieved together or inclusively, and what can be achieved apart or exclusively. I call this the paradox of people.

8.6 The Paradox of People

At the beginning of this chapter, I included two contradictory quotes about people working together, each of which is true. The paradox of people emphasises the paradoxical nature of human interaction whereby, as Stacey (2009) explains, people both constrain and enable each other. This paradox expresses a critical message of the vocabulary of paradox for the implementation of sustainability and resilience initiatives. Although much can be accomplished together, much must also be accomplished apart. No initiative can be universal and therefore every initiative invokes what Stacey (2009) calls the *dynamics of inclusion and exclusion*. In this view, every group and initiative is at least implicitly exclusive. Defining who is included necessarily defines who is excluded. Further, these tensions of the muddled middle in the paradox of people are critical to progress. The desire to be included and the desire to be different create tensions which motivate ongoing praxis, creativity and innovation.

In the vocabulary of paradox, the most general statement to be made about people is paradoxical: people must work both together and apart. The paradox dissolves through a muddled middle of intermingled metaphorical and conventional tension, dissolving completely in the immediate circumstances of a fluid and immersive reality where, at a given moment, people are working together and/or apart.

For example, in May 2010, the SEMPR community group was awarded a grant to conduct the 'My Island, My Community' environmental education and awareness programme in Tobago (Armstrong, 2012). As part of the grant, a workshop was conducted at which a broad coalition of local organisations was established, the 'My Island, My Community' Tobago Coalition (DB118, 07/10/2010). Although several collaborations did take place amongst the organisations in the following years, for example when coalition groups shared a booth at Tobago World Food Day celebrations (DB410, 20/10/2010; DB029, 19/10/2011), the coalition itself did not continue to meet formally beyond the end of the year (DB143, 08/12/2010) and afterwards reconvened only for a closing evaluation workshop (DB035, 24/01/2012). The SEMPR group felt that they were more effective in focusing their efforts on their community and collaborating opportunistically with other organisations (DB268, 16/09/2011). They were

particularly influenced by the advice of one of their facilitators (DB268, 16/09/2011), who explained: “Choose what you do well and get to be known for that. Focus on what your critical areas are. Because what happens is people can come and take you off track” (Interview, 26/08/2012).

Put in the terms of paradox, they felt they were more effective being apart from a formal coalition, although this view was never expressed; it was simply enacted. In the vocabulary of paradox, the generalisation of the broad coalition dissolved into particular collaborations between particular groups and individuals which manifested as specific activities in particular circumstances, such as collaboration for an International Coastal Cleanup beach cleanup held in Speyside (DB281, 01/10/2011). These activities in turn resolved into new collaborations outside the original scope of the project, such as funding from a government agency to contribute to the SEMPR group painting an environmental mural on a wall of the local primary school (DB412, 06/06/2012).

This view explicitly contradicts what Harper and Stein (2006) call a postmodern perspective which problematizes not just a particular conflict or tension, but the notion of conflict in general. Comprehensive inclusion and consensus become ideals. Harper and Stein (2006) thoroughly critique such a perspective. In the vocabulary of paradox, although a particular conflict may be problematic or even disastrous, conflict, and the tension it represents, remains a critical motive force.

Similarly, a commonly cited corollary of incomplete knowledge in complex adaptive systems is the need to include more perspectives (e.g., Kay, 2008b). This is a response to the challenge of convergence described in chapter 3. It is reflected in calls for collaboration, co-management (Kofinas, 2009), and cooperation (Zielger & Ott, 2012). As a practitioner explained: “One discipline will not have the variety of perspectives. You need all the sectors. You need all the perspectives" (Interview, 18/10/2011). Although there are sound reasons for such activities, the paradox of people suggests that increasing inclusion comes at a cost (e.g., Innes & Booher, 2010). As Harper and Stein (2006) explain, the extreme of such an approach is a postmodernist ideal that is both nonsensical and impractical. Reiterating their statement

quoted in chapter 6, “The idea that we should accept everything in every tradition is itself a universal principal, one that would destroy pluralism. It leaves us few options: at best separation; at worst, violence” (Harper & Stein, 2006, p. 253). Summarised as a postmodernist paradox; we are all equally different.

The paradox of people suggests that the dynamics of inclusion and exclusion in the muddled middle will dissolve into particular actions and interactions by particular people in particular situations. Tensions associated with such actions and interactions will then resolve as they are given meaning through analysis, discussion and reflection. Such tension is a critical motive force to the process of praxis. In this way, the paradox of people, who is included and who is excluded, becomes another essential paradox to the praxis of sustainability.

8.7 Conclusion

Sustainability and resilience are about more than patterns of human behaviour. The concepts invoke the interdependence of human and natural systems. The vocabulary of paradox is an attempt to make sense of the concepts and their implementation. Stacey’s (2009) CRP does not treat social-ecological systems, sustainability or resilience. He is concerned explicitly with human behaviour in organisations. However, the implementation of sustainability and resilience initiatives necessarily involves human behaviour. As one practitioner explained, “The conservation of coasts or the environment is management. People have to work together" (Interview, 26/08/2012). CRP provides an account of human behaviour that synergises with the vocabulary of paradox. Specifically, it is an account that is continuous from the particular to the general and that is, at its most general, explicitly paradoxical. CRP justifies the importance of everyday local interactions, the importance of tension and muddle, and the limitations that emergence places on deliberate control.

Finally, it leads to the paradox of people, that people paradoxically enable and constrain each other in dynamics of exclusion and inclusion, of power and trust. There is significant scope to further explore the implications of the paradox of people for sustainability and resilience praxis. Future work could examine synergies with the concepts of collective agency and the

capability approach (Pelenc et al., 2013), as well as Rawls' concept of reciprocal reasonableness (Harper & Stein, 2006).

I have introduced three paradoxes to make sense of the implementation gap. The paradox of praxis describes the interrelated nature of theory and practice, knowing and doing, generalities and particularities. The paradox of sustainability describes the interrelated nature of continuity and change in human circumstances. Finally, the paradox of people describes the interrelated nature of exclusion and inclusion, power and trust, in human interactions. In chapter 9, I draw these three paradoxes together to explore the concept of *paradoxical agency* for sustainability which I describe as *knowing and doing, together and apart, for continuity and change*.

Chapter 9: Paradoxical Agency: Knowing & Doing, Together & Apart, for Continuity & Change

Implementation is a question of human agency. What is the scope for individuals and small groups to intentionally influence their circumstances? In chapter 3, I discussed how the implementation of sustainability and resilience initiatives involves integrating a range of knowledge and values under conditions of urgency and uncertainty. Complexity is one way to articulate the experience of uncertainty about causes and consequences in implementing such initiatives. In chapter 4 I discussed several frameworks for making sense of complexity. Here, I introduce another. As part of the theory of *complex responsive processes* (CRP), Stacey (2009) has articulated a five-point typology of complexity. In this chapter, I use a simple heuristic that connects Stacey's (2009) typology of causality to implications for human agency and control. I use this heuristic to frame the notion of *paradoxical agency*, which captures all three paradoxes of the vocabulary of paradox for sustainability: knowing and doing (praxis), together and apart (people) for continuity and change (sustainability).

9.1 Complexity: Pattern, Cause, Control

Complexity is an exploration of causality. What is the relation between a cause and an effect? In his analysis of complex systems models, Stacey (2009) proposes a five-point typology of causality: efficient, rationalist, formative, adaptationist and transformative. He explores how models of each kind are interpreted in published literature to inform organisational management. I use a simple heuristic to summarise Stacey's extensive scholarship and connect it explicitly to the scope for human agency in sustainability and resilience praxis. The heuristic is: pattern, cause, control.

Pattern refers to patterns in human circumstances. Sustainability and resilience are informed and inspired by such patterns. In chapter 1, I discussed patterns in social-ecological systems in terms of the cartography of crisis. In chapter 6, I discussed patterns in human circumstances in terms of 'attributes of human circumstances', quantified for example through sustainability indicators. Chapter 8 focused on patterns of human behaviour. As a more specific example, in chapter 3 I presented a system map drawn by members of the Speyside Eco-Marine

Park Rangers (SEMPR) community group as part of a workshop (DB269, 17/09/2011; Figure 3.1). On the map, group members included a pattern they had observed on the coral reefs adjacent to their village and that had been confirmed by local coral reef surveys (van Bochove & McVee, 2012), the overgrowth of coral by algae. The praxis of sustainability seeks to understand and modify such patterns. These constitute the 'pattern' element of this heuristic.

In the Western intellectual tradition, patterns are associated with causes, or reasons, through some form of causality. The form of causality most strongly associated with this tradition is linear causality, where each cause has a single, proportional effect, as discussed in chapter 3. Interest in complexity has opened the discourse to other forms of causality that are discussed below. In general however, patterns are associated with discernable causes or reasons. For example, in the causal chain described by SEMPR group members, overgrowth of coral by algae was influenced by deforestation on the slopes above the village adjacent to the reef (DB269, 17/09/2011; Figure 3.1). This is the *cause* element of the heuristic.

Finally, the *control* element of the heuristic refers to the scope for humans to intentionally influence a pattern by means of the cause. Applied to the SEMPR group example, what is the scope for humans to influence algal overgrowth of coral by limiting deforestation? In North East Tobago, such action has been proposed with a view to limiting degradation of the local marine environment (EDG & Kairi Consultants, 2003). To summarise the heuristic of pattern, cause and control: if there is a pattern, is there a cause? If there is a cause, is there scope for human control of the pattern by means of the cause? Stacey's five forms of causality in systems models suggest different answers to these questions.

9.2 The Causalities of Certainty

Stacey calls efficient and rationalist causality the causalities of certainty. *Efficient causality* is linear, or mechanistic causality, the causality of 'if-then'. In such models, each effect has a single, proportional cause. Applied to agency in sustainability praxis, actions will have predictable effects. Patterns have a cause. If the cause is adjusted, the pattern will be predictably adjusted. Returning to the example of beach patrols for sea turtle conservation

from chapter 3, sea turtle conservation actions can be interpreted using a linear cause and effect model where beach patrols, the control, will deter beach poaching of sea turtles, the cause, which will concomitantly prevent sea turtle nesting failure, the pattern.

Efficient causality parallels the simple and complicated domains of Snowden and Boone's (2007) *Cynefin* framework discussed in chapter 3. For mechanical challenges, for circumstances where *ceteris paribus* largely holds true, or where dissolving tension is explicitly interposed between findings and actions in particular circumstances, this can be an effective interpretation to inform implementation. For example, in chapter 6 I discussed the value of structured approaches to quantifying attributes of human circumstances. However, efficient causality is also associated with modernism, a dominant tradition in contemporary Western society. The modernist vocabulary has some unfortunate moral and practical consequences and has been rigorously critiqued (e.g., Harper & Stein, 2006; Holling & Meffe, 1996; Lindbolm, 1959; 1979; Stacey, 2009). As a concise summary, Harper and Stein conclude that:

> The modernist paradigm … is fatally flawed. Its theoretical foundations are inadequate and confused, it is practically unworkable, and it is morally bankrupt. The model cannot be salvaged by claiming that it is a useful heuristic because its results are frequently the very opposite of what is intended. (2006, p. 39)

Further exploration of such critiques falls explicitly outside the purpose of this thesis which aims instead to propose a complementary conversation about the praxis of sustainability and resilience. For the purpose of this inquiry, the salient point is that in the complex circumstances of sustainability and resilience praxis, efficient causality rarely applies. Consequently, initiatives directed solely on the assumption of efficient causality and by the associated vocabulary of modernism are likely to be ineffective. Returning to the heuristic, in such circumstances there is rarely a predictable, linear relationship between pattern, cause and control.

Stacey uses *rationalist causality* to describe the causality underlying the dominant organisational management discourse. Here, he maintains, managers and leaders are understood to choose goals using human reasoning in a rational and ethical manner. These goals are then implemented according to efficient causality within an organisation. In this case,

patterns and causes are observed from a 'God's eye' perspective outside a system and optimal solutions are designed which are then conveyed to agents within the system who implement them according to efficient causality. The analogy is that managers or technocrats are to the real-world challenge what a computer programmer is to a system model (Stacey, 2009).

Applied to North East Tobago for example, data from the Tobago Coastal Ecosystem Mapping Project were used to inform proposals for a marine protected area (d'Abadie, 2011; van Bochove & McVee, 2012). These proposals were submitted to local government and non-government organisations to implement. In this case, the pattern was objectively quantified degradation of the coastal marine environment (van Bochove & McVee, 2012), an identified cause was lack of marine protection (van Bochove & McVee, 2012), and the proposed control was conservation protection measures implemented by government and non-government organisations within the social-ecological system.

Stacey (2009) is critical of this view, which he refers to as *dual causality*. Goals are chosen according to a rationalist causality from outside the system, and are meant to be implemented according to efficient causality within the system. It is what Putnam calls "an impossible attempt to view the world from nowhere" (1990, p. 28). This view is problematic. As discussed in chapter 8, processes of human behaviour, which Stacey (2009) describes as 'complex responsive processes', are neither strictly efficient nor strictly rational. Humans do not interact according to simple or complicated rules. Nor do they make strictly rational or ethical decisions. Dual causality in this case invokes what Morawski calls the *reflexive paradox* of "claiming rational authority about the irrationality of human nature" (2005, p. 74). Applied to social-ecological systems where sustainability praxis takes place, the human processes by which proposals are selected are as much a part of the system as are the human processes by which proposals will be implemented. Put another way, the human processes by which proposals are selected, such as proposals for a marine protected area, although superficially quantitative, objective, principled or rational, involve to some degree the same human processes that will be required to implement the proposals, Stacey's (2009) messy *everyday local interactions.* Stacey (2009) argues that it is at best naive and at worst coercive to deny this.

There is substantial scope to explore and expand on the implications of this critique for the praxis of sustainability and resilience. However, again, this falls outside the scope of the thesis. Returning to the heuristic, the relevant point is that for most sustainability and resilience initiatives, rationalist causality will not predictably allow human control of patterns by means of causes. Continuing with the example of North East Tobago, the pattern of degradation of the coastal marine environment cannot be reliably controlled by rationally informed proposals for a marine protected area to address the proposed cause; a lack of protection for the coastal marine environment. In North East Tobago this is the case. Despite several technical and well-reasoned proposals for marine protected areas (e.g., d'Abadie, 2011; Institute of Marine Affairs, 2002; van Bochove & McVee, 2012), as of this writing, no such protected area exists.

9.3 The Causalities of Uncertainty

Stacey calls formative, adaptationist and transformative causality the causalities of uncertainty, associated with non-linear models of the complexity sciences. In *formative causality*, observed patterns are variations of a mature form enfolded in possibly hidden or unknown rules of interaction in the model. In this case, causality is non-linear in that model elements exhibit self-organisation, but because rules of interaction are fixed, resulting patterns are contextual variations on a mature form. An example here is models of nest searching behaviour by social insects (e.g., Robinson et al., 2011) where behaviour can be complex but broadly predictable.

Control from within such a model is not possible because elements or agents follow fixed rules to produce complex behaviour. Stacey argues that prescriptions for control based on such models emphasise identifying and manipulating simple rules and leverage points (e.g., AtKisson, 2010) to influence, if not the specific path of the system, then the general structure of the mature form. Such approaches therefore also implicitly appeal to a rationalist causality outside the system (Stacey, 2009). The analogy is once again that managers or technocrats are to the real-world challenge what a computer programmer is to an, albeit much more complex, system model (Stacey, 2009). This also invokes Morawski's reflexive paradox. Stacey (2009) is particularly critical of the dominant management discourse that appeals to complexity models,

where rational leaders and managers step outside the organisation, understood as a complex system, to make decisions that are then implemented through compliance within the organisation.

> If managers are choosing what 'emerges', then it is not emerging. If they have a blueprint guiding self-organization then it is not self-organization, that is, it is not agents acting on the basis of their own local organizing principles, but rather on the basis of simple rules chosen for them. (Stacey, 2009, p. 86)

There is scope to explore the implications of formative causality for resilience thinking. For example, system drivers and controlling variables (Walker & Salt, 2012) could be interpreted as possibly hidden or unknown rules of interaction. The adaptive cycle and panarchy could be interpreted as contextual variations on a mature form based on these limited, albeit non-linear, local interactions. Suggestions for managing such systems could imply a perspective outside of the system, a dual causality, the role of a system programmer. For example Walker and Salt advise "actively guiding the transformation process so as to retain the valued aspects of the 'old' system while achieving a system that is in tune with the larger world" (2012, p. 65). In this interpretation, the pattern is the adaptive cycle, the cause is drivers and controlling variables, and the control is humans manipulating controlling variables to achieve an, if not specifically predictable, than at least more desirable adaptive cycle. A detailed critique is outside the scope of this thesis however. For the purposes of this discussion, as with rationalist causality, initiatives informed by formative causality are unlikely to allow effective control of patterns by means of causes.

Stacey (2009) uses *adaptationist causality* to refer to evolutionary systems. Here causality is again non-linear. Observed patterns are the result of self-organisation. Unlike formative causality, such systems can generate novelty because variation in local interactions is possible, yielding novel forms. However, the implications for control remain limited because the source of variation is chance which is selected by competitive selection within the environment. Stacey makes the point that adaptationist causality leaves no space for human ingenuity and spontaneity.

> The cause of change is chance, which is adapted to an environment through the process of competitive selection so that very little, if any, room is allowed for human agency and organizational evolution is primarily due to chance and competition. (Stacey, 2009, p. 55)

Applied to the heuristic, patterns of natural selection are caused by competitive selection of chance variations. There are no clear implications of such models for human agency in sustainability praxis.

Finally, Stacey describes *transformative causality*. Once again, causality is non-linear. Observed patterns are the result of numerous local interactions, of self-organisation, but in this case each interaction paradoxically both repeats and varies from wider patterns because agents, in their interaction, can generate novel behaviour. The property of non-linearity means that variations can proliferate to transform wider patterns. Stacey (2009) argues that such transformative causality resonates with the experience of individuals and groups functioning in organisations.

Returning to the heuristic, patterns paradoxically influence and result from causes. For example, the SEMPR community group can be understood as a social object, as the generalised tendency of a group of people to act in similar ways in similar circumstances. In the experiential data, this pattern of human behaviour was associated with successful initiatives, such as an environmental mural on the wall of the local primary school (DB370, 08/06/2012) and with a mission to moderate or reverse ongoing degradation of the community's natural heritage (DB268, 16/09/2012). Over the nearly two and a half years of experiential research, the 'pattern' of the SEMPR group 'caused' group members to attend meetings. Paradoxically, however, as I discussed in chapter 8, the group itself emerged from the many local interactions of group members attending meetings and activities. The 'pattern' of the group therefore paradoxically influenced and resulted from the 'cause' of individual group members repeatedly attending meetings. This addresses the 'pattern' and 'cause' elements of the heuristic. The outstanding question for sustainability and resilience praxis is the element of control.

9.4 Transformative & Paradoxical Causality

Transformative causality is the paradox at the core of Stacey's (2009) CRP. Any action or interaction is at the same time a constrained expression of wider patterns representing the general and continuity, and the potential for a new pattern, representing the particular and change. In this way, transformative causality integrates the paradoxes of praxis and sustainability from the vocabulary of paradox. The general and the particular interrelate in patterns of interrelated continuity and change. As Stacey explains; "the process is one of perpetual construction of the future as both continuity and potential transformation at the same time" (2009, p. 149).

Stacey's transformative causality explicitly invokes a paradox of continuity and transformation. It is a causality of "forming and being formed at the same time" (Stacey, 2009, p. 134). He describes this causality with the term 'transformative' to emphasise the potential for change, novelty and innovation. In the vocabulary of paradox however, the critical characteristic of this form of causality is its paradoxical nature. It invokes the paradoxes of both praxis and sustainability. I therefore refer to it as *paradoxical causality*.

Such paradoxical causality is difficult to make sense of. It relates, for example, to Hegel's dialectical thinking, particularly the notion of *Aufhebung* wherein contradiction is at the same time overcome and preserved through a creative synthesis (Appignaneis, 1996). It is reflected in the work of the American Pragmatists including James, Mead & Dewey (Stacey, 2009). I have drawn connections in the preceding chapters with ideas of Wittgenstein, Rorty, Kelso and Engstrøm (2007), Gross (2010), Kahane (2010), Patton (2011), Brown et al. (2010), Smith and Lewis (2011), and Westley et al. (2006). There is ample scope to further develop a rich and nuanced vocabulary to explore the praxis of sustainability. The vocabulary of paradox is an initial attempt to articulate such a vocabulary.

9.5 Paradoxical Agency

Following Stacey's (2009) interpretation, paradoxical causality is the implication of complexity for human systems. Expressed in the vocabulary of paradox, the general and the particular

interrelate in interrelated patterns of continuity and change. Returning to the heuristic, patterns paradoxically influence and result from causes. What is the scope for individual and small group agency in a paradoxical causal framework? What is the scope for control? This is the question of paradoxical agency and I maintain that it forms the crux of meaningful sustainability praxis.

Returning to Stacey's (2009) CRP, he begins with a simple premise: "People in organizations accomplish whatever it is that they accomplish through continually interacting with a relatively small number of others" (Stacey, 2009, p. 160). If people in sustainability and resilience initiatives also accomplish whatever it is that they accomplish through continually interacting with a relatively small number of others, then, as discussed in chapter 8, agency invokes the *paradox of people*. People both enable and constrain each other. I therefore interpret paradoxical agency as three intermingled paradoxes of praxis, people and sustainability. Paradoxical agency for sustainability involves *knowing and doing, together and apart, for continuity and change*.

The vocabulary of paradox renders these paradoxes tractable. At its most general, paradoxical agency for sustainability is about both knowing and doing, it involves working together and apart, and it is about continuity and change. These paradoxes dissolve as they are particularised relative to increasingly specific circumstances. As they dissolve, they become muddled and interrelated; they become less clear. Eventually, they are applied in a specific, unique context and ultimately disappear in a fluid and immersive reality.

Summarising briefly from the experiential data, while working with the SEMPR community group we learned as we undertook group activities. For example, group members and I spent many meetings organising receipts and financial accounts for the funded environmental outreach project, 'My Island, My Community' (e.g., DB031, 04/02/2012). In so doing, group members developed simple and workable accounting practices and significantly increased their computer and financial literacy as described in chapter 7 (Armstrong, 2012) – the paradox of praxis. Similarly, over the course of nearly two and a half years, the group partnered to varying degrees of formality with a series of other organisations and initiatives

such as the North East Sea Turtles Tobago community group (DB409, 14/04/2012), and participated in structured collaborations, such as the 'My Island, My Community' coalition, that did not sustain, as described in chapter 8 – the paradox of people. Finally, the group and their social-ecological system both changed and continued as described in chapters 6 and 7 – the paradox of sustainability. In this way, the ongoing experience of praxis of the group was one of knowing and doing, together and apart, for continuity and change, both in the group and in group members' circumstances. Critically, these paradoxes all dissolved into lived experience through a muddled middle between ideals and a fluid and immersive reality. Praxis is the activity of navigating the muddled middle where the muddle itself, understood as interrelated metaphorical and conventional tension, is a motive force to seek meaning and results. The challenge for sustainability researchers and practitioners is to function in this space (Figure 5.1).

The vocabulary of paradox suggests that praxis can be informed by asking which paradox is dominating particular circumstances and how it might be dissolved, using which particular frameworks and tools, always valuing and articulating the politics of everyday life in everyday local interactions. In chapter 10 I explore these ideas further by proposing the role of a *sustainability agent,* a role that involves supporting the paradoxical agency of groups engaging in sustainability and resilience initiatives.

9.6 Conclusion

Although paradoxical agency emphasises everyday local interactions, it is not a condemnation of generalisations. Although it emphasises paradox, it does not involve abandoning reason and meaning. Although it emphasises emergence and paradoxical causality, it is not a wail of despair for lost control. Rather, it is an invitation to a complementary conversation; to openly discuss and value the processes of daily local interaction and their interrelationship with wider patterns of human behaviour and circumstances, to acknowledge paradox, action and the messiness of the muddled middle, and to acknowledge the potential, out of collaboration and conflict, for novelty, spontaneity and creativity through praxis.

Chapter 10: A Sustainability Agent

Dissolving the implementation gap for sustainability and resilience initiatives requires a coherent account of individual and small group human agency. Put simply, what can I do? What can we do? According to Westley et al. "Understanding how the agency of individuals can contribute to a sustainable future should … be a vital task of scholarship in the domain of resilience thinking" (2013, p. 1). In the vocabulary of paradox, *paradoxical agency* for sustainability and resilience embodies three paradoxes: praxis, people and sustainability. It involves *knowing and doing, together and apart, for continuity and change*. The implementation gap is replaced by a muddled middle through which these and other paradoxes can be resolved and dissolved to clarify both meaning and action. This view of sustainability and resilience praxis opens a range of rich possibilities for research and practice. It is beyond the scope of this thesis to explore further than one critical issue, a role for a reflective practitioner or practical researcher.

In the vocabulary of paradox, sustainability and resilience are aspirational concepts that capture a paradoxical desire for both continuity and change in human circumstances. Practical initiatives that invoke these terms therefore invoke the paradox of sustainability and the attendant paradoxes of people and praxis. Paradox is by definition an uncomfortable concept. Initiatives cannot rely on an absolute quantifiable reality, 'just the facts', because the concepts at issue are inherently normative, as discussed in chapter 6, and uncertain, as discussed in chapter 3. Nor can they rely on a comprehensive utopian consensus, 'we all agree', because of the paradox of people and the conflictual particularisation of generalities discussed in chapter 8. In this view, the role of a reflective practitioner or practical researcher is therefore to support a group in its struggles with the inevitable conditional clarity and muddled middle that accompany the concepts of sustainability and resilience. In the vocabulary of paradox, this involves supporting collective praxis, resolving and dissolving between theory and practice, knowing and doing, paradox and action. This is the role I proposed briefly in chapter 6.

There is a growing published literature of roles proposed for supporting sustainability and resilience. I use the paradox of sustainability to group these into two broad categories:

change agents and continuity agents. The vocabulary of paradox allows a synthesis of these two roles into the role of what I call a *sustainability agent*. There are rich traditions of theory and practice that can be drawn on to further explore what such a role would involve and I introduce some of them briefly. I propose that a sustainability agent can support the paradoxical agency of groups engaging with sustainability and resilience initiatives: knowing and doing, together and apart, for continuity and change.

10.1 Change Agents

Individual agency for sustainability and resilience is often associated with a vocabulary of change. AtKisson (2010) for example, draws on the change agent tradition from organisational dynamics (Caldwell, 2003; Ottaway, 1983) to articulate characteristics and skills for supporting the implementation of sustainability. In discussing community groups pursuing sustainability initiatives in North East Tobago, a highly experienced local practitioner uses similar language. “What we are really looking at is how do we prepare people and help people to create change, because we're looking at change management. We're looking at behaviour change” (Interview, 26/08/2012).

Westley et al. (2013) review literature from the resilience and management traditions and summarise roles for individuals who ‘make it happen’ in complex systems. The roles involve individuals making systems or circumstances different than what they are. As they explain:

> Successful change agents in complex systems work to change beliefs, in particular, by convening all stakeholders around a common vision, change the flow of political authority and resources, in particular, by playing key roles in networks and mobilizing social capital, and challenge technical and legal frameworks, in particular, by encouraging integration of local knowledge, experimentation, and new scientific frameworks. (Westley et al., 2013, p. 2)

Agency associated with terms such as ‘invention’ and ‘innovation’ also emphasises change. As Leach et al. explain, innovation can be “broadly defined as new ways of doing things, in science and technology but also associated institutions and social practices" (2012, p. 2). Westley et al. define invention as “the creation and implementation of new ideas” and innovation as “the spread of the latter in society” (2011, p. 763).

Transformation is another term emphasising change that is associated with agency for sustainability and resilience. I have already discussed Stacey's (2009) transformative causality in chapter 9. Westley et al. (2013) speak to transformative agency for sustainability and summarise skills proposed for such agents. They draw on the resilience thinking tradition wherein transformation is the capacity of actors in a system to create a fundamentally new system (Walker et al., 2006). Kahane (2012) and AtKisson (2011) also both explore individual agency for transformation understood as profound, systemic change.

Finally, as discussed in chapter 6, in the vocabulary of paradox 'development' can be understood as a term that connotes desired change in human circumstances. Explorations of individual agency for development also fall into the category of agency for change. For example van Kerkhoff and Lebel conclude that "Efforts to link knowledge and action toward sustainable development are manifested in the changed behavior of individuals, but individual change may require altering powerful institutions or social relations first" (2006, p. 470). Whether it is agency for change, invention, innovation, transformation or development, these roles and their attendant skills emphasise individuals deliberately changing human circumstances. I propose that all of these can be grouped into the broad category of a *change agent*.

10.2 Continuity Agents

Conversely, there are traditions within the sustainability, resilience and management literatures that emphasise agency for continuity. Whereas the role of a change agent emphasises people who work to make systems and circumstances different than what they are, these roles emphasise instead the agency of individuals to keep systems and circumstances the same or within acceptable boundaries.

The entire field of applied conservation, for example, implies agency for continuity (e.g. Dyke, 2008). Similarly, the concept of 'stewardship' emphasises avoiding, absorbing or controlling change. For example, in describing ecosystem stewardship, Chapin III et al. identify:

> three strategies that make optimal use of current understanding in an environment of inevitable uncertainty and abrupt change: reducing the magnitude of, and exposure and

> sensitivity to, known stresses; focusing on proactive policies that shape change; and avoiding or escaping unsustainable social–ecological traps. (2010, p. 241)

In the resilience thinking tradition, agency for continuity is also captured by the concept of adaptation, understood as: "the capacity of the actors in a system to manage resilience" (Walker et al., 2006, p. 3), where resilience generally connotes persistence as discussed in chapter 1. How can individuals maintain their circumstances? Adaptation is widely invoked in discussions of sustainability and resilience (Brown & Westaway, 2011) through concepts such as adaptive co-management (e.g., Kofinas, 2009) and adaptive governance (e.g., Folke et al. 2009). However, exploration of what the concept means for agency at the individual level is so far limited (Brown & Westaway, 2011).

Whether it is agency for conservation, stewardship or adaptation, these roles emphasise individuals deliberately maintaining continuity in human circumstances – absorbing, preventing, or minimising change. I propose that all of these can be grouped into the category of a *continuity agent*. Although the term has not been used in the sustainability or resilience discourse, a paradoxical interpretation of sustainability suggests that it exists by implication. If sustainability is continuity through change, and there are change agents, then are there continuity agents? The role becomes conspicuous by its absence. Further, the related change management literature in organisational management acknowledges individual agency for both change and stability (Westover, 2010). I propose the role of a continuity agent as a necessary notional complement to the role of a change agent that is reflected in the limited literature on individual and small group agency for sustainability and resilience. Further exploration of this concept would be useful, but falls outside the purposes of the thesis.

In common parlance, both sustainability and resilience imply continuity or persistence. However, agency for both is often associated with the role of a change agent. This contradiction between the connotations of the concepts and the connotations of individual agency proposed to promote them is problematic in uncertain circumstances where human control is not absolute, as discussed in chapter 9. However, in the vocabulary of paradox, this merely reflects the expected paradoxical interdependence of continuity and change.

10.3 Continuity Through Change

Superficially, terms such as 'sustainability transformation' (e.g., AtKisson 2010; Westley et al., 2013) are profoundly paradoxical. Relative to agency, they imply radically changing some things in order to avoid changing other things. This is a confusing ideal when circumstances and human agency are uncertain. Agency does not allow complete control over what continues and what changes. Even when the paradox is separated across scales of space and/or time, there are no guarantees that predictable cascades will occur.

For example, Folke et al. define 'active transformation' as "the deliberate initiation of a phased introduction of one or more new state variables at lower scales, while maintaining the resilience of the system at higher scales as transformational change proceeds" (2010, p.3). From the perspective of individual agency in the context of complexity, there is no reason to expect that individual human action from within a system, for example the "phased introduction of one or more new state variables at lower scales", will lead to predictable patterns such as "maintaining the resilience of the system at higher scales", particularly if it is by means of transformation, understood as systemic change. Such a perspective speaks to Stacey's concept of 'formative causality' discussed in chapter 9, where human agency is analogous to the role of a programmer manipulating a computer system model. Based on an extensive literature review, Brown concludes that "there is ongoing debate, especially in the environmental change literature, about the relationship between transformational change and resilience" (2014, p. 113). The scope for individual agency for sustainability and resilience remains ambiguous (Brown & Westaway, 2011).

It is therefore unsurprising that there is no absolute distinction between change agents and continuity agents. Most approaches either explicitly or implicitly seek to do both. For example, Westley et al. (2013) discuss the role of change agents and support their discussion with a list of skills proposed for ecosystem stewards, a role that emphasises continuity. As Westover explains from the management tradition:

> As society and its institutions are likely to continue facing tremendous change in the environment, a growing awareness must be developed of the impact of uncontrolled

> growth and the need for the process of stabilization as well as that of change. Agents emphasizing change and those concentrating on stability are not mutually exclusive individuals or types of behavior, although individuals may be predisposed to one role or the other. Change agents must fully recognize … the necessity of stability as a basis for growth. (2010, p. 47)

This sense that change only makes sense relative to some form of continuity is expressed by Wittgenstein:

> In that system some things stand unshakeably fast and some are more or less liable to shift. What stands fast does so, not because it is intrinsically obvious or convincing; it is rather held fast by what lies around it. (1974, §144)

In the vocabulary of paradox, this background of continuity echoes the concept of a web of belief or a shared vocabulary introduced in chapter 5. Returning to agency, in the education literature, Smeyers and Burbles explain:

> that it is the very continuity and stability of practices that makes transformation possible; they are related, not opposed, concepts.... Because a set of implicit norms and values are shared within educational encounters, participants feel secure enough to embark on the risky journey of sailing uncharted seas together. (2006, p. 446)

Harper and Stein (2006) propose a process of agency for continuity through change by modifying Lindbolm's (1959; 1979) *incrementalism*. In their view, there is a process of decisions and actions that are incremental. They contrast three processes to implement change in social systems: coercion, conversion and consensus. *Coercion* involves an exercise of power. People are forced to make new kinds of decisions and take new kinds of actions. Coercion is problematic for many reasons, principally because it contradicts liberal democratic values. *Conversion* involves an entirely new way of thinking, talking and believing. Harper and Stein (2006) maintain that this is problematic because it leaves no way to relate to current vocabularies. By definition, it can only be judged in its own terms. They maintain that *consensus* of some form is the only legitimate way forward in a liberal democratic society. "New ideas must be connected step-by-step back to the old tradition" (Harper & Stein, 2006, p. 131). They do not maintain that the results of a series of decisions and actions are incremental. Big breaks, tipping points, or transformation, remain possible. "What makes change 'incremental' is not its

‘smallness’ but its *contiguity* with our traditions, values, and institutions” (Harper & Stein, 2006, p. 130). They argue that “in a liberal democratic society, change must take place within a consensually held framework of sameness” (Harper & Stein, 2006, p. 121). This view of incrementalism resonates with Patton’s (2011) process of developmental evaluation where, in circumstances where results are uncertain, attention to process becomes critical. Similarly, in the vocabulary of paradox it synergises with the concept of continuity in the midst of change. There is a narrative of continuity in understanding, decisions and actions in the midst of uncontrolled change.

Conversely, Chia (2013) proposes a perspective where change is the context within which continuity, organisation, and stability are the exceptions. In this perspective, “all of reality is change so that it is the phenomenon of organization itself that is a remarkable achievement.… ‘organizations’ are nothing more than stabilized patterns of relations forged out of an underlying sea of ceaseless change” (Chia, 2013, p. 1). Chia proposes that agency for managing change therefore involves taking ownership of ongoing change and ‘letting it happen’. In this view, agency “is more about small, timely and quiet insertions made to release immanent forces of change always already present in every organizational situation” (Chia, 2013, p. 1). This speaks to a more effortless, less forceful approach to agency in complex circumstances than approaches that emphasise prescribed movement between stable states.

The concept of paradoxical agency described in chapter 9 embraces both perspectives. Although the terms ‘sustainability’ and ‘resilience’ retain an *a priori* emphasis on continuity, the term ‘sustainable development’ does not. In all cases, however, agency for sustainability and resilience involves interweaving continuity and change. On the one hand, in Stacey’s (2009) terms, small variations on larger patterns both perpetuate and change those larger patterns in a context of continuity. Equally, in Chia’s (2013) terms, intimate actions of imperfect replication both create and potentially dissolve fragile patterns of continuity in a context of change. Since, in the vocabulary of paradox, sustainability describes a paradox of continuity and change, I propose that agents supporting both continuity and change can be called sustainability agents. Such agents are explicitly concerned with both.

10.4 Sustainability Agents

In the vocabulary of paradox, agency is paradoxical, invoking interrelated paradoxes of praxis, people and sustainability: knowing and doing, together and apart, for continuity and change. I propose that the vocabulary of paradox can help bring coherence to a role that explicitly supports the paradoxical agency of groups engaging with sustainability or resilience initiatives in uncertain and changing circumstances. This involves asking and observing how the three interrelated paradoxes are resolved and dissolved as an initiative progresses. What is understood and what is done (praxis), who is involved and who is excluded (people), and what continues and what changes (sustainability)? Sustainability agents support the praxis of sustainability by making the process of praxis explicit.

I propose that there is significant scope to develop the role of a sustainability agent by drawing on a range of rich traditions of research and practice that express complementary concepts. I explore some of these here, emphasising how they contribute to both resolving towards generalised paradox and dissolving into contextual action and interaction.

10.4.1 Institutional Entrepreneur

Westley et al. (2013) review a range of literature on agency from the fields of linked social-ecological systems and organizational dynamics. They propose the role of an *institutional entrepreneur* to describe individuals who work to transform social-ecological systems from undesirable states or trajectories. “Institutional entrepreneurs are highly sensitive to the context in which they work, and seek to guide, rather than commandeer, transformation using skills and strategies appropriate to this kind of agency” (Westley et al., 2013, p. 10). Institutional entrepreneurs exhibit a diffuse agency. By contrast with conventional top-down leadership, they foster change through often informal networks (Merrie & Olsson, 2014). Westley et al. (2013) review and present skills and strategies of institutional entrepreneurs, helpfully associated with opportunity contexts linked to the phases of Holling and Gunderson’s (2002) adaptive cycle.

The literature on institutional entrepreneurship is helpful to articulate the role of a sustainability agent. First, the sense of diffuse agency reflects the muddled middle of paradoxical agency where individual actors are enabled and constrained by others and are limited by, but can also transform, broader patterns of human and social-ecological system behaviour. Second, the concept of opportunity contexts provides a structure to discuss broader patterns and generalisations and in so doing constitutes one approach to 'resolving'. Finally, many of the skills and strategies proposed, including facilitation, brokering and leveraging, reflect the politics of everyday life, the everyday local interactions in which humans are immersed. These skills speak to 'dissolving' in the vocabulary of paradox, particularising generalisations into actions and interactions. In the vocabulary of paradox, the role of an institutional entrepreneur can be understood as one way to articulate and value the art of praxis.

10.4.2 Developmental Evaluator

Patton (2011) proposes the role of a *developmental evaluator* to support adaptive management or social innovation in complex adaptive systems. "The evaluator is often part of a development team whose members collaborate to conceptualize, design and test new approaches in a long-term, ongoing process of continuous development, adaptation, and experimentation, keenly sensitive to unintended results and side effects" (Patton, 2011, p. 1). A developmental evaluator makes sense of the processes by which initiatives proceed in complex circumstances where ends are emergent and unpredictable. Much of the rationale and many of the skills Patton (2011) proposes for developmental evaluators resonate with the role of a sustainability agent. Patton's (2011) work is valuable because it is firmly grounded in practice. It also explicitly acknowledges and values the passion and emotion associated with implementation, Stacey's (2009) 'politics of everyday life'.

In the vocabulary of paradox, evaluation can be understood as an approach to 'resolving', to making sense of circumstances and actions. This is one component of praxis. Patton (2011) emphasises however that a developmental evaluator also contributes to implementation. In the vocabulary of paradox, this is the process of 'dissolving', of applying

generalities in particular unique circumstances. I propose that the role of a sustainability agent involves both evaluation and implementation. In the vocabulary of paradox, this is simultaneous resolving and dissolving intermingled in the art of praxis. With reference to Patton, the emphasis shifts slightly from evaluation to praxis. Patton's (2011) practice-oriented description of the role of a developmental evaluator provides a rich source of skills and tools to inform the role of a sustainability agent.

10.4.3 Knowledge Integration

Significant knowledge and expertise in the contemporary intellectual tradition is codified in disciplines. One powerful approach to resolving involves integrating disciplinary knowledge. There is an extensive literature addressing how such knowledge can be integrated to address specific challenges (e.g., Bennett & Jessani, 2011). This is commonly expressed in a typology of disciplinarity: disciplinary, multidisciplinary, interdisciplinary, and transdisciplinary (e.g., Bammer, 2005; Horlick-Jones & Sime 2004; Klein 2004; Tress et al., 2005). Transdisciplinarity involves integrating disciplinary and non-disciplinary knowledge to create a new frame of reference for an evolving challenge (Tress et al., 2005). More recently, van Kerkhoff (2014) has suggested that the term 'transdisciplinarity' is too broadly defined and has not gained methodological traction. van Kerkhoff (2014) instead proposes 'integrative research', a term I introduced briefly in chapter 2, which incorporates much of the thinking associated with transdisciplinarity. Both terms address the integration of knowledge from across disciplinary traditions.

For the purposes of this discussion, integrative research and transdisciplinarity open up the disciplinary concept of knowledge to an ongoing process. As discussed in chapter 6 regarding 'attributes of human circumstances', disciplinary perspectives are critical to making sense of ongoing sustainability and resilience challenges. However, in the vocabulary of paradox, the paradoxical interdependence of knowing and doing relative to a particular, evolving sustainability challenge emphasises an ongoing process of resolving. This is a process of making shared sense of shared, changing human circumstances. Disciplinary traditions can contribute significantly to resolving in the vocabulary of paradox. The growing literature

treating transdisciplinarity and integrative research provides a rich source of material to inform the role of a sustainability agent in explicitly supporting the process of resolving for a particular sustainability or resilience initiative.

10.4.4 Dialogical Planning

Harper & Stein (2006) express the process of resolving with an adaptation of Rawls (2001) concept of wide reflective equilibrium which I introduced in chapter 2. Repeating Harper and Stein's quote from chapter 2, wide reflective equilibrium "involves seeking coherence among (1) our considered judgements; (2) normative theories, or principles; and (3) other background theories. 'Background theories' include all the relevant information and knowledge available to us" (2006, p. xx). The concept of a wide reflective equilibrium is helpful for several reasons. It is not a theoretical ideal. It is tied to specific people in specific circumstances through the first element of considered situational judgements. It also explicitly invokes a normative dimension of values, addressed in this thesis in the chapter 6 definition of sustainability. The goal of the process is temporary negotiated coherence around a particular initiative. Finally, the back and forth process of moving between judgements, principles and theories resonates with the back and forth process of resolving and dissolving through the muddled middle in the vocabulary of paradox. There is significant scope to further explore the implications of the concept of wide reflective equilibrium for the implementation of sustainability and resilience initiatives.

Wide reflective equilibrium is an element of Harper and Stein's (2006) *dialogical planning*, stemming from the interrelated disciplines of planning and design. These provide another rich tradition of theory and practice for addressing complex challenges. In this tradition, such challenges are often described as *wicked problems*, a concept developed by Rittel and Webber (1973) that mirrors the challenges associated with complexity (Brown et al., 2010). In their 2006 work, Harper and Stein propose a process of dialogical planning that is: liberal, pragmatic, communicative, critical, incremental and political. The role they advocate for a dialogical planner provides yet another source of concepts, skills and strategies to inform the role of a sustainability agent.

Harper and Stein (2006) suggest that dialogical planners can play many roles in a process, including as a: reflective critical interpreter, communicator, public educator, mediator, advocate of justice and fairness, agent of change, consensus builder, coalition builder, political strategist, problem formulator and technical analyst or advisor. All of these roles involve dialogue, reflecting the name of the approach. By emphasising dialogue, dialogical planning prioritises the everyday local interactions in which humans are immersed. In this way, the approach is informative for the process of praxis in the vocabulary of paradox because it values everyday local action and interaction, the medium through which paradoxical agency for continuity and change is both manifest and given meaning.

10.4.5 Communication: Knowing Together

Dialogical planning is one articulation of a dialogical or communicative, process-oriented approach to collaborative sense-making. Another example is Innes and Booher's (2010) exploration of Habermas's concept of 'ideal speech' and how it can be applied to foster communities of inquiry and joint fact finding. As Innes and Booher explain: " a community of inquiry engages in collective framing and reframing, creating metaphors, storytelling, role playing, and using cognitive bricolage to jointly form a picture of the problems a community faces and how it can address those problems" (2010, p. 12). Like the concept of a wide reflective equilibrium, this is an ongoing process of communication that aims for temporary coherence amongst diverse information and influences that will allow a particular group of people in particular circumstances to address particular issues. In the vocabulary of paradox, it is an approach to resolving.

By invoking communication and dialogue, these and other related articulations (e.g., Weick, 1995) in turn invoke the concept of narrative.

> While formal argumentation from premises to conclusions remains a part of deliberation, other kinds of reasoning can be more powerful in group dialogues. In these, participants use storytelling and role playing as a primary way to explain and persuade.... They then use a kind of intellectual bricolage to develop new options and strategies as they draw on their many experiences and their broader knowledge for

> components that can be assembled in various ways to create new approaches. (Innes & Booher, 2010, p. 6)

Stacey draws on Brunner to explain this as follows:

> Narratives are inextricably interwoven truth and possibility and display sensitivity to what is ordinary and what is exceptional in human interaction. The negotiation of meaning between people is made possible by this feature of narrative in which meaning arises in identifying deviations from the ordinary in a comprehensible form. (2009, p. 153)

This narrative-like process of joint story-telling provides a common framework or forum in which different ways of knowing can be integrated relative to the particular circumstances of a particular group of people facing particular challenges. It is an approach for sustainability agents to support the process of resolving continuity through change in a sustainability or resilience initiative. A Speyside Eco-Marine Park Rangers (SEMPR) member provides an example from North East Tobago.

> People ask theyself all sorts of question about nature. They don't ask people it, but they ask theyself it. Like why we getting landslides? Why we not seeing this type of fish anymore? Why we getting a lot of sun bleaching on the coral, no mantas, and all these things? So this is where we come in now, to really tell a story why you are not seeing things and why these things are happening. (Interview, 22/08/2012)

Such collaborative resolving, understood as a kind of knowing together through a form of narrative-like communication is a way to deal with the dynamic and uncertain circumstances of sustainability and resilience initiatives. As Stacey explains, “truly complex understanding is provided by narrative knowledge, not propositional knowledge, which is always reductionist and intrinsically unable to deal with the complex at its own level of articulation” (2009, p. 90). Further, it connects with Rorty’s understanding of “knowledge as a matter of conversation and of social practice” (1980, p. 171). Conversation and social practice in turn invoke a first person perspective and specific actions and interactions, tying knowledge to action. Returning to the vocabulary of paradox, generalisations must be dissolved into action. Knowing and doing are mutually inclusive. Each requires the other.

To summarise, there are a variety of rich and complementary traditions associated with dialogue and communication that are available to inform the role of a sustainability agent. Interpreted in the vocabulary of paradox, all of these traditions describe approaches to collaborative resolving. They are approaches to *knowing together*. Critically however, the paradox of praxis emphasises that praxis also involves dissolving understanding into specific actions in specific circumstances. Praxis must also involve *doing together*.

10.4.6 Collective Action: Doing Together

In the vocabulary of paradox, praxis also involves dissolving coherent articulations of knowledge, experience and values into the ongoing flow of intimate daily human experience. It involves doing together: collective action to influence shared human circumstances. Collective action is the subject of an extraordinary amount of thought and work (e.g., Anderies & Janssen, 2013). How can groups of people work together to achieve desired ends? In the words of an experienced practitioner describing her work in North East Tobago:

> How do you get people in teams? How are they working together? How do they deal with conflict? Issues of power? How do we deal with the diversity? You must make the most of the diversity. Find the strengths. What can I contribute? It is in that empowerment that people know and appreciate each other. (Interview, 26/08/2012)

Following from Stacey's (2009) complex responsive processes, the vocabulary of paradox emphasises the importance of such intimate daily human action and interaction to sustainability and resilience initiatives. These are the daily dynamics of trust, obligation, inclusion, exclusion, blaming, empathy, conflict, spontaneity, frustration and creativity in which humans are immersed (Stacey, 2009). They are captured in extensive business and organisational literature addressing concepts such as teamwork (e.g., Edmondson, 2012).

As with knowing together, in uncertain circumstances the process of doing together becomes important. Approaches such as developmental evaluation (Patton 2011) explicitly track and value these processes. Critically, in the vocabulary of paradox, the paradox of people emphasises that doing together will invoke tension with doing apart. There is extensive scope

to further explore this tension and its implications for the collaborative praxis of sustainability and resilience, particularly drawing on Kahane's (2010) concept of power and love.

10.5 Synthesis

The purpose of the above discussion is to illustrate that there are rich traditions of theory and practice available to make sense of the role of a sustainability agent. Many other helpful approaches have also been articulated. These include Weick's (2011) concept of a *change poet*, Brown's (2010) concept of the *transdisciplinary imagination*, Kahane's (2012) *transformative scenario planning*, and AtKisson's (2010) *indicators, systems, innovations and strategy* approach. These approaches, and those treated in more detail above all acknowledge confusion or muddle and the sense of sustainability agents being in between, at the boundaries or in the interstices. All acknowledge the importance of creativity and imagination, as well as the importance of human interaction. A sustainability agent could function effectively by following any of these approaches.

The novel contribution of the sustainability agent role lies in the vocabulary of paradox. I maintain that the concepts associated with the vocabulary provide a wide reflective equilibrium. They bring coherence to a wide range of rich theoretical and practical traditions, linking them explicitly to deliberate and reasonable actions by individuals and small groups implementing sustainability and resilience initiatives in particular and unique circumstances.

By contrast with the discourse associated with the implementation gap and attempts to bridge it, I maintain that the vocabulary of paradox allows for a positive, proactive and theoretically robust complementary conversation about the praxis of sustainability. In this conversation, the implementation gap dissolves. It is no longer a problem. The vocabulary allows a deliberate, reasoned, aggressively practical conversation about the role of a sustainability agent to meaningfully engage with continuity and change in particular, dynamic circumstances. To summarise even more briefly, if the implementation gap is the question, then sustainability agents and the groups and initiatives they support, articulated in the vocabulary of paradox, are an answer.

I maintain that this perspective represents an exciting opportunity to explore the wealth of traditions from Western and other cultures for concepts and skills that value and embrace uncertainty, urgency, and the intimate flow of human experience. I believe that there is extensive scope to further explore the role of a sustainability agent using the vocabulary of paradox.

10.6 Case Study Reflection

This thesis is informed by nearly two and a half years of experiential research supporting a small community group in North East Tobago and their collaborators as they implemented conservation and sustainability initiatives. My research was initially an attempt to use tenets of resilience thinking to support ongoing conservation and sustainability initiatives. However, although resilience thinking was helpful in making sense of the social-ecological context, for example through a systems thinking exercise I conducted as part of a workshop with the group (DB268, 16/09/2011), I was unable to apply it productively to the daily struggles and successes of the group. The group's daily experience was dominated by a host of considerations that are not explicitly addressed by resilience thinking such as personality conflicts and team dynamics (DB101, 06/09/2010), inadequate resources (Armstrong et al., 2012), uncertainty about what actions to take (DB183, 18/04/2011) and logistics, such as building a storage locker for the group's equipment (DB098, 24/08/2010), getting a computer repaired (DB322, 08/03/2012), getting transport to meetings and events (DB154, 21/01/2011), obtaining credit for the group's phone to maintain communication (DB397, 22/07/2012) or organising an event such as a beach cleanup (DB097, 21/08/2010). Further, these experiences were interwoven and continuous. They were experienced not as obvious and distinct elements of any particular framework, such as the adaptive cycle but instead as a "sense of fluent indeterminacy and temporality" (Chia, 1998, p.35).

As I proceeded I developed an intuition for a role that was lacking, whose absence was impeding implementation of the group's initiatives. I immersed myself in that role, which was increasingly seen as valuable both by members of the group, and by collaborating organisations. As expressed by a SEMPR group member: "I want to give thanks to Keith.

Sometimes, when you feel down, he lift you up. He help us a lot to move forward" (DB268, 16/09/2011). Similarly, a practitioner from a collaborating organisation explained my work as follows:

> One of the things I liked about your mentorship and something that is critical for community groups in Trinidad and Tobago is [that] it requires patience, which you displayed. It requires an understanding of how to work with people making little steps. And how you detail things so they can replicate them and understand it and make changes as they need to. I remember how I saw you showing them how to keep records. Mentoring requires certain kinds of qualities, and it's not pushing what you have in your mind towards people. It requires a lot of patience and understanding, and seeing the growth of the group, and that is what you did. (Interview, 26/08/2012)

At the same time, I struggled unsuccessfully to reconcile my experience with published theory. This led me to search across an increasingly diverse range of literature, listed in chapter 2, and to question increasingly fundamental assumptions of the concepts of sustainability and resilience. The result is the vocabulary of paradox, the paradoxes of praxis, sustainability and people, the concept of paradoxical agency, and the role of a sustainability agent described in this thesis.

In practice, my experience with the role of a sustainability agent involved repeatedly returning to the question: how can I help? The answers ranged widely, from fixing computers (e.g., DB299, 16/11/2011) to giving rides to group members (e.g., DB250, 09/08/2011), or delivering phone credit to allow group members to communicate (e.g., DB304, 09/12/2011). It included more conventional support such as facilitation and team building (e.g., DB371, 09/06/2012), technical support, particularly for financial management (e.g., DB267, 10/09/2011), letter writing (e.g., DB170, 09/02/2011), process support for procedures such as group elections (e.g., DB314, 17/01/2012), and strategic advice for initiatives (e.g., DB087, 03/08/2010). Equally important was appreciating that some help that I could provide was not needed. For example, although technical assessments of the social-ecological system (e.g., van Bochove & McVee, 2012), or assessments of opportunities for sustainable livelihoods (e.g., Caribbean Natural Resources Institute, 2011) were informative, these largely confirmed the group's current understanding and priorities as discussed in chapter 6, but did not address

pressing daily challenges. Conversely, for initiatives that called on the strong and diverse competencies of group members, where their competencies exceeded my own, my help was likewise not needed. Examples included preparing and running a village barbeque (DB307, 17/12/2011), building a storage locker (DB098, 24/08/2010), and consulting with the many diverse sectors of the community including church groups and schools (e.g., DB382, 25/06/2012). In these cases, my not being involved contributed positively to group members' sense of worth and to their confidence in their own abilities. One member explained his experience organising participation by the group in the 2011 Tobago Carnival celebrations (DB178, 08/03/2011). "It was a real run up and down, back and forth, Trinidad and Tobago. We had short notice. It was a first-time experience for me.... I really enjoyed seeing the team come together" (DB268, 16/09/2012). Learning when to 'step back' requires humility and tact on the part of a sustainability agent, skills that I developed only through experience.

I structured my praxis as a sustainability agent around the three paradoxes of paradoxical agency: knowing and doing, together and apart, for continuity and change. Knowing and doing involved continuously encouraging discussion about diverse aspects of the group's activities and circumstances, reflecting together on members' concerns, hopes, and experiences. Discussions occurred in a wide range of circumstances, for example one-on-one while giving a group member a ride (e.g., DB153, 19/01/2011), or more formally amongst group members at a scheduled meeting (e.g., DB184, 19/04/2011). Such discussions helped to create an ongoing narrative that, in Stacey's terms, began to identify what was ordinary and what was exceptional in the group's ongoing experience. Critically, however, the narrative required action to give it meaning. For example, the group put a great deal of time and effort into planning a village sports day that was never implemented (DB091, 10/08/2010), leading to some frustration among group members (DB101, 06/09/2010). In this case, discussing without doing, knowledge without action, was meaningless. Consequently, my role also included supporting action, for example facilitating logistics for a beach cleanup (e.g., DB097, 21/08/2010), or a workshop (e.g., DB371, 09/06/2012).

Knowing and doing together invokes the paradox of people: the tension between what can be achieved together and what can be achieved apart. Here, my role as a sustainability agent involved mediating personality tensions within the group (e.g., DB388, 20/06/2012), and facilitating team building initiatives (e.g., DB270, 18/09/2011). It is worth noting that group members used advice and material from an early team-building workshop (DB367, 07/09/2010) to very good effect in their internal inter-personal dynamics. They subsequently remained very open about and cognisant of both their strengths and challenges working together, as I discussed in chapters 3 and 5. My role also involved supporting the group in its interactions with other organisations to help build and manage those relations. This involved for example helping to write letters to solicit support from other organisations (e.g., DB297, 13/11/2011), or helping to write reports to fulfill and conclude the group's obligations to another organisation (e.g., DB393, 17/07/2012).

Finally, my praxis as a sustainability agent reflected the paradox of sustainability: continuity through change. As discussed in chapter 6, this involved asking what should, does, and can continue and change in the particular circumstances of the group. This in turn involved fostering the ongoing narrative mentioned above that encompassed both the group and its circumstances, the social-ecological context that the group sought to influence. Group members were involved in the group because they were passionate about their community and natural heritage. As one member explained: "The best thing for me, what really give me inspiration, actually is that I see this as my purpose. I see myself as a seed, you know, that is my purpose on earth to do this" (Interview, 22/08/2012). In the words of another member: "It is a calling. It makes me want to spread that message. I'm not afraid to speak out" (Interview, 13/08/2012). Consequently, discussions about what should continue and change were common. For example, group members were readily able to populate a grid of environmental and social challenges that they felt should be urgently addressed in their community (DB023, 21/06/2010). Considered another way, as I discussed in chapter 7, the group was remarkably consistent and unanimous in their vision for their group, community and social-ecological system. My role also involved supporting both discussions and learning about what was continuing and changing, captured for example in the system diagrams group members

prepared at a workshop (e.g., Fig 3.1). Finally, I worked to support the group in its actions to attempt to influence continuity and change, both in the group, through for example team-building initiatives (e.g, DB269, 17/09/2012), and in the wider social-ecological context through for example a beach cleanup (e.g., DB281, 01/10/2012) or school outreach programme (e.g., DB412, 06/06/2012).

To summarise, my experience as a sustainability agent involved helping to make the process of group praxis for sustainability explicit; resolving and dissolving between knowing and doing, together and apart, for continuity and change. In my experience the role of a sustainability agent was neither prescriptive, nor solely technical. It required training and technical competence, but I also had to develop competence through experience. In this sense, the praxis of sustainability is an art as well as a science.

This thesis begins with an epigraph quoting A.N. Whitehead: “The art of progress is to preserve order amid change and to preserve change amid order” (1978, p. 339). I return to it here because I believe that this sixteen-word paradox concisely captures what is required of researchers and practitioners engaging with sustainability and resilience. In the vocabulary of paradox, it is the art of praxis.

Chapter 11: Conclusion

In this thesis, I have made the case for a profoundly counterintuitive conclusion. The conventional discourse on sustainability and resilience is concerned with "how problems of normativity, ambiguity, and uncertainty may be dealt with" (Kemp & Martens, 2007, p. 5). By contrast, I argue that sustainability and resilience praxis *cannot proceed without* normativity, ambiguity and uncertainty. They are expressed in the vocabulary of paradox as tension and muddle. In this view, the implementation gap ceases to be a problem and instead becomes the generative source for sustainability and resilience praxis. Muddle and even paradox, far from being the principle impediments to implementation, are in fact its driving force.

I propose that this complimentary perspective and the associated vocabulary reduce the burden on researchers and practitioners to provide a clear, definitive solution to the problems of sustainability and resilience implementation. As Bohm argues; “as long as a paradox is treated as a problem, it can never be dissolved. On the contrary, the 'problem' can do nothing but grow and proliferate in ever-increasing confusion” (1996, p. 63).

The vocabulary of paradox is an attempt to shift the discourse away from a panicked search for definitive answers, reasons and statements, and the associated sense of crisis, to a more pragmatic emphasis on what can be accomplished by particular people in particular circumstances, valuing individual and contextual capacities such as ingenuity, empathy and wisdom. I chose the metaphor of dissolving and resolving for this reason. Although general and global problems are dire, they are not susceptible of solution in the sense of a mathematical or mechanical problem. Instead, they dissolve into everyday human circumstances. Everyday human circumstances can also be dire, but they are at least tractable. They fall within the bounds of human agency and experience. The processes of dissolving and resolving are where I see hope for sustainability and resilience. The implementation gap ceases to be a chasm and instead becomes an inspirational muddle of aspiration, understanding and lived experience.

To make this argument, I have drawn heavily on the extensive scholarship of several authors. Stacey (2009) connects process sociology and philosophy to findings from the complexity sciences to make sense of the experience of individuals in organisations. The critical

difference between Stacey's work and the vocabulary of paradox is that although he acknowledges paradox, he does not center his perspective on it. He also has not addressed the implications of his thinking for sustainability or resilience. By combining paradox theory and elements of neopragmatism including Rorty and Wittgenstein with Stacey's theory of complex responsive processes, I propose a novel vocabulary to make sense of the praxis of sustainability and resilience.

Harper and Stein (2006) undertake a comprehensive critique of contemporary planning and make a deeply reasoned proposal for a dialogical alternative. Although they do address sustainability to a certain extent, it is not the focus of their work. Additionally, they do not incorporate findings from the complexity sciences, and they do not incorporate paradox theory. I draw on Harper and Stein (2006) for several elements of the thesis. First, their extensive critique of modernism and postmodernism allows me to focus on articulating a complementary vocabulary. This thesis is explicitly articulated in its own terms and is not structured by comparison or contrasts with other perspectives. However, there is an implicit critique of modernist and postmodernist traditions and that critique rests largely on Harper and Stein's (2006) work. Second, I draw on Harper and Stein (2006) as an access point to pragmatism and neopragmatism with particular emphasis on their articulation of neopragmatism. There is extensive scope for further work exploring the implications of Harper and Stein's (2006) neopragmatism for the praxis of sustainability and resilience articulated in the vocabulary of paradox. Finally, I use Harper and Stein's (2006) interpretation of Rawls' wide reflective equilibrium as a method to structure my approach to research.

The vocabulary of paradox represents a novel, counterintuitive, and empowering contribution to the discourse on sustainability and resilience. I maintain that it is robust, broadly applicable, and that it successfully addresses the two challenges of this thesis: the implementation gap for sustainability and resilience, and a role for a practical researcher and reflective practitioner. However, I propose that its principle recommendation is that it is intuitively applicable to praxis. Sustainability and resilience praxis is dominated by a paradoxical desire for both continuity and change in human circumstances. This paradox can be dissolved

by asking what should, does and can continue and change in particular, unique circumstances. Asking and answering those questions requires that individuals engage with paradoxical agency. They must know and do, together and apart, for continuity and change. These activities can be supported by a sustainability agent who draws on available concepts, experience and resources to help make the ongoing process of knowing and doing, together and apart, for continuity and change explicit for particular people in particular circumstances. I believe that there is substantial scope to further explore these ideas both in theory, and in practice.

Bibliography

Ackoff, R. L. (1979). The Future of Operational Research is Past. *The Journal of the Operational Research Society*, *30*(2), 93–104.

Agyeman, J., Bullard, R. D., & Evans, B. (2003). Joined-Up Thinking: Bringing Together Sustainability, Environmental Justice and Equity. In J. Agyeman, R. D. Bullard, & B. Evans (Eds.), *Just Sustainabilities: Development in an Unequal World* (pp. 1–16). New York: MIT Press.

Alemu I, J. B., & Clement, Y. (2014). Mass Coral Bleaching in 2010 in the Southern Caribbean. *PLoS ONE*, *9*(1), e83829.

Alkins, G., & Mason-Alkins, Z. (2012). *Capacity Development Program 2012: Establishing Sustainable Eco-Tourism for the Charlotteville Community Through Sea-Turtle Conservation* (Proposal) (p. 32). Tobago, West Indies: North East Sea Turtles Tobago.

Anderies, J. M., & Janssen, M. A. (2013). *Sustaining the Commons* (1st ed.). Tempe, Arizona: Center for the Study of Institutional Diversity.

Anderies, J. M., & Norberg, J. (2008). Theoretical Challenges: Information Processing and Navigation in Social-Ecological Systems. In J. Norberg & G. S. Cumming (Eds.), *Complexity Theory for a Sustainable Future* (pp. 155–179). New York: Columbia University Press.

Appignanesi, R. (1996). *Hegel for Beginners*. Icon Books, Limited.

Arendt, H. (1998). *The Human Condition*. Chicago: University of Chicago Press.

Armstrong, H. (2010). *Coastal and Marine Management and Education in the South Eastern Caribbean (CAMMESEC) Final Report* (No. GAL-2A42) (p. 31). Tobago, West Indies: Buccoo Reef Trust.

Armstrong, H. (2012). *My Island My Community: Increasing Awareness and Changing Attitudes and Behaviours on Climate Change and Environment in Tobago* (Project Report) (p. 11). Tobago, West Indies: Speyside Eco-Marine Park Rangers.

Armstrong, H., van Bochove, J.-W., Low-Décarie, E., Alemu I, J., & Raines, P. (2009). *Speyside Marine Area Community-Based Management Project (SMACMP)* (Project Report) (p. 74). Tobago, West Indies: Buccoo Reef Trust & Coral Cay Conservation.

AtKisson, A. (2010). *The Sustainability Transformation: How to Accelerate Positive Change in Challenging Times*. Oxford: Earthscan.

AtKisson, A. (2011). *Believing Cassandra: How to Be an Optimist in a Pessimist's World*. Earthscan.

AtKisson, A. (2013). A Fresh Start for Sustainable Development. *Development*, *56*(1), 52–57.

Balmford, A., & Cowling, R. M. (2006). Fusion or Failure? The Future of Conservation Biology. *Conservation Biology*, *20*(3), 692–695.

Bammer, G. (2005). Integration and implementation sciences: Building a new specialization. *Ecology and Society*, *10*(2), 6.

Bascompte, J. (2007). Networks in ecology. *Basic and Applied Ecology*, *8*(6), 485–490.

Beisner, B. E. (2012). The shifting states of resilience: Easier to define than to measure. *Ideas in Ecology and Evolution*, *5*, 57–62.

Bennett, G., & Jessani, N. (Eds.). (2011). *The Knowledge Translation Toolkit: Bridging the Know–Do Gap: A Resource for Researchers*. New Delhi, India: Sage.

Berkes, F., & Davidson-Hunt, I. J. (2008). The Cultural Basis for an Ecosystem Approach: Sharing Across Systems of Knowledge. In D. Waltner-Toews, J. J. Kay, & N.-M. E. Lister (Eds.), *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability* (pp. 51–78). Columbia University Press.

Biggs, D., Abel, N., Knight, A. T., Leitch, A., Langston, A., & Ban, N. C. (2011). The implementation crisis in conservation planning: could 'mental models' help? *Conservation Letters*, *4*(3), 169–183.

Bohm, D. (1996). *On Dialogue*. (L. Nichol, Ed.). Routledge.

Bohm, D., & Peat, F. D. (2000). *Science, Order, and Creativity* (2nd ed.). New York, NY: Psychology Press.

Boodram, K. (2012, February). Diver spots dreaded lionfish in Tobago reef. *Trinidad Express Newspaper*. Trinidad & Tobago, West Indies.

Boström, M. (2012). A missing pillar? Challenges in theorizing and practicing social sustainability: introduction to the special issue. *Sustainability: Science, Practice, & Policy*, *8*(1), 3–14.

Brand, F. S., & Jax, K. (2007). Focusing the Meaning (s) of Resilience: Resilience as a Descriptive Concept and a Boundary Object. *Ecology and Society*, *12*(1), 23.

Brown, K. (2014). Global environmental change I: A social turn for resilience? *Progress in Human Geography*, *38*(1), 107–117.

Brown, K., & Westaway, E. (2011). Agency, Capacity, and Resilience to Environmental Change: Lessons from Human Development, Well-Being, and Disasters. *Annual Review of Environment and Resources*, *36*(1), 321–342.

Brown, V. A. (2010). Collective Inquiry and Its Wicked Problems. In V. A. Brown, J. A. Harris, & J. Y. Russell (Eds.), *Tackling Wicked Problems: Through the Transdisciplinary Imagination* (pp. 61–83). London: Earthscan.

Brown, V. A., Harris, J. A., & Russell, J. Y. (Eds.). (2010). *Tackling Wicked Problems: Through the Transdisciplinary Imagination*. Earthscan.

Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, *8*(2), 5–21.

Burke, L., Reytar, K., Spalding, M., & Perry, A. (2011). *Reefs at Risk Revisited*. Washington DC: World Resources Institute.

Caldwell, R. (2003). Models of Change Agency: a Fourfold Classification. *British Journal of Management*, *14*(2), 131–142.

Calhoun, C. (2002). *Dictionary of the Social Sciences*. Oxford, UK: Oxford University Press.

Caribbean Natural Resources Institute (CANARI). (2011). *Speyside Community: Improving Livelihoods in Rural Communities in Trinidad and Tobago by Developing Small Business Ideas Based on the Sustainable Use of Natural Resources* (p. 31). Trinidad & Tobago, West Indies: Caribbean Natural Resources Institute.

Castillo, K. (2011, February). More rainfall this dry season. *Trinidad Express Newspaper*. Trinidad & Tobago, West Indies.

Central Statistical Office of Trinidad and Tobago (CSO). (2012). *Trinidad and Tobago 2011 Population and Housing Census Demographic Report* (p. 442). Port of Spain, Trinidad: Central Statistical Office of the Ministry of Planning and Sustainable Development of the Government of the Republic of Trinidad and Tobago.

Chapin III, F. S., Carpenter, S. R., Kofinas, G. P., Folke, C., Abel, N., Clark, W. C., … Swanson, F. J. (2010). Ecosystem stewardship: sustainability strategies for a rapidly changing planet. *Trends in Ecology & Evolution*, *25*(4), 241–249.

Charles, A. (2011, April). Split on beauty plan. *Tobago News*, p. 2. Tobago.

Chawla, S., Me, A., Bisogno, E., Malby, S., Jandl, M., Davis, P., … Cenci, M. (2011). *2011 Global Study on Homicide: Trends, Contexts, Data* (p. 128). Vienna, Austria: United Nations Office on Drugs and Crime.

Chesterton, G. K. (2008). *Orthodoxy*. Rockville, MD: Serenity Publishers.

Chia, R. (1998). From Complexity Science to Complex Thinking: Organization as Simple Location. *Organization*, *5*(3), 341–369.

Chia, R. (2013). Reflections: In Praise of Silent Transformation – Allowing Change Through 'Letting Happen'. *Journal of Change Management*, 1–20.

Chin, G., & Culotta, E. (2014). What the numbers tell us. *Science*, *344*(6186), 818–821.

Cronbach, L. (1975). Beyond the two disciplines of scientific psychology. *American Psychologist February 1975*, *30*(2), 116–127.

Crutzen, P. J., & Stoermer, E. F. (2000). The 'Anthropocene'. *Global Change Newsletter*, *41*(May), 17–18.

Cumming, G. S., Barnes, G., Perz, S., Schmink, M., Sieving, K. E., Southworth, J., … Van Holt, T. (2005). An Exploratory Framework for the Empirical Measurement of Resilience. *Ecosystems*, *8*(8), 975–987.

Curtin, C. G., & Parker, J. P. (2014). Foundations of Resilience Thinking. *Conservation Biology*.

D' Abadie, J. (2011). *Marine Protected Areas - Zoning for conservation and rehabilitation of coral reefs in data poor areas - A case study of North-Eastern Tobago* (M.Sc.). University of Queensland, Brisbane, Australia.

Daly, H. E. (1998). The return of Lauderdale's paradox. *Ecological Economics*, *25*(1), 21–23.

Davidson, D. (1973). On the Very Idea of a Conceptual Scheme. *Proceedings and Addresses of the American Philosophical Association*, *47*, 5–20.

Day, J., Dudley, N., Hockings, M., Holmes, G., Laffoley, D., Stolton, S., & Wells, S. (2012). *Guidelines for applying the IUCN protected area management categories to marine protected areas*. Gland, Switzerland: IUCN.

Day, O. (2009). *The impacts of climate change on biodiversity in Caribbean islands: what we know, what we need to know, and building capacity for effective adaptation* (CANARI Technical Report No. 386) (p. 28). Trinidad, West Indies: Caribbean Natural Resources Institute.

Dellink, R., Elzen, M. den, Aiking, H., Bergsma, E., Berkhout, F., Dekker, T., & Gupta, J. (2009). Sharing the burden of financing adaptation to climate change. *Global Environmental Change*, *19*(4), 411–421.

D' Entreves, M. P. (2009). Hannah Arendt. *Stanford Encyclopedia of Philosophy*, *2009*(Spring).

Dramstad, W. E., & Fjellstad, W. J. (2013). Twenty-five years into 'our common future': are we heading in the right direction? *Landscape Ecology*, *28*(6), 1039–1045.

Drexhage, J., & Murphy, D. (2010). *Sustainable Development: From Brundtland to Rio 2012* (Background Paper) (p. 26). United Nations Headquarters, New York: United Nations High Level Panel on Global Sustainability.

Dyke, F. V. (2008). *Conservation Biology: Foundations, Concepts, Applications* (2nd ed.). Springer Science & Business Media.

Earth Charter Initiative (ECI). (2000). *The Earth Charter* (p. 4). San José, Costa Rica: The Earth Charter Initiative.

Eckstein, M. A. (1983). The Comparative Mind. *Comparative Education Review*, *27*(3), 311–322.

Economic Development Board of Trinidad and Tobago (EDBTT). (2011). North East Tobago. Retrieved from http://edb.planning.gov.tt/growth-poles/north-east-tobago/

EDG, & Kairi Consultants Ltd. (2003). *Tobago North East Management Plan* (p. 440). Oxford, UK: Environment & Development Group.

Editor. (2007). The great divide. *Nature*, *450*(7167), 135–136.

Edmondson, A. C. (2012). Teamwork On the Fly. *Harvard Business Review*, *90*(4), 72–80.

Ehnert, I. (2009). *Sustainable Human Resource Management: A Conceptual and Exploratory Analysis from a Paradox Perspective*. Springer.

Election and Boundaries Commission of Trinidad and Tobago (E&BCTT). (2014). Operations of the E&BC. Retrieved 5 April 2014, from http://www.ebctt.com/ourOperations.php

Esler, K., Prozesky, H., Sharma, G., & McGeoch, M. (2010). How wide is the 'knowing-doing' gap in invasion biology? *Biological Invasions*, *12*(12), 4065–4075.

Fisher, R., & Shapiro, D. (2005). *Beyond Reason: Using Emotions as You Negotiate*. Penguin.

Flower, J. (2011, July). *Tobagan fishers' livelihood security and attitudes to coastal management in the context of declining catches* (MSc in Tropical Coastal Management). Newcastle University, Newcastle upon Tyne, United Kingdom.

Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, *30*, 441–473.

Folke, C. S., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience Thinking: Integrating Resilience, Adaptability and Transformability. *Ecology and Society*, *15*(4), 20.

Folke, C. S., Chapin, F. S., & Olsson, P. (2009). Transformations in Ecosystem Stewardship. In F. S. Chapin, G. P. Kofinas, & C. S. Folke (Eds.), *Principles of Ecosystem Stewardship* (pp. 103–125). Springer.

Ford, J., & Backoff, R. (1988). Organizational change in and out of dualities and paradox. In R. E. Quinn & K. S. Cameron (Eds.), *Paradox and Transformation: Toward a Theory of Change in Organization and Management* (pp. 81–121). Pensacola, FL: Ballinger Pub. Co.

Forester, J. (2006). Making Participation Work When Interests Conflict: Moving from Facilitating Dialogue and Moderating Debate to Mediating Negotiations. *Journal of the American Planning Association*, *72*(4), 447–456.

Foster, J. B., & Clark, B. (2009). The Paradox of Wealth: Capitalism and Ecological Destruction. *Monthly Review: An Independent Socialist Magazine*, *61*(6), 1–18.

Frame, B. (2008). Wicked, messy, and clumsy: longterm frameworks for sustainability. *Environment and Planning C*, *26*(6), 1113–1128.

Frye-Levine, L. A. (2012). Sustainability Through Design Science: Re-Imagining Option Spaces Beyond Eco-Efficiency. *Sustainable Development*, *20*(3), 166–179.

Funtowicz, S., & Ravetz, J. (2008). Beyond Complex Systems: Emergent Complexity and Social Solidarity. In D. Waltner-Toews, J. J. Kay, & N.-M. E. Lister (Eds.), *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability* (pp. 309–322). Columbia University Press.

Gasparatos, A., El-Haram, M., & Horner, M. (2009). The argument against a reductionist approach for measuring sustainable development performance and the need for methodological pluralism. *Accounting Forum*, *33*(3), 245–256.

Gibson, K. W., Hall, C. L., & Kramer, D. L. (2006). Time-concentrated sampling: a simple strategy for information gain at a novel, depleted patch. *Canadian Journal of Zoology*, *84*(10), 1513–1521.

Gibson, R. B., Hassan, S., Holtz, S., Tansey, J., & Whitelaw, G. (2005). *Sustainability Assessment: Criteria and Processes*. Earthscan.

Gladwell, M. (2006). *The Tipping Point: How Little Things Can Make a Big Difference*. Hachette Digital, Inc.

Goldstein, B. (2010). The Weakness of Tight Ties: Why Scientists Almost Destroyed the Coachella Valley Multispecies Habitat Conservation Plan in Order to Save it. *Environmental Management*, *46*(2), 268–284.

Gomory, R. E. (1995). The known, the unknown and the unknowable. *Scientific American*, *272*(6), 120.

Gray, B. (2004). Strong opposition: frame-based resistance to collaboration. *Journal of Community & Applied Social Psychology*, *14*(3), 166–176.

Gray, E., & Tall, D. (2007). Abstraction as a natural process of mental compression. *Mathematics Education Research Journal*, *19*(2), 23–40.

Gross, M. (2010). *Ignorance and Surprise: Science, Society, and Ecological Design*. MIT Press.

Gunderson, L. H., & Holling, C. S. (Eds.). (2002). *Panarchy*. Washington: Island Press.

Hahn, T., Schultz, L., Folke, C., & Olsson, P. (2008). Social Networks as Sources of Resilience in Social-Ecological Systems. In J. Norberg & G. S. Cumming (Eds.), *Complexity Theory for a Sustainable Future* (pp. 119–148). New York: Columbia University Press.

Handegard, N. O., Boswell, K. M., Ioannou, C. C., Leblanc, S. P., Tjøstheim, D. B., & Couzin, I. D. (2012). The Dynamics of Coordinated Group Hunting and Collective Information Transfer among Schooling Prey. *Current Biology*, *22*(13), 1213–1217.

Handl, G. (2012). Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration), 1972 and the Rio Declaration on Envirronment and Development, 1992. *United Nations Audiovisual Library of International Law*, 11.

Happaerts, S. (2012). Are you Talking to us? How Subnational Governments Respond to Global Sustainable Development Governance. *Environmental Policy and Governance*, *22*(2), 127–142.

Harper, T. L., & Stein, S. M. (2006). *Dialogical Planning In A Fragmented Society: Critically Liberal, Pragmatic, Incremental*. New Brunswick, New Jersey: Center for Urban Policy Research.

Hawkes, J. (2001). *The Fourth Pillar of Sustainability: Culture's Essential Role in Public Planning*. Common Ground.

Helliwell, J., Layard, R., & Sachs, J. (2013). *World Happiness Report* (p. 156). New York, NY: Sustainable Development Solutions Network.

Hewitt-Taylor, J. (2012). Identifying, analysing and solving problems in practice. *Nursing Standard*, *26*(40), 35–41.

Higgins, M. (2011, October 11). Caribbean Beaches Dig Out From Massive Seaweed Invasion. *The New York Times*. New York, NY.

Hoegh-Guldberg, O., & Bruno, J. F. (2010). The Impact of Climate Change on the World's Marine Ecosystems. *Science*, *328*(5985), 1523–1528.

Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, *4*(1), 1–23.

Holling, C. S., & Gunderson, L. H. (2002). Resilience and Adaptive Cycles. In L. H. Gunderson & C. S. Holling (Eds.), *Panarchy: Understanding Transformations In Human And Natural Systems* (1st ed., pp. 25–62). Washington: Island Press.

Holling, C. S., Gunderson, L. H., & Ludwig, D. (2002a). In Quest of a Theory of Adaptive Change. In L. H. Gunderson & C. S. Holling (Eds.), *Panarchy: Understanding Transformations In Human And Natural Systems* (1st ed., pp. 3–24). Washington: Island Press.

Holling, C. S., Gunderson, L. H., & Peterson, G. D. (2002b). Sustainability and Panarchies. In L. H. Gunderson & C. S. Holling (Eds.), *Panarchy: Understanding Transformations In Human And Natural Systems* (1st ed., pp. 63–102). Washington: Island Press.

Holling, C. S., & Meffe, G. K. (1996). Command and Control and the Pathology of Natural Resource Management. *Conservation Biology*, *10*(2), 328–337.

Hopwood, B., Mellor, M., & O'Brien, G. (2005). Sustainable development: mapping different approaches. *Sustainable Development*, *13*(1), 38–52.

Horlick-Jones, T., & Sime, J. (2004). Living on the border: knowledge, risk and transdisciplinarity. *Futures*, *36*(4), 441–456.

Innes, J. E. (1995). Planning Theory's Emerging Paradigm: Communicative Action and Interactive Practice. *Journal of Planning Education and Research*, *14*(3), 183–189.

Innes, J. E., & Booher, D. E. (2010). *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy*. London & New York: Taylor & Francis.

Institute of Marine Affairs (IMA). (2002). *A management plan for the Speyside Reefs Marine Park, Tobago* (p. 101). Trinidad & Tobago, West Indies: Institute for Marine Affairs.

Institute of Marine Affairs (IMA). (2011, September). The mysteries of Sargassum. *Trinidad Express Newspaper*. Trinidad & Tobago, West Indies.

Intergovernmental Panel on Climate Change (IPCC). (2013). Summary for Policymakers. In T. F. Stocker, D. Qin, Plattner, G.K., M. Tignor, S. K. Allen, J. Boschung, … P. M. Midgley (Eds.),

Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (pp. 3–29). Cambridge, UK: Cambridge University Press.

Jahn, T., Bergmann, M., & Keil, F. (2012). Transdisciplinarity: Between mainstreaming and marginalization. *Ecological Economics*, *79*, 1–10.

Jones, N. A., Ross, H., Lynam, T., Perez, P., & Leitch, A. (2011). Mental models: an interdisciplinary synthesis of theory and methods. *Ecology and Society*, *16*(1), 46.

Kahane, A. (2010). *Power and Love*. San Francisco, CA: Berrett-Koehler Publishers.

Kahane, A. (2012). *Transformative Scenario Planning: Working Together to Change the Future*. San Francisco, CA: Berrett-Koehler Publishers.

Kairi Consultants Ltd. (2006). *Comprehensive Economic Development Plan for Tobago: 2006-2010* (p. 282). Tobago, West Indies: Tobago House of Assembly.

Kairi Consultants Ltd. (2012a). *CEDP 2.0: Redoubling the Effort* (No. 1) (p. 162). Tobago, West Indies: Tobago House of Assembly.

Kairi Consultants Ltd. (2012b). *Review of the Comprehensive Economic Development Plan 2006-2010: Accomplishments, Shortfalls, Lessons Learned* (p. 108). Tobago, West Indies: Tobago House of Assembly.

Kay, J. J. (2008a). An Introduction to Systems Thinking. In D. Waltner-Toews, J. J. Kay, & N.-M. E. Lister (Eds.), *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability* (pp. 3–13). Columbia University Press.

Kay, J. J. (2008b). Framing the Situation: Developing a System Description. In D. Waltner-Toews, J. J. Kay, & N.-M. E. Lister (Eds.), *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability* (pp. 15–36). Columbia University Press.

Kelso, J. A. S., & Engstrøm, D. A. (2006). *The complementary nature*. MIT Press.

Kemp, R., & Martens, P. (2007). Sustainable development: how to manage something that is subjective and never can be achieved. *Sustainability: Science, Practice, & Policy*, *3*(2), 5–14.

Klein, J. T. (2004). Interdisciplinarity and complexity: an evolving relationship. *Emergence: Complexity & Organization*, *6*(1), 2–10.

Klimoski, R. (1991). Theory presentation in human resource management. *Human Resource Management Review*, *1*(4), 253–271.

Knight, A. T., Cowling, R. M., Rouget, M., Balmford, A., Lombard, A. T., & Campbell, B. M. (2008). Knowing But Not Doing: Selecting Priority Conservation Areas and the Research–Implementation Gap. *Conservation Biology*, *22*(3), 610–617.

Knight, F. H. (1921). *Risk, Uncertainty and Profit*. Hart, Schaffner & Marx; Houghton Mifflin Co.

Knights, D., & Clarke, C. A. (2013). It's a Bittersweet Symphony, this Life: Fragile Academic Selves and Insecure Identities at Work. *Organization Studies*.

Kofinas, G. P. (2009). Adaptive Co-management in Social–Ecological Governance. In F. S. Chapin, G. P. Kofinas, & C. S. Folke (Eds.), *Principles of Ecosystem Stewardship* (pp. 77–101). Springer.

Kunz, N. C., Moran, C. J., & Kastelle, T. (2013). Conceptualising 'coupling' for sustainability implementation in the industrial sector: a review of the field and projection of future research opportunities. *Journal of Cleaner Production*, *53*, 69–80.

Lang, D. J., Wiek, A., Bergmann, M., Stauffacher, M., Martens, P., Moll, P., … Thomas, C. J. (2012). Transdisciplinary research in sustainability science: practice, principles, and challenges. *Sustainability Science*, *7*(1), 25–43.

Leach, M., Rockström, J., Raskin, P., Scoones, I., Stirling, A. C., Smith, A., … Olsson, P. (2012). Transforming Innovation for Sustainability. *Ecology and Society*, *17*(2), 452–458.

Levin, S. (1999). *Fragile Dominion*. Basic Books.

Lewis, M. W. (2000). Exploring Paradox: Toward a More Comprehensive Guide. *The Academy of Management Review*, *25*(4), 760–776.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hills, California: SAGE.

Lindblom, C. E. (1959). The Science of 'Muddling Through'. *Public Administration Review*, *19*(2), 79–88.

Lindblom, C. E. (1979). Still Muddling, Not Yet Through. *Public Administration Review*, *39*(6), 517–526.

Liu, J., Dietz, T., Carpenter, S. R., Alberti, M., Folke, C., Moran, E., … Taylor, W. W. (2007). Complexity of Coupled Human and Natural Systems. *Science*, *317*(5844), 1513–1516.

Lopez, U., Gautrais, J., Couzin, I. D., & Theraulaz, G. (2012). From behavioural analyses to models of collective motion in fish schools. *Interface Focus*, 1-15.

Lozano, R. (2008). Envisioning sustainability three-dimensionally. *Journal of Cleaner Production*, *16*(17), 1838–1846.

Macagno, T. (2013). A Model for Managing Corporate Sustainability. *Business and Society Review*, *118*(2), 223–252.

Mallela, J., Parkinson, R., & Day, O. (2010). An assessment of coral reefs in Tobago. *Caribbean Journal of Science*, *46*(1), 83–87.

Margules, C., & Pressey, R. (2000). Systematic conservation planning. *Nature*, *405*(6783), 243–253.

Matthew, R. A., & Hammill, A. (2009). Sustainable development and climate change. *International Affairs*, *85*(6), 1117–1128.

McDonough, W., & Braungart, M. (2010). *Cradle to Cradle: Remaking the Way We Make Things*. Farrar, Straus and Giroux.

Meadows, D. H. (2008). *Thinking in systems: a primer*. Chelsea Green Publishing.

Meadows, D. H., Randers, J., & Meadows, D. L. (2005). *The Limits to Growth*. London, U.K.: Earthscan.

Merrie, A., & Olsson, P. (2014). An innovation and agency perspective on the emergence and spread of Marine Spatial Planning. *Marine Policy*, *44*, 366–374.

Midgley, M. (2004). *The Myths We Live by*. Routledge.

Millennium Ecosystem Assessment (2003). *Ecosystems and Human Well-Being: A Framework For Assessment* (1st ed.). Island Press.

Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-Being: Our Human Planet: Summary for Decision Makers* (1st ed.). Island Press.

Ministry of Planning and Sustainable Development of Trinidad and Tobago (MPSD). (2012). *Medium Term Policy Framework: Innovation for Lasting Prosperity* (p. 124). Trinidad & Tobago, West Indies: Ministry of Planning & Sustainable Development.

Moore, R. (1985). *Niels Bohr: The Man, His Science, & the World They Changed*. MIT Press.

Morawski, J. G. (2005). Reflexivity and the psychologist. *History of the Human Sciences*, *18*(4), 77–105.

Murphy, K. (2012). The social pillar of sustainable development: a literature review and framework for policy analysis. *Sustainability: Science, Practice, & Policy*, *8*(1), 15–29.

Myers-Smith, I. H., Trefry, S. A., & Swarbrick, V. J. (2012). Resilience: Easy to use but hard to define. *Ideas in Ecology and Evolution*, *5*, 44–53.

Norberg, J., & Cumming, G. S. (2008). Introduction. In J. Norberg & G. S. Cumming (Eds.), *Complexity Theory for a Sustainable Future* (pp. 1–13). New York: Columbia University Press.

Nyström, M., Graham, N., Lokrantz, J., & Norström, A. (2008). Capturing the cornerstones of coral reef resilience: linking theory to practice. *Coral Reefs*, *27*(4), 795–809.

O'Connor, M. (2006). The 'Four Spheres' framework for sustainability. *Ecological Complexity*, *3*(4), 285–292.

Open Working Group of the General Assembly on Sustainable Development Goals (OWGSDG). (2013). *Progress report of the Open Working Group of the General Assembly on Sustainable Development Goals* (p. 30). New York: United Nations.

Ostrom, E. (2008). Frameworks and theories of environmental change. *Global Environmental Change*, *18*(2), 249–252.

Ottaway, R. N. (1983). The Change Agent: A Taxonomy in Relation to the Change Process. *Human Relations*, *36*(4), 361–392.

Oxford Engilsh Dictionary Online. (2013, September). tension, n. *Oxford English Dictionary*. Oxford, UK: Oxford University Press.

Patton, M. Q. (2011). *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use*. New York & London: Guilford Press.

Pelenc, J., Lompo, M. K., Ballet, J., & Dubois, J.-L. (2013). Sustainable Human Development and the Capability Approach: Integrating Environment, Responsibility and Collective Agency. *Journal of Human Development and Capabilities*, *14*(1), 77–94.

Pohl, C., Kerkhoff, L., Hadorn, G. H., & Bammer, G. (2008). Integration. In G. H. Hadorn, H. Hoffmann-Riem, S. Biber-Klemm, W. Grossenbacher-Mansuy, D. Joye, C. Pohl, … E. Zemp (Eds.), *Handbook of Transdisciplinary Research* (pp. 411–424). Springer Netherlands.

Poole, M. S., & Van de Ven, A. H. (1989). Using Paradox to Build Management and Organization Theories. *The Academy of Management Review*, *14*(4).

Pritchard, D. (2012). Wittgenstein and the groundlessness of our believing. *Synthese*, *189*(2), 255–272.

Pullin, A. S., Knight, T. M., Stone, D. A., & Charman, K. (2004). Do conservation managers use scientific evidence to support their decision-making? *Biological Conservation*, *119*(2), 245–252.

Putnam, H. (1987). *The Many Faces of Realism: the Paul Carus Lectures*. La Salle, Ill.: Open Court.

Putnam, H. (1990). *Realism with a Human Face*. (J. Conant, Ed.). Cambridge, Massachusetts: Harvard University Press.

Quental, N., Lourenço, J. M., & da Silva, F. N. (2011). Sustainable development policy: goals, targets and political cycles. *Sustainable Development*, *19*(1), 15–29.

Ramberg, B. (2009). Richard Rorty. *Stanford Encyclopedia of Philosophy*, *2009* (Spring).

Ramirez, G. A. (2012). Sustainable development: paradoxes, misunderstandings and learning organizations. *The Learning Organization*, *19*(1), 58–76.

Rampersad, I. (2010). People-Centered Governance in Trinidad and Tobago. *Peace Review*, *22*(4), 453–460.

Raudsepp-Hearne, C., Peterson, G. D., Tengö, M., Bennett, E. M., Holland, T., Benessaiah, K., … Pfeifer, L. (2010). Untangling the Environmentalist's Paradox: Why is Human Well-Being Increasing as Ecosystem Services Degrade? *BioScience*, *60*(8), 576–589.

Redpath, S. M., Young, J., Evely, A., Adams, W. M., Sutherland, W. J., Whitehouse, A., … Gutiérrez, R. J. (2013). Understanding and managing conservation conflicts. *Trends in Ecology & Evolution*, *28*(2), 100–109.

Reed, B. (2011). Certainty. *Stanford Encyclopedia of Philosophy*, *2012* (Winter).

Reid, W. V., Mooney, H. A., Cropper, A., Capistrano, D., Carpenter, S. R., Chopra, K., … Zurek, M. B. (2005). *Ecosystems and Human Well-Being: Synthesis* (1st ed.). Washington DC: Island Press.

Rittel, H. W. ., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, *4*(2), 155–169.

Robinson, E. J. H., Franks, N. R., Ellis, S., Okuda, S., & Marshall, J. A. R. (2011). A Simple Threshold Rule Is Sufficient to Explain Sophisticated Collective Decision-Making. *PLoS ONE*, *6*(5), e19981.

Robinson, J. (2004). Squaring the circle? Some thoughts on the idea of sustainable development. *Ecological Economics*, *48*(4), 369–384.

Robinson, J. (2011). Ethical pluralism, pragmatism, and sustainability in conservation practice. *Biological Conservation*, *144*(3), 958–965.

Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin, F. S., Lambin, E. F., … Foley, J. A. (2009). A safe operating space for humanity. *Nature*, *461*(7263), 472–475.

Rogers, D. S., Duraiappah, A. K., Antons, D. C., Munoz, P., Bai, X., Fragkias, M., & Gutscher, H. (2012). A vision for human well-being: transition to social sustainability. *Current Opinion in Environmental Sustainability*, *4*(1), 61–73.

Rorty, R. (1980). *Philosophy and the Mirror of Nature*. Princeton University Press.

Rorty, R. (1989). *Contingency, Irony, and Solidarity*. Cambridge University Press.

Russell, J. Y. (2010). A Philosophical Framework for an Open and Critical Transdisciplinary Inquiry. In V. A. Brown, J. A. Harris, & J. Y. Russell (Eds.), *Tackling Wicked Problems: Through the Transdisciplinary Imagination* (pp. 31–60). London: Earthscan.

Saridakis, G., Sookram, S., & Mohammed, A.-M. (2013). Does crime deter UK tourists from visiting Trinidad and Tobago? *Tourism Economics*, *19*(4), 959–966.

Schön, D. A. (1983). *The Reflective Practitioner: How Professionals Think in Action*. Basic Books.

Senge, P. M. (2010). *The necessary revolution: working together to create a sustainable world*. New York: Broadway Books.

Singh, R. K., Murty, H. R., Gupta, S. K., & Dikshit, A. K. (2012). An overview of sustainability assessment methodologies. *Ecological Indicators*, *15*(1), 281–299.

Smeyers, P., & Burbules, N. C. (2006). Education as Initiation into Practices. *Educational Theory*, *56*(4), 439–449.

Smith, D., Converse, S., Gibson, K. W., Moehrenschlager, A., Link, W., Olsen, G., & Maguire, K. (2011). Decision analysis for conservation breeding: maximizing production for reintroduction of whooping cranes. *Journal of Wildlife Management*, *75*(3), 501–508.

Smith, T. (2011). Using critical systems thinking to foster an integrated approach to sustainability: a proposal for development practitioners. *Environment, Development and Sustainability*, *13*(1), 1–17.

Smith, W. K., & Lewis, M. W. (2011). Toward a Theory of Paradox: A Dynamic Equilibrium Model of Organizing. *Academy of Management Review*, *36*(2), 381–403.

Snowden, D. J., & Boone, M. E. (2007). A Leader's Framework for Decision Making. *Harvard Business Review*, *85*(11), 68–76.

Søgaard, V. (2012). Contingent Eclecticism. *Journal for the Theory of Social Behaviour*, *42*(1), 20–39.

Sommers, F. G., & Dineen, T. (1984). *Curing Nuclear Madness: A New-age Prescription for Personal Action*. Toronto, Canada: Methuen.

Sorensen, R. (2013). Epistemic Paradoxes. *Stanford Encyclopedia of Philosophy (Spring)*.

Spangenberg, J. H. (2004). Reconciling sustainability and growth: criteria, indicators, policies. *Sustainable Development*, *12*(2), 74–86. doi:10.1002/sd.229

Stacey, R. (2012). *Tools and Techniques of Leadership and Management: Meeting the Challenge of Complexity*. New York: Routledge.

Stacey, R. D. (2009). *Complexity and Organizational Reality: Uncertainty and the Need to Rethink Management after the Collapse of Investment Capitalism*. Routledge.

Staff. (2010, November). Damage from Tomas now estimated at $45m. *Tobago News*. Tobago, West Indies.

Staff. (2011, June). Firefighters up to the challenge. *Tobago News*. Tobago, West Indies.

Stanley, J. (2003). Context, interest relativity and the sorites. *Analysis*, *63*(280), 269–281.

Starbuck, W. H. (2004). *Vita Contemplativa*: Why I Stopped Trying to Understand the Real World. *Organization Studies*, *25*(7), 1233–1254.

Starzomski, B. (2012). Clarity, confusion, and idea refining in ecology. *Ideas in Ecology and Evolution*, *5*, 54–56.

Stockholem Resilience Centre. (2007, December 18). What is resilience? - Stockholm Resilience Centre [text]. Retrieved 19 September 2014, from http://www.stockholmresilience.org/21/research/what-is-resilience.html

Syne, S.-M. (2011, June 1). *Evolution of the Speyside Eco-Marine Park Rangers from a Community-Based Management Project: Contributions of the Global Environment Facility – Small Grants Programme in Tobago*. Paper presented at the International Conference on the Sustainable Development of Coastal Communities: Challenges and Solutions, Port of Spain, Trinidad.

Taleb, N. N. (2010). *The black swan: the impact of the highly improbable*. New York: Random House Trade Paperbacks.

Tress, B., Tress, G., & Fry, G. (2005). Integrative studies on rural landscapes: policy expectations and research practice. *Landscape & Urban Planning*, *70*(1-2), 177–191.

United Nations Department of Economic and Social Affairs (UNDESA). (2013). *World Economic and Social Survey 2013: Sustainable Development Challenges* (No. E/2013/50/Rev. 1 ST/ESA/344) (p. 216). New York, NY: United Nations Department of Economic and Social Affairs.

United Nations Environment Programme (UNEP). (2012). *Global Environment Outlook 5: Environment for the future we want*. Nairobi, Kenya: UNEP.

United Nations General Assembly (UNGA). (2000). *United Nations Millennium Declaration* (Resolution adopted by the General Assembly No. A /RES/55/2) (p. 9). New York: United Nations.

United Nations General Assembly (UNGA). (2005). *2005 World Summit Outcome* (Resolution adopted by the General Assembly No. A /RES/60/1) (p. 38). New York: United Nations.

United Nations General Assembly (UNGA). (2012). *The Future We Want* (Resolution adopted by the General Assembly No. A /RES/66/288) (p. 53). New York: United Nations.

Valéry, P. (1942). *Mauvaises pensées et autres*. Paris: Gallimard.

Van Bochove, J.-W., & McVee, M. (2012). *Tobago Coastal Ecosystems Mapping Project Final Report: Results of Community and Scientific Work April 2007 - June 2011* (p. 78). Puttenham, UK: Coral Cay Conservation.

Van Kerkhoff, L. (2014). Developing integrative research for sustainability science through a complexity principles-based approach. *Sustainability Science*, *9*(2), 143–155.

Van Kerkhoff, L., & Lebel, L. (2006). Linking Knowledge and Action for Sustainable Development. *Annual Review of Environment and Resources*, *31*(1), 445–477.

Waas, T., Hugé, J., Verbruggen, A., & Wright, T. (2011). Sustainable Development: A Bird's Eye View. *Sustainability*, *3*(12), 1637–1661.

Wadsworth, Y. (2011). *Building In Research and Evaluation: Human Inquiry for Living Systems*. Left Coast Press.

Walker, B. H., Gunderson, L. H., Kinzig, A. P., Folke, C., Carpenter, S. R., & Schultz, L. (2006). A handful of heuristics and some propositions for understanding resilience in social-ecological systems. *Ecology and Society*, *11*(1), 13.

Walker, B., Holling, C. S., Carpenter, S. R., & Kinzig, A. P. (2004). Resilience, Adaptability and Transformability in Social–ecological Systems. *Ecology and Society*, *9*(2), 5.

Walker, B., & Salt, D. (2012). *Resilience Practice: building capacity to absorb disturbance and maintain function*. Washington: Island Press.

Walker, B., & Salt, D. (2006). *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Island Press.

Walker, G., & Gibson, K.W. (in press). The First Documented Evidence of a Rookery of the Critically Endangered Hawksbill Sea Turtle (*Eretmochelys imbricata*) in North East Tobago. *Chelonian Conservation and Biology*.

Watkins, S. C., Swidler, A., & Hannan, T. (2012). Outsourcing Social Transformation: Development NGOs as Organizations. *Annual Review of Sociology*, *38*(1), 285–315.

Weick, K. E. (1995). *Sensemaking in Organizations*. SAGE.

Weick, K. E. (2011). Reflections: Change Agents As Change Poets – On Reconnecting Flux and Hunches. *Journal of Change Management*, *11*(1), 7–20.

Weinberg, G. M. (1975). *An introduction to general systems thinking*. Wiley.

Westley, F. (2002). The Devil in the Dynamics: Adaptive Management on the Front Lines. In L. Gunderson & C. S. Holling (Eds.), *Panarchy: Understanding Transformations In Human And Natural Systems* (1st ed., pp. 333–360). Washington DC: Island Press.

Westley, F., Olsson, P., Folke, C., Homer-Dixon, T., Vredenburg, H., Loorbach, D., … van der Leeuw, S. (2011). Tipping Toward Sustainability: Emerging Pathways of Transformation. *AMBIO: A Journal of the Human Environment*, *40*(7), 762–780.

Westley, F. R., Tjornbo, O., Schultz, L., Olsson, P., Folke, C., Crona, B., & Bodin, Ö. (2013). A Theory of Transformative Agency in Linked Social-Ecological Systems. *Ecology and Society*, *18*(3).

Westley, F., Zimmerman, B., & Patton, M. (2006). *Getting to Maybe: How the World Is Changed*. Random House Canada.

Westover, J. H. (2010). Managing Organizational Change: Change Agent Strategies and Techniques to Successfully Managing the Dynamics of Stability and Change in Organizations. *International Journal of Management & Innovation*, *2*(1), 45–50.

Wharton, S. (2004, December). Living with geoharzards. *Tobago News*, p. 4. Tobago.

White, G. (2009). Trinidad & Tobago. In *Important Bird Areas Americas: Priority sites for biodiversity conservation* (pp. 351–356). Quito, Ecuador: BirdLife International.

Whitehead, A. N. (1925). *Science and the Modern World*. New York: The New American Library.

Whitehead, A. N. (1926). The Education of an Englishman. *The Atlantic Monthly*, *138*, 192-198.

Whitehead, A. N. (1978). *Process and Reality*. (D. R. Griffin & D. W. Sherburne, Eds.) (Corrected Edition.). New York: The Free Press.

Wilson, G., & Shpall, S. (2012). Action. *Stanford Encyclopedia of Philosophy*, *2012* (Summer).

Wittgenstein, L. (1974). *On Certainty*. (D. Paul & G. E. M. Anscombe, Trans., G. E. M. Anscombe & G. H. von Wright, Eds.) (Reprinted with corrections and indices.). Oxford, UK: Blackwell Publishing Ltd.

Wittgenstein, L. (1998). *Culture and Value: A Selection from the Posthumous Remains*. (P. Winch, Trans., G. H. von Wright, H. Nyman, & A. Pichler, Eds.) (2nd ed.). Oxford, UK: Blackwell Publishing Ltd.

Wittgenstein, L. (2009). *Philosophical Investigations*. (P. M. S. Hacker & J. Schulte, Eds.) (4th ed.). United Kingdom: Blackwell Publishing Ltd.

Woodcock, L. (2010, June 3). *Islands of inequality: the environmental history of Tobago and the crisis of development and globalisation in the Caribbean 1763–2007* (PhD). University of Sussex, Sussex, U.K.

World Commission on Environment and Development (WCED). (1987). *Our Common Future*. Oxford, UK: Oxford University Press.

World Summit on Sustainable Development (WSSD). (2002). *Johannesburg Declaration on Sustainable Development* (No. A/Conf.199/20) (p. 5). Johannesburg, South Africa: United Nations.

Ziegler, R., & Ott, K. (2011). The quality of sustainability science: a philosophical perspective. *Sustainability: Science, Practice & Policy*, *7*(1), 31.

Zimmerman, J. B. (2005). EPA's P3 - People, Prosperity, and Planet - Award. *Sustainability: Science, Practice & Policy*, *1*(2), 32–33.