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Chapter 1

Social science at work on the world: introducing theory, context, and practice

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I can't help but dream of the kind of criticism that would try not to judge but to bring an oeuvre, a book, a sentence, an idea to life; it would light fires, watch grass grow, listen to the wind, and catch the sea foam in the breeze and scatter it. It would multiply not judgments but signs of existence; it would summon them, drag them from their sleep. Perhaps it would invent them sometimes – all the better. All the better. [...] It would not be sovereign or dressed in red. It would bear the lightning of possible storms (Foucault, 1997, p. 323).

1.1 A challenge and an opportunity: setting the scene

The production of knowledge for public good has to be done differently. A version of this challenge can be heard via television and radio news, when concern is expressed about both the products and processes of science (for example the case of genetically modified maize trials (Riordan, 2000). Different ways of making knowledge are also called for in policy-making rooms when an absence of appropriate evidence is identified to make decisions about the use of natural resources (for example when a local council is responding to the implications of a recent drought). Newspaper editorials and blog sites discuss a 'crisis of science', with public trust of scientific expertise dropping (OPMSAC, 2012). Others concerned about the economic productivity of New Zealand suggest greater investment in research and development and technological innovation. However, absent from these calls to produce knowledge differently is reference to knowledge of the production of differences in the world.

Through the quote above Foucault invites us to do and think otherwise. This pragmatic and philosophical challenge is presented through a variety of settings for a range of reasons. It weaves across work in human geography over the last 2 decades developing non-representational theories (Anderson & Harrison, 2010; Thrift, 2000a, 2004b; Le Heron, Le Heron & Lewis, 2011). This dissertation contributes to the

knowledge and politics of knowledge production by exploring the creation of difference (for example human/non-human, nature/society, and citizen/consumer) through knowledge systems. In doing so, possibilities of enactive social science (Law & Urry, 2004) are identified and circulated.

I got caught up in the challenge of creating new ways of producing knowledge while working in one of New Zealand's Crown Research Institutes during the period 2004–2012. This was when the metropolis 'Auckland' (the city I lived and worked in) was being reimagined and repositioned in New Zealand's social landscape. The Labour government's Sustainable Development Programme of Action (SDPOA) was just gathering some momentum. Launched in 2003 through the Department of the Prime Minster and Cabinet (DPMC, 2003), the SDPOA was supported through a whole-of-government, multi-agency response in Auckland that came to be known as the Auckland Sustainable Cities Programme (ASCP). This programme fostered research policy links via a "Connecting research and practice" series of workshops where we attempted (and occasionally succeeded) to align research time-frames and milestones with programme objectives across a variety of organisations (ASCP, 2004). The stated aim of these workshops was to increase the relevance and uptake of research on sustainable urban development by linking the research programmes with 'real life' urban development initiatives, policy makers, designers, and development practitioners. Yet we were not just producing new knowledge through new practices, we were also altering the balance of what was 'private or public', 'individual or collective', 'human or non-human', 'knowledge or action', and even what was 'science and social science'. We were, intentionally or not, acting politically. It was only when attention was given to the production of difference, the exploration of boundaries and assemblages, that these additional political achievements became visible.

Here I pause to comment on the importance of understanding the world as saturated (*sensu* Foucault) with power. I do so to introduce the perspective on methodology which shaped this dissertation. Geographers are increasingly working with awareness that politics is not just about governments and political parties (see Agnew, Mitchell & Toal, 2003; Braun & Whatmore, 2010). Politics make material and discursive social practices; the everyday things that people do and think

individually and collectively. Material characteristics of social practices (e.g. research methods) can be understood as those which involve the organisation, use or mobility of things. Discursive practices involve and mobilise ideas, language, symbols and meanings. Description of the world (and this thesis) is served by distinguishing the material from the discursive – but they are most usefully understood as inherently bound – responding to and enabling each other. Writing a dissertation, a funding contract or a policy briefing are all discursive and material practices. They are performative enactments, layered with politics. Larner, Le Heron and Lewis (2007) extend our thinking of the material-discursive aspects of politics. They work with political projects as

> *strategically mobilised narratives that marshal diverse and often contradictory interests and assemble institutions, governmentalities, political and economic trajectories, and socio-spatial imaginaries such as community or industry. Such projects will take different, situated forms and there will always be multiple co-constitutive projects, which may give coherence to particular spaces and moments (Lewis, 2011, p.227).*

This dissertation is informed by Larner, Le Heron and Lewis's (2007) insights about globalization as an interventionist political project in New Zealand repositioning the global as a relational scale of governance. These geographers have shown how formation of the knowledge economy coupled with creative cities has been central to globalizing projects. Industry has been re-assembled and urban spaces reproduced as new creative actors emerged in a global market for education, waterfront development and design innovations (Larner, Le Heron & Lewis, 2007). Relationships between crown research institutes (CRIs) and universities, social scientists and scientists, urban and rural, policy and practice, theory and method were all being shaped in response to these political projects (Lewis, 2011).

Politics narrated as the usability and relevance of research were visible in a range of settings. Increasingly, people across science-policy-practice communities responded to challenges of research relevance by calling for a new mode of knowledge production (Gibbons et al., 1994), with greater links across disciplines, professional practices and non-governmental organisations (Kinzig et al., 2000; Funtowicz & Ravetz, 1993). This new research was expected to engage multiple interests in

diverse ways in order to reach broad consensus and increase uptake of findings. Interventions for new ways of producing knowledge have become central to approaches for sustainable development (Kates, Clark, Corell, Hall, & Jaeger, 2001) as well as to approaches to building a knowledge economy focused on innovating for increased productivity (Rooney, 2003).

Increased attention to the multiplicity of interests and ways of getting involved in knowledge production opens up questions about how and when consensus can be achieved and how difference of perspectives and conflicting outcomes are understood and worked with. For many this has led to a focus on the systems and process of knowledge transfer across science, policy and practice. The 'black box' of science has been challenged and more attention paid to the iterative processes of science-policy transfer. Post-normal (Funtowicz & Ravetz, 1993) and Sustainability Sciences (Kates et al., 2001) have emerged, along with greater interest in science-policy studies (Nutley, 2007) and the formation of boundary organisations (Funtowicz & Ravetz, 1993) and resilient systems (Adger, 2000; Norris, Stevens, Pfefferbaum, Wyche & Pfefferbaum, 2008). All these approaches point to the importance of understanding links between science and development and the role politics plays in both the creation and implementation of knowledge.

1.2 Social science methodologies shape sustainable development knowledge and practice

This dissertation asks how a new social science of sustainable development might be brought into being in and through the contested spaces generated in this questioning of the production of knowledge for public good. To refresh social research methodologies and broader practices of social science whilst also intentionally participating in the politics of sustainable development research, this dissertation provides a situated, enactive enquiry focused on the making of knowledge-action relationships. Heuristics of *traces*, *spaces*, *trajectories*, and *boundaries* were developed to critically explore social research practices and the politics they enact. The *categories*, *actors* and *practices* circulating through social research (which was not always the same as social science) in a science context are examined with a sensitivity to the effects (impacts and consequences) and affects (non or precognitive embodied responses) of methodology (Anderson, 2010; Harvey 2007; Thrift, 2004a).

This dissertation addresses how questions and research relationships shape and are shaped by the objects and subjects of their analysis. This contribution was inspired by the sentiment that " methods talk liberates and deepens the conversation allowing us to more effectively connect politics and practice" (Barnes et al in Tickell et al, 2007 p. 24).

Politics and practice have tentatively been connected through this PhD research. The methodology addressed how I and my peers were researching sustainable development and explored the emerging and situated relationships between knowledge and action. Knowledge and action have for too long been over-represented through policy, research, and sustainable development discourses as distinct from one another. This dissertation arises from the premise that knowledge and action are co-constituted, they become at the same time – to know we act, to act we know, hence "to change our understanding is to change the world" (Law & Urry, 2004, p. 391). Accordingly an explication of knowing about knowing is provided. Since reality includes what might have happened (Dewsbury, 2000, p.481) I have worked with the idea of performativity to develop a

> *sense of experimentation that greets us every day; it is our on-going tentative endeavour to enact local utopias that seek to create situations for joyful encounters...that are creative in that they negotiate the new, enabling ways to 'go on' (Dewsbury, 2000, pp. 493–4).*

1.3 A response: addressing environmental politics by exploring practices

The enactments making knowledge and taking action for sustainable development documented in this thesis were resourced through my paid work with Manaaki Whenua Landcare Research Ltd. (Landcare Research). In 2003 funding for a Social Researcher to work in an interdisciplinary team was accessed from the Foundation for Research Science and Technology (FRST) Sustainable Cities and Settlements research funding pool. The team was formed to undertake integrative research in the field of sustainable urban development. It was Landcare Research's first large, consolidated foray into the urban field and was heavily informed by systems theory (Gunderson, Holling & Light, 1995) and experiences with integrated catchment management (Feeney, Allen, Lees & Drury, 2010) The development of this field of

research occurred at the same time as FRST were working with CRIs to move towards both stronger policy or 'end user' engagement in the research and a focus on the outcomes to which the research contributes. One aspect of the job which attracted me was I would be working in the company's brand new sustainable building situated on the University of Auckland's Tamaki campus (Figure 1). The location of the building was intended to integrate CRI research with that of the university. The design of the building also incorporated notions of integrated systems through technologies for re-using rain water.

Figure 1 Landcare Research's sustainably designed building in Auckland

PM Opens Unique 'Green' Science Building

(Landcare Research press release Thursday, 29 April 2004)

Landcare Research's new state-of-the-art, environmentally friendly science building will be officially opened by the Prime Minister this morning. Landcare Research has relocated its Auckland base from Mt Albert to the University of Auckland's Tamaki campus, to enhance linkages between the two organisations. Its new facility has been purpose-built to house 100 staff from both Landcare Research and the Ministry of Agriculture and Forestry, as well as University guests. It also houses millions of insects and thousands of fungi and bacteria within Landcare Research's nationally significant collections.

I saw all these as opportunities to be involved in the sort of collaborative and integrating research I had come to understand as necessary to move towards sustainable development for New Zealand (PCE, 2004). Informed by my everyday experiences of being located in a place of scientific knowledge production, I developed with my supervisors an inquiry to understand how my presence in this site, discursively and materially, was part of a sociality co-constituting both social science

and sustainable development. I examined the ways knowledge and actions were assembled in rooms; “rooms are points of entry into temporary coalitions of actors seeking to perform or enact worlds” (Le Heron, 2009, p.149). Policy and academic knowledge could therefore be approached as “the product of contingent outcomes of performance and practice” (Le Heron, 2009, p.149). This dissertation provides an exploration of social science identities, practices, and institutions, and how and where these were connected and separated from ecologies, science, technology and development.

1.5 A refreshed thesis enactment: and explication of methodologies

I invite the reader to practise with me the art of reading the world as multiply constituted. Through three narratives – intellectual, institutional, and personal – I present partial accounts of performances and possibilities of sustainable development research as constituted in my specific context. I have not presented all that was occurring, all that was assembled or enacted, nor do I predict the events, data or content will be detectable at any other time or in other places as I have described. What I provide is a framework for thinking through and writing about the production of nature-society knowledge that make a difference in the world. This methodology is in itself an experiment positioning an explication of methodologies. It is my intention that this work will resonate with if not be generalised to other people, places and times.

1.6 The work each chapter does

Chapters 2 and 3 locate this dissertation in both the epistemological and ontological problem of how social science contributes to the making of the world. These chapters show the tight relationship between epistemology and ontology and outline how an enacting social science might generate a wider set of possibilities for sustainable development transitions.

Chapter 4 describes how New Zealand social science for sustainable development is usefully understood as a complex assemblage of both intellectual and political projects making science and social science as well as practices shaping environments and economic development. This chapter introduces the reader to the context from

which the thesis research developed. Discourses of science, social science, and interdisciplinary research together with related funding decisions are outlined. All these influenced the institutional and organisational settings of sustainable development social science analysed in the following chapters.

Chapters 5 and 6 invite the reader to consider how objects and subjects of sustainable development research come into circulation, are acted on, and influence sustainable development outcomes. These chapters have been written for affect, in hope of generating hope. These empirical chapters do more than describe past events or findings: providing evidence for an enacting social science thesis, they do the work of framing, analysing, and suggesting alternative (at times conflicting) interpretations of knowledge-action relationships. As a result these chapters situate the knowledge production in details of specific people, places, times, and issues, AND address the mobility of these people, ideas, policies, and actions. In doing so the dualism of specific vs. generalisable knowledge is ruptured.

Chapter 7 provides a further reading of the empirical evidence by drawing on a co-production of knowledge framework. This chapter shows how both knowledge and social order were produced through the rooms and moments of sustainable development research in New Zealand. Possibilities for collective institutions were supported, capabilities for enactive research developed, and non-human actors were introduced as participants in research. A template for framing future social science contributions is also provided.

Chapter 8 concludes the dissertation, answering the question of ‘so what?’ by creating a pause and then signalling future directions for inquiry. The content and structure of the argument for enacting social science is restated and then current examples are identified as ways that might continue the momentum for enacting social science.

The appendix provides more detail of the research projects on which this dissertation reflects. This layer of empirical data or artifact evidence presents processes of analysis, and a range of research performances enacted. The texts were produced for publication from each of the research projects discussed in the core of this dissertation. The reader can first, become more familiar with the research projects

discussed, and second how these research projects were represented. The reader's attention is drawn to where and how practices of representation fixed people, places, and ideas, and re-produced dominant constricting categories and identities. In doing so a sense of a learning journey is expressed, but this journey has not been a linear progression, rather points of slippage and of un-learning can be identified. These points are discussed in the body of the dissertation.

Chapter 2

Theoretical perspectives: positioning enactive social science

> *Engagement with a thinker and her/his concepts, responses to an event, and the encounter with an empirical site or question are just some of the ways in which [we can] work with, experiment and make assemblage into an object of reflection. In this context legislating between uses gives way to affirming the vitality that follows from connecting a term to diverse problems, theories, sites and questions. What emerges is an ethic of theory-as-assemblage, i.e. as a constellation of singularities that holds together through difference rather than in spite of it, and that cultivates a provocative and fertile common ground (McFarlane & Anderson, 2011, p. 164).*

Colin McFarlane and Ben Anderson wrote the above statement in a special edition of Area (2011) focused on Assemblage and Geography. Inspired by this ethic of theory as assemblage, this chapter presents a constellation of ideas, heuristics, and approaches to theorising knowledge and action. Concepts of spaces, traces, assemblages, co-production of knowledge, co-learning, social science, sustainable development, knowledge, and agency are all worked with to highlight the material and discursive contexts of this dissertation. These reflections elaborate the logics of analysis for the dissertation. More importantly, these terms are observed together, then juxtaposed and contrasted with the intention of positioning an enactive social science, undertaking epistemological and ontological work.

2.1 A goal: to cultivate the becoming of a refreshed social science

The goal for this thesis research was to experiment with theories, ideas, relationships, and conversations that would assist the generation of alternative development pathways for New Zealand's people and environments. This was a response to knowledge-making that re-inscribes dominant binary and dichotomising representations of the world. I sought to avoid closing down the possibilities for sustainable development to a 'this or that', but rather to find the 'and, and, and', of sustainable development known and made otherwise. The challenge was to participate in the enlivening of social science so that the politics of development could be more intentionally navigated.

Cultivating the becoming of a refreshed social science requires more than representation of the doing of social science and sustainable development. Practising different ways of knowing about the work of social science and sustainable development enabled me not only to describe how the production of knowledge is changing, but also to develop capabilities to influence these changes in the moments and rooms in which they were occurring around me.

As such, this dissertation responds to the depiction of the shift from Mode 1 (conventional) knowledge production to Mode 2 (distributed) knowledge production, developed by Gibbons et al. (1994). These authors argue that Mode 1 has become the mode of production characteristic of disciplinary research institutionalised largely in universities and Mode 2 is the trans-disciplinary approaches institutionalised in a more heterogeneous, flexible, and socially distributed system. Their account of shifts in knowledge production usefully illustrates relationships between research and the creation of supply and demand. Gibbons et al. (1994) show how knowledge creates comparative advantages for companies while at the same time acting as a commodity, commercialised and positioned within and across internationalised markets.

This dissertation illustrates reflexive responses to accounts of shifting modes of knowledge production. Empirical stories are presented of how capabilities for acting were constrained and expanded through the distributed knowledge production systems Gibbons et al. (1994) described. We glimpse how the heuristic of Mode 1 and 2 knowledge production became performative in New Zealand. By focusing on what social science was becoming through a New Zealand science organisation it is also possible to show how the categories of carbon, streams, and networks were becoming actors in the knowledge production system, also co-producing socialities.

2.2 Assembling theory, enacting social knowledge through spaces of co-learning

To begin a conversation about the ‘co-production of social science and sustainable development’ this dissertation takes a route via the idea of ‘spaces of co-learning’. This route was taken due to the discursive and material possibilities it offered for enactive social science addressing the practices, institutions, and discourses of sustainable development. Spaces of co-learning (both material and discursive) were explored by drawing on the intellectual, political and inter-personal resources to hand

situated between the University of Auckland's School of the Environment and the collaborative learning group at Landcare Research, a New Zealand science organisation mandated to contribute to sustainable land development.

I encountered 'spaces of co-learning' as intentionally collaborative efforts for making knowledge and taking action. Through these spaces a sense (Deleuze & Harrison, 2000) was expressed of inter-relatedness, difference, and alternative 'doings'. Being attentive to how these 'spaces of co-learning' shaped social science and the production of social knowledge has focused this dissertation on the identities, institutional arrangements, and actors emerging from the problematic of 'social science for sustainable development'.

The notion of spaces infers lively dynamism, an opening through which things travel and emerge, for example, money, activities, ideas, roles, political rationalities, and an enthusiastic social scientist. Much has been written about the importance of the work of the heuristic of space. My reading on this topic focused on the ways Massey (2005), Amin and Thrift (2000), and Whatmore (2002) addressed the multiple trajectories through which spaces of knowledge and action are co-constituted. Key to my argument is the idea that through spaces of knowledge-practice multiple processes of knowledge and power are assembled. Understood as assemblage, knowledge and practice can be known as co-constituted, and we find that contrary to most theories of knowledge they are not fixed to times, places, scales or identities. Indeed these elements, time, scale, and identity are themselves all co-produced and contingent on each other; they are, as Nietzsche (1956) presented, all becoming in relation to each other. So, how we know and learn about a place or a person or a thing shapes how I, we, and that person, place or thing is becoming – how it and we can act in the world. Explanatory power is gained by revealing the relationships between the knowing and doing of identities, scale, and places – the spaces of knowledge-practice (Massey, 2005). And with practice, I found the heuristic of 'spaces of co-learning' did indeed help to understand and make visible trajectories through which knowledge, practices, identities and discourses were being made, legitimated and resourced.

To support use of the term ‘spaces of co-learning’ ideas about and practices making science and society relationships were explored as being assembled variously over times and places. Deleuze and Guattari (1983) deploy the term assemblage to make visible territories, or spaces, made up of various heterogeneous fragments. This territory embodies patterns and routines, and has both content and expression. Furthermore, Deleuze and Guattari (1994) suggested that experience exceeds our concepts by presenting novelty, and this experience of difference actualizes an idea, unrestrained by prior categories, forcing us to invent new ways of thinking and doing.

Accordingly, instead of asking questions of identity such as ‘is it true?’ or ‘what is it?’ Deleuze encourages us to inquire about the functional or practical characteristic of a concept: ‘what does it do?’ or ‘how does it work?’ Hence this dissertation began by asking ‘what were spaces of co-learning for sustainable development doing? How were they assembled, and who was at work through them? What were social science and sustainable development becoming through these spaces?

This entry point is partly a response to other points of entry that would typically have begun by positing the focus of analysis as a fixed notion of sustainable development (for example weak-strong, or provision for future generations) and then ask about possible contributions of social science as a separate concept and process to this external goal. These entry points would have asked questions of how research builds social capital; or what is best practice for interdisciplinary research; or how community resilience is built; or what social networks enable transformation towards sustainable development. But as shown by this dissertation, selecting the unit of analysis influences the ontological work that can be done. It required sensitivity to how the unit of analysis for this dissertation was getting stuck in time, place, and beings. Sensitivity was achieved by exploring the category social science and catching glimpses of what social science was doing. It was necessary to reflect on my day to day work to attune myself to the ways social science was being named, when, where, how, and for what purposes.

2.3 What constitutes a unit of analysis?

Multiplicity, contingency, and processes of co-constitution are discussed in this thesis through use of the descriptive power of core geographical concepts of *situating*, *trajectories, traces, spaces,* and *boundaries*. One of the first issues we encounter is the ever converging–diverging pathways and sites through which the unit of analysis, social science, has emerged. As will be illustrated time and again in the following chapters this thing social science in all its discursive and material forms, which I claim is of great importance to how New Zealand society develops, is not tightly codified and thus does not take on the same solid bounded form in every context.

Social science appeared in Landcare Research through a number of pathways. Social science was blown in with the New Zealand high country tussock seeds[1]; social science was precipitated by poor water quality in catchments[2]; and social science was designed in alongside composting toilets and rain gardens[3]. These trajectories of knowledge-practice created spaces for social science in Landcare Research's budgets, offices, annual plans, tea rooms, and funding applications. But each of these trajectories shaped the space and form of social science in different ways for different purposes, and in turn social science has shaped the tussocks, catchments, and sustainable buildings in a variety of unpredicted ways. But before relaying those stories, this chapter pauses temporarily to put boundaries to, or limit the scope of my unit of analysis social science in order to provide a sense of what is not covered in my analysis. But please note, these boundaries will be lost, challenged, and remade at various points in the thesis.

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[1] See an example from 2000, when collaborative learning was just developing through a tussock management programme. http://www.tussocks.net.nz/newsletter.pdf [Accessed 10 July 2013]

[2] In 2004 an Art-Science exhibition was held in Nelson to support dialogue for improved management of a South Island river catchment. http://icm.landcareresearch.co.nz/research/research.asp?theme_id=4&research_id=32 [Accessed 10 July 2013].

[3] In 2004 the Tamaki, Auckland, office of Landcare Research was opened, complete with a bio-retention system including raingardens for treating stormwater onsite. Composting toilets were also installed on two levels of the building and a new Built Environment multi-disciplinary research team created, including me as a Social Scientist.

2.4 Social science as a unit of analysis for sustainable development

Although informed by the work of Science and Technology Studies (S&TS) (Hackett, 2008; Jasanoff, Markle, Petersen & Pinch, 1995) this thesis is not a typical S&TS project. This dissertation does not take as its main focus how biophysical sciences are shaping worlds, or indeed even the overarching category of science. Instead, I have paid specific attention to the work of social science in a science organisation addressing sustainable development. Therefore attention is not given to the specific practices of biophysical science projects but have focused on the performances, or the work of social science in the science context. Put another way, I have examined the intellectual and strategic project of representing and influencing the socialities of the environment, science, and development. This is very much the concern of S&TS and is the work the co-production idiom (Jasanoff, 2004) makes possible. By exploring the co-production of science, social science, and sustainable development the dissertation addresses the situations and politics distinguishing science from social science, and a Scientist from a Social Scientist. Nature and society kept getting separated through these representational practices, but there are indeed spaces through which less bifocal worlds are becoming (Latour, 2004a, b & 1993).

Between 2004 and 2012 a greater diversity of practices emerged through which socio-environmental knowledges were legitimised and enacted. This created broader engagement in society with social theories and a pragmatic incorporation of social science in environmental management. Discourses of sustainable development, growth and innovation, participatory democracy, integrated planning, and climate change materialised in many ways, including through network meetings, catchment planning and integrated research.

For many doing social science in this field it was a frustrating yet intellectually stimulating time as the territory that could be social research was articulated and rearticulated. Amid more reflexive, relationally oriented ways of governing, how to be a (social) researcher became an increasingly important question, for me, the individuals involved and their organisations, as well as for society as a whole. Central to this question was how those doing social science participate in constituting nature-

society relations. This thesis reveals a few of these performances and possibilities by addressing the questions:

- *How were social science and sustainable development co-produced?*
- *What was social science becoming through the co-production of knowledge and sustainable development?*

2.5 Methodologies shape possibilities of development

Geographers address the fracturing of nature-society in numerous ways. The literature already discussed above plus Gibson-Graham (1996, 2011), Harvey (1996), Le Heron (2009, 2013), Massey (2003), Thrift (2000b), and Whatmore (2002) demonstrate how frameworks for thinking about nature–society influence the problems that get addressed and which aspects of the world are made visible or invisible. Over the last two decades this body of work provided a range of perspectives for researchers looking at socio-environmental change. These perspectives have shown multiple ways of thinking about nature–society relationships extending beyond dominant Cartesian discourses. This literature makes more visible and accessible less dominant knowledges about nature and society (for example those specific to context, language or ethnicity; stemming from feminist enquiry or subversive research; post-development and indigenous accounts). In doing so, a greater number of ways of conceptualising and framing nature–society relations are revealed, some conflicting, but all providing alternative rationales for identifying socio-environmental problems and solutions (Head, Trigger, & Mulcock, 2005;Whatmore, 2006). Through this work we can understand what Latour (1993) refers to as the ‘modern constitution’; how the ontological segregation of the human from the non-human, has co-produced science, and industrialised society, and continues to privilege de-contextualised facts and technocratic perspectives of the environment:

> *the power of facts, that is their potent capacity to instrumentally facilitate complex material achievements, has resulted in them being conflated with the world itself so that we commonly insist that they tell us what to do, thereby obscuring more constructive courses of action (Healy, 2005, p. 241).*

Key to the 'modern constitution' is an epistemology assuming knowledge is representational either of the external material world or the internal human world (Anderson & Harrison, 2010; Thrift & Dewsbury, 2000). This sorting of the world into human or non-human representations informs the primary distinction between science and social science. In doing so it constrains how socio-environmental change can be understood and enacted.

2.6 Dominant narratives of social science and sustainable development

This study of social science and sustainable development arises out of, and makes a response to, three well-rehearsed stories about knowledge production dominating the practice of social science for sustainable development in the period of study (Swyngedouw, 2009; Jasanoff, 2004).

A. *The challenge of certainty:* Social science will assist the state and its citizens to take the best course of action to avoid impacts of climate change.

B. *The quest for democracy:* Social science can support public participation in decision making about the places people live in, which will lead to a more sustainable future.

C. *The rational other:* Social science assists the transfer of scientific knowledge so that consumers will make informed choices, taking into account the current and future environmental impact of their consumption.

Each of these stories frames nature as separate to society but able to be influenced by decisions made by individuals or society as a whole. This ability to influence (agency) is ascribed to subjects of the state, citizens, consumers, the public, scientists, policy officials, and social researchers (sometimes distinct from social scientists). Common to each of these stories is the knowing of facts about nature by these subjects who are then able to make rational choices in the face of uncertainty and complexity. The doing of social science through these rationalities becomes translating science, facilitating public participation, and resolving conflict and managing risks.

The headings in Table 1 below – *knowledge for progress, knowledge for change, and knowledge for possible worlds* – present diverging discourses shaping knowledge-

agency frames and practices. The table indicates the main distinctions between these discourses, which are built on to argue for knowledge for possible worlds. Below the table the discussion covers what the categories were a response to. The details in the table provide the stepping off point for the work of the empirical chapters (5 and 6). In these chapters the effects and affects of knowledge-practice categories are explored. The nuances in the headings used for the table helped to create a focus on co-producing the knowing, doing, and organising of both social science and sustainable development in New Zealand.

Table 1 Categories used to know and do sustainable development through a CRI

	Knowledge for progress	**Knowledge for change**	**Knowledge enacting possible worlds**
How knowledge can be made	Experimental vs. Experiential vs. Propositional Traditional vs. Western Truth vs. Belief Knowledge is accumulated Only individuals learn	Action learning Adaptive management Social learning Local/Indigenous Collaborative/Multi-disciplinary/integrative Systems learn Situated learning Structural analysis	Co-production Knowledge spaces Practices Performative (Non)Representation Human and non-human actors Nature–society relations Practices in action Scenes and settings Situated action and interaction Effects and affects Post-Development
How the world can be changed	Application of research Technology transfer Extension science Technological revolutions Social/natural/economic capitals Academia for policy for society	Empowerment Managing complexity Implementation Knowledge management Communities of practice Integrating policy, research and practice Learning society Transforming institutions	
How to do social science for sustainable development	Extension for application of science Objective and impartial Mediating uncertainty Enabling democratic participation Representations of the social world Taking knowledge elsewhere Educating Representing epistemology Research to policy to operation	Facilitating social processes Active participant in local processes Translating science Managing risks and uncertainties Enabling democratic participation Empowering for transformation Representation of the social-environmental Representing epistemologies Instrumental methods Research to policy and/or operation	Enacting socio-technical assemblages Representing and enacting hybrid social and biophysical worlds Enacting epistemologies Situated theorising Hosting conversations Collective experimentation

Knowledge for progress: organising technologies confuse our socials

Table 1 above is a response to social science of sustainable development that circulates dualisms of modern science, for example *object/subject, mind/body, research/management, material/discourse, traditional/modern.* These concepts are instrumental to how nature/society relations can be understood experienced, engaged with and researched[4]. Sustainable development is often posited through social science as **not** the Modern Western Science approach to development. Discourses of 'knowledge for change' or 'Mode 2 knowledge' emerge in response to arguments for 'knowledge as necessary for progress', that growth of economies will create security and well-being for civilised societies.

Through discourses of knowledge for progress or Mode 1 (Gibbons et al., 1994) or conventional knowledge, social science becomes an approach for extending or applying science. Social science is presented as objective and impartial and is able to mediate uncertainty. Social science presented in the context of knowledge for progress is argued to enable democratic participation. In this way social science is understood to make representations of the social world, and that knowledge of distinct social and natural worlds can be transferred elsewhere so that lay publics can be educated. Those working with the idea of knowledge being produced for economic progress also have to repeatedly address the value of social science to the economic development project. Another concept arising in science transfer, research investment, and technology adoption policy processes is that social science produces nothing but passivity, as articulated by John Raulston Saul below:

> *Their experiments do not provide any measurable progress in the manner of real science. In place of real evidence they are obliged to pile up overwhelming weights of documentation relating to human action – none of which is proof, little of it even illustration. This sort of material carries the force of neither history nor creativity. What they are working with is circumstantial evidence. They claim to produce truths, but these truths are too fragile to produce anything other than passivity (Saul, 1997, p. 69).*

[4] See Harding (2008) for in-depth discussion of modernity theorising with relation to science and technology.

Knowledge for change: how nature lost agency

> *I believe that a desirable future depends on our deliberately choosing a life of action over a life of consumption, on our engendering a lifestyle which will enable us to be spontaneous, independent, yet related to each other, rather than maintaining a lifestyle which only allows to make and unmake, produce and consume - a style of life which is merely a way station on the road to the depletion and pollution of the environment. The future depends more upon our choice of institutions which support a life of action than on our developing new ideologies and technologies (Illich, 1973a, p. 57).*

Writing in the early 1970s Ivan Illich is one of many authors who not only challenged dominant forms of science-and technology-driven economic production but who also argued for new ways of understanding knowledge and action and the contributions of social science. The sustainable development discourses I worked with have a strong lineage back to authors who were just beginning to gain prominence in the US and UK, among the rise of diverse social movements and major shifts in state-market relationships. Texts articulating alternative ways of thinking about knowing and doing from the 1960s to early ’70s are still shaping practices of social science and sustainable development today. The authors circulated concepts of and practices for adaptive management (Gunderson, Holling, & Light, 1995), Action Learning (Lewin, 1952; Kolb, 1984) and Learning Systems (Argyris & Schön, 1978).

Diverse knowledges, local and indigenous, were addressed through these research approaches and the sites of knowledge production were given more primacy in the process. Common to these approaches was a critique of knowledge accumulated by individuals through methodical learning and able to be put to work in the same way in many places. Relational aspects across people, across people and nature, and across places of knowledge production were argued to be more important than objective, generalisable, and detached modes of knowledge production for more sustainable ways of developing societies. Below I present a discussion of the key approaches shaping social science and sustainable development by reconfiguring the relationship between knowing and doing. It is these approaches that informed my initial ways of doing co-learning, and to which I have responded by arguing for a

perspective that presents power as performed and performative through both human and non-human actors (Gregson & Rose, 2000: Nash, 2000).

Kurt Lewin, writing from Iowa in the 1940s in the emerging field of social psychology, developed ideas of experiential learning and action research to solve social problems. His work was a response to the idea that individuals are primarily responsible for their behaviours. He argued that behaviours must be understood in context, they are a function of a field, a life space, for example family, church or work and therefore individual behaviours must be understood as part of this a broader field. Through his experiments in group dynamics, referred to as social management or social engineering the practice known as action research emerged. Action Research as expressed by Lewin is an approach directed toward problem solving in social and organisational settings. Working at the end of the Second World War, his approach to social science was also a contribution to discourses of democracy. Lewin showed great reflexivity about the relationship of social science to democracy. He argued that democracy depends on social science for knowledge of and obedience to the laws of human nature in group settings (Lewin, 1948 p.82).

Lewin's work is heralded for his concern for social science to shape the world directly, through the integration of theory and practice (Kolb, 1984 p.9). This was symbolized in his often cited quotation "there is nothing so practical as a good theory" (Lewin, 1952 p.169). In the 1980s, also in the US, Kolb developed Lewin's ideas of experiential learning further to provide ways of conceptualising reflective adult learning that enabled individuals to change their circumstances. He provided diagrams of the adult reflective learning cycle where, ideally, people will go through iterative phases of 1) concrete experience, followed by (2) observation and experience, followed by (3) forming abstract concepts, followed by (4) testing in new situations through praxis.

Kolb appears to have focused more on processes in the individual mind, rather than learning as situated. Accordingly, he expresses the relationship between knowledge and learning as learning being the experience whereby knowledge is created through the transformation of experience (Kolb, 1984, p. 38) and "knowledge results from the combination of grasping experience and transforming it" (p. 41).

The writing of Argyris and Schön (1978) follows in the line of Kolb (1984), Lewin (1948) contributing to pragmatic learning theories. Their work is well known for the notion of Single and Double Loop learning. They presented an approach to theorizing of theory-in-action, plus generated models of organisational learning that have been put to work in diverse contexts. Furthermore, their conceptualization of organisational learning has been, and continues to be, a significant contribution to the appreciation of processes in organisations. Their notion of 'double-loop learning' provides a heuristic device useful for illustrating what were at the time the more taken-for-granted aspects of organisations and experiences. 'Double-loop' learning provided an alternative way of naming a phenomenon (and problem), and a possible way of 'learning our way out' (Finger & Asún, 2001). In contrast to Dewey's (1952), Lewin's or Kolb's learning cycle, where a mistake would be made then reflected upon it, Argyris and Schön (1978) conceptualised learning as simply reflecting critically upon the theory-in-action. In other words, it was not necessary to go through the entire learning circle in order to develop the theory further. It was sufficient to readjust the theory through double-loop learning. Much of the work developed through Landcare Research's collaborative learning group at the time I joined, was informed by the notion of double loop learning (Allen, Bosch, Gibson, & Jopp, 1998; Allen, Bosch, Kilvington, Oliver, & Gilbert, 2001; Allen & Kilvington. 2005).

In 1998 Etienne Wenger published a book titled *Communities of practice: learning meaning and identity* through which he developed a social theory of learning based on the idea that knowledge is about engagement with the world in order to make meaning and learning is a social practice supported through communities of practice. Over the years his work has inspired much research into how communities of practice can be supported and indeed created to support knowledge production within and across organisations and localities. Engagements between science, policy, and practice have been presented as 'communities of practice' and or 'systems of social learning'. In this primarily policy studies literature learning is often conceived as either instrumental (technical) learning (for example how to build a rain garden); or strategic (political) (for example how best to influence other parties); or conceptual.

Insights from social constructionist debates have also been intertwined into the normative framing of social learning for environmental management.

> *Social learning is the collective action and reflection that occurs among different individuals and groups as they work to improve the management of human and environmental interrelations...Social learning re-establishes the mental connections between our actions and environments, thus creating pathways for social change (Keen, Brown & Dyball, 2005, pp. 4–5).*

Social learning gained prominence in New Zealand through approaches to adaptive environmental management and sustainable development[5]. Learning was presented as an essential component of management (Tippett, Searle, Pahl-Wostl & Rees, 2005). This methodology promotes practitioner reflection, a systems orientation, integration, negotiation, and participation. It encourages 'authentic reflection' on the interests that motivate the inquiry as well as a holistic perspective to construction of knowledge. Reflection on multiple meanings of language is encouraged, along with trans-disciplinary approaches.

The literature on social learning presents research as inquiry that catalyses change through transformative learning (Keen et al., 2005). Learning aims to create institutional change (changing underlying norms and processes), resulting in changed behaviour from a wide range of actors. Perceptions and values are regularly treated as structural preconditions for social change. Schön (1973, p. 109) claimed the "need for public learning carries with it the need for a second kind of learning. If government is to learn to solve new public problems, it must also learn to create the systems for doing so and discard the structure and mechanisms grown up around old problems". He posed the questions what is the nature of the process by which organisations, institutions and societies transform themselves? What are the characteristics of effective learning systems? What are the forms and limits of knowledge that can operate within processes of social learning? What demands are made on a person who engages in this kind of learning? (Schön, 1973, pp. 28–9).

[5] For a useful archive see *Learning for sustainability* retrieved from http://learningforsustainability.net [Accessed July 2013]

Typically participation of those affected by the research (often referring to Arnstein's ladder (1969)) is sought in all stages of a social learning inquiry. Research can become facilitation of processes, with an ethic of democracy, avoiding elitism, and prioritising the local. Inquiry is inductive – as opposed to deductive. Attention is often given to processes, attitudes, underlying cultural and institutional norms, and to linkages across different levels of scale. A systems perspective is incorporated, problems are articulated as part of adaptive self-organising, self-regulating systems (Keen et al., 2005; Tippett et al., 2005; Holling, Gunderson & Ludwig, 2002).

Keen et al. (2005) developed their social learning approach by drawing on a Habermasian (1984, 1987) framing of communicative action and arguing for greater attention to the discursive in environmental management. The argument was made that an individual's capacity to respond to their environment is inextricably linked to the interaction between language and emotions, commonly termed conversation. Thus environmental management becomes an ecological conversation.

> *Engaging with this metaphor is not to turn away from the doing of science or ecology, or any other practice. This experiential activity opens up new possibilities. It entails the responsibility of reflection, of making other distinctions and considering their consequences (Ison in Keen et al., p. 29).*

There are two main critiques of the action-learning approaches I was working with through spaces of co-learning– first, how knowledge is represented, and second, how action is represented. Action-learning approaches used in social science for sustainable development in New Zealand have tended to focus more on learning for management and on how to make learning happen. There has also been too heavy a focus on epistemology (how people are coming to know the world) and not enough on ontology (how people are becoming and able to act in the work) (Burgoyne, 2009, p. 153; Jasanoff, 1996).

The second critique is how action and agency are typically understood. Action-learning perspectives have predominantly represented a structure-agency framing of power-knowledge often leading to a re-inscription of structured subject positions. If participants focus their attention on learning through their collective identity, which was articulated in relation to a dominant entity (be it peasants to a capitalist

landowner, oppressed women to patriarchy or the 'Top sales team' in an organisation), then to learn about the challenges they commonly face they will need to keep re-stating the existence of the dominant entity – potentially never enabling it to go away. This links with the first point about epistemology and ontology. Critical approaches to action learning emphasise paying more attention to how the issue and the collective identity have come to be known as central to the practice of designing new/different ways of dealing with the issue:

> *When we turn to look at the common sense world of practical action through the pedagogical lens of action learning, it is easy to miss the phenomenon of how that world is possible… (Fox, 2009, p. 12)*

> *The talk is in parts 'representational' of its context, because it describes features of it, and it is also 'performative' because in describing context it formulates it in a certain way, a way that is constitutive of members' expectancies and relevancies (Fox, 2009, p. 13).*

The field of study for this thesis has a trajectory extending back to previous research in which I was involved in the New Zealand public health sector. When writing my PhD proposal my thinking was highly influenced not only by what I had learnt but what remained unaddressed from a 2-year study I had just completed. The Meta Analysis of Community Action Research (Greenaway &Witten, 2006) was an intersectoral project exploring how reflective practice (Denzin & Lincoln, 1994) supported transformation through community action projects in New Zealand. It was a highly instrumental piece aimed at informing future community action research projects funded across ministries. Our overall findings were that breadth and form of relationships plus inclusion of reflective practices enabled communities to address the problems at hand and build capacity for on-going development. These findings were consistent with approaches to participatory action research (PAR) informed by Freire's work (1970) which shaped the theoretical background of the Meta Analysis (Sankaran, 2001; Smith, Williams & Johnson, 1997; Reason & Bradbury, 2001).

My understanding of PAR at this time was that it facilitated situated learning and the collaborative construction and production of meaning. I understood theory as educed and participants able to be empowered to change their lives through this process.

Central to the literature on PAR and our research framing was presentation of a dialectic relationship between action and reflection – often depicted as cycles – theories of learning from experience. Participants learnt about the world through collaborative action and also learn about themselves at work in the world. There was a strong evocation of pragmatism throughout the conversations of our research, expressions of the need to get on and get the work done. PAR, with its focus on action and reflection, had an air of pragmatic sensibility as it meant the work did not need to stop but could be enhanced by reflection – people would learn by doing.

As Yorks (2005) stated, "changes in personal identity and self-understanding invariably result in changes in how people 'show up' in various settings." (p. 1225). Thus learning denotes change and "transforms private troubles into public issues" (Genat, 2009, p. 111). Typically, social change invoked notions of structures of power and processes of empowerment through subversion of or resistance to these structures. Through these PAR frames research pays attention to processes, power, representation, ethics, reflexivity, inequality, and the subversive. Research is to be facilitative and is framed as collaborative, critical inquiry. My previous work upheld reflection and reflexivity as valid practices for practitioner-based collaborative inquiry. Research then became a political act of representation – making subjugated knowledge visible and relinquishing (to various degrees) the power of the 'educator'. Instead researchers became facilitators, critical friends, interpreters, and recorders. Genat (2009, p. 112) argues research can provide accounts of key interactional moments and articulate critical emic (participant generated) categories of meaning.

The Meta Analysis included two case studies where action research and evaluation approaches had been used in an environmental management context. Learning about these projects led me to engage with notions of collaborative learning for adaptive environmental management (Allen et al., 2001). A leading New Zealand author in this field, Dr Will Allen was an advisor on the Meta Analysis project and became a central influence on my thinking about collaborative learning. He introduced me to Landcare Research and the opportunity to work in the collaborative learning field. I came to understand collaborative learning as a methodology which

> *shifts the emphasis from observing then describing the situation after events have happened, to action oriented participatory methods. The aim is to facilitate learning that will result in longer-term transformative change. By adopting an action learning approach the researchers are attempting to use action reflection cycles that enable people to move through a process of diagnosing, designing, doing and developing…(van Roon, Greenaway, Dixon & Eason, 2006, p 536)*

In summary and as a way to move towards the central frame of this thesis, accounts of the use of social and/or action-learning approaches in sustainable development commonly emphasise stakeholder or public participation through deliberative and democratic processes that are typically place based. Watershed or catchment management problems have lent themselves well to this approach, along with regional initiatives aimed at changing farming practices. Action learning approaches making knowledge for change have reified identities and their ability to represent groupings of people in places. They have also tended to privilege the local while at the same time oversimplifying global-local relationships such as markets, states, communities, and institutions. Additionally, the focus on processes of learning has often taken attention away from the objects of learning. In doing so the multiple and contradictory ways power, knowledge and politics are at work through action-learning processes has often not been identified. Indeed, these approaches to making knowledge for change have been mobilised in many conflicting change-making projects. As technologies of governance (Dean, 1999; Hajer & Wagenaar, 2003) action and social learning techniques have transformed organisations, states, and market relations.

Sustainability Science is another assemblage of theories and institutional relationships positioning themselves as alternative to established methodologies of knowledge for progress. While co-production of knowledge is promoted as key to achieving sustainability, social science contributions have primarily been framed through the heuristics of systems, complexity, integration, and place based research. Institutions were promoted as key objects of social analysis, but technology and science were often posited as external to social science.

Sustainability Science is generally heralded as an initiative in response to the work of the World Commission on Environment and Development and the subsequent report *Our Common Future* (Bruntland, 1987). A new form of science to span natural and social sciences was suggested by the US National Research Council (1999) in a report titled *Our common journey: a transition toward sustainability*. In this report they assert

> *Sustainability science has emerged in recent years as a vibrant field of research and innovation. Like agricultural science and health science, it is a use-driven field of work…Its foundations build on the natural and social sciences, on engineering and medicine, and on the multiple knowledges of practice. Its methods are integrative and translational, seeking to link knowledge with action in the spirit of what Donald Stokes dubbed "Pasteur's Quadrant" where "basic science and technological innovation" meet and interact (Kates et al., 2001, p 2).*

However, research associated with Sustainability Science often lacks reflexive analysis. It can over-determine the role of technology and science in social change and, is commonly devoid of analysis about the politics shaping both the production of knowledge and the actions that are purported to be achieving sustainability. The 2006 launch of the *Sustainability Science Journal* illustrated this point. The journal was launched out of a Sustainability Science integrated research centre in Tokyo, Japan. In the first editorial for the Journal the editors positioned their work in relation to Sustainability Science initiatives of the International Science Council (ICSU) during the 1990s: There were, increasingly, calls for a science of sustainability predicated on recognition of the fundamental link between science and economy while remaining free from political bias of the sort seen, for example, when North–South issues are raised in debates over sustainable development (Kates et al., 2001; Clark & Dickson, 2003). These advocates of Sustainability Science have carved a path for science to become more cognisant of its socialities, but in doing so social science potentially became the hand maiden, useful for but separate to science and technology.

Knowledge enacting possible worlds

Thinking back to how I first began to work with the idea of knowledge and action for changing the world, what was not discussed in the 'Meta-analysis' journal paper we published about this research was my growing unease with how I understood transformation. I was looking for an approach that recognised the multiple impacts and stories that come through the process – whose agenda leads it and who says when it has happened? By asking these questions I also didn't want to leave the hope of transformation behind. I wanted to be able to critique participatory approaches to research without undermining them. I was also aware that this sense of unease with participatory approaches was making me less passionate about them and I was wary of becoming dispassionate about social change through my research. A number of conversations that informed this line of thought occurred around the time I was beginning to read poststructuralist critiques of participatory research approaches (Kesby, 2005; Cameron & Gibson, 2005).

> *New forms of subjectivity emerge through unexpected shifts in the visceral and affective registers that free embodied practices from their usual sedimented patterns, creating opportunities to act on other possibilities for being (Cameron & Gibson, 2005, p 320)*

So a central question arising from this review of knowledge for change methodologies is how might we understand agency, or the capability to shape our worlds? And how are knowledge or learning networks or relationships co-constitutive?

Judith Butler's work (1993) presents agency as an effect of discourse. It is through discourse that articulation of nature-society knowledges (note the emphasis on the plural) gain legitimacy and meaning. Bulkeley (2000) drew on actor network theory and governmentality to explore the formation of climate change discourse coalitions. Foucault's (1997) work on how knowledge disciplines and Rose (1999) and Dean's (1999) further developments of governmentality pay attention to the discourses, technologies and subjectivities through which power is performed. Le Heron, Larner and Lewis's collaborative development of post-structural political economy perspectives (Larner, Le Heron & Lewis, 2007; Le Heron & Lewis, 2011) point to

the ways knowledge and actions are assembled in moments and rooms (Le Heron, 2007, 2009, 2013; Le Heron, Le Heron & Lewis, 2011).

Research can now be understood as a contingent outcome of performance. Rationalities (Rose, 1999) of 'research making a difference in the world' can also be understood as informing and being leveraged by various political projects (Larner, Le Heron & Lewis, 2007; Le Heron & Lewis, 2009). This is to say that the relational complex through which knowledge of nature-society is performed becomes performative. Rationalities work to legitimate claims and actions and become intelligible to others through discourse coalitions. Hence attention to metaphors, concepts or imaginaries of the world shows how rationalities are translated through conversations in rooms or the application of technologies to account for the world and to enable action in it. Dewsbury draws on Deleuze's framing to express:

> *It is not that there are several perspectives on the same world rather that each viewpoint opens up another world that is at the same time 'of this world'. So, if what makes an action significant is that this happened rather than that, that there is a choice and a potential difference,...the event in itself speaks of all these worlds, of all these potential eventualities... (Dewsbury, 2000, p. 481).*

2.7 A geographical experiment with the co-production idiom

Sheila Jasanoff (2004) also encouraged us to see knowledge and the world as co-produced: "the ways in which we know and represent the world (both nature and society) are inseparable from the ways we choose to live in it" (Jasanoff, 2004, p .2). She promotes science and technology studies which investigate knowledge societies "in all their complexity" (Jasanoff, 2004, p .2). The co-production perspective addresses idioms in research – the ways of "interpreting and accounting for complex phenomena so as to avoid the strategic deletions and omissions of most other approaches in the social sciences" (Jasanoff, 2004, p. 3).

Informed by feminist geographies I found ideas of situated knowledges helped to address the tensions of making knowledge of the specific able to be generalisable knowledge. Through situating research we are able to re-present the world through constitutive negotiation (Rose, 1997). Key to this approach is making visible the relationship between the researcher and the researched. Over-generalising,

universalising claims are countered by making one's own position clearly visible and specific. Partial perspectives on the world are produced, gaining legitimacy through resonance with others' experiences. In 1997, Rose argued that the spaces in which positionality takes place are also a problematic project. "Feminists should try and make more visible the mystery that is the research process" (Rose, 1997, p. 309). Thus how social science research is accepted into the scientific community and becomes part of the known also requires critical examination. "Researchers are entangled in the research process in all sorts of ways, and the demand to situate knowledge is a demand to recognize that messiness." (Rose, 1997, p. 314).

Calls are often made for researchers to "step out of the academy' and put their knowledge to good work in the world. Or in a similar vein that research must be more policy relevant. The distinction I make here is that research performs in the world whether we are conscious of it or not. So the question is not how could research shape the world but how does research shape the world. This alternative perspective requires of the researcher reflexive consideration of how they might act, and what politics and ethics might be enacted through research practices.

> *This is a concern less to claims about what might be done, and intentions and motivations about such claims, and more to a probing of what might actually be done and is done in the conditions faced by actors who are often very aware of their constrained and contingent circumstances…(Le Heron, 2009, p. 137).*

Framing knowledge as constitutive focuses analysis on the emergence of new facts, things and systems of thought, and on how stability of these is achieved and maintained. This is closely associated with philosophies of science and metaphysical concerns of what it means to be natural or social, human or nonhuman (Castree & Nash, 2004). Thus one area of attention of co-production approaches is to look at the formation of boundaries between the natural and social or between research, policy, and practice.

The co-production idiom makes visible relationships influencing the becoming of knowledge and multiple possibilities for knowing-acting ourselves and the world. These concepts provide an analytical frame for making visible knowledge-action

relationships and practices. Working with the co-production idiom I am able to contribute to the challenge posed by leading authors in action learning, Reason and Torbet (2001), for a fully-fledged social science that does not seek to describe an external reality, but instead supports personal, social, and epistemological inquiry and transformation. By putting to work geographical techniques illustrating the constitution of temporal-spatial relationships and representations (trajectories, spaces, sites) I am able to reconnect nature-society, and more specifically social knowledge of nature in ways that have been typically absent from most accounts of action-learning that dominate the field of sustainable development.

The concept of 'knowledge spaces' helps account for knowledge making through the assemblage of sites, practices, people, equipment, and concepts co-constituting how people work together to know the world and act through this understanding. These spaces are distinguishable because of differences in the way the "'motley' collection of practices, instrumentation, theories and people" (Turnbull, 1997, p. 553) are assembled. Turnbull uses the concept of knowledge spaces to advocate for knowledge to be understood as a "complex heterogeneous blend of knowledge, practice, trusted authority, spiritual values and local social and cultural organisation" (1997, p. 560). He does this in order to work with knowledge as both representational and performative, by which he removes boundaries between notions of orthodox or western science and indigenous or local knowledges. He also opens up the possibilities for the social organisation of trust to be negotiated. He argues this is necessary as the myth of science and progress collapses so that we can work more effectively across multiple knowledge systems. This proposition again calls for attention to the heterogeneity of science and social science, and recognition that this is a path well-trod, it is not about producing new knowledge, but about generating knowledge in new ways, at new times, and in new spaces. Indeed, my path is littered with those working to reveal relationships; I am reminded of this every day by my colleagues working with concepts from ecology and ecological economics. This dissertation re-sites and refreshes social science in relation to science, the environment and development.

2.8 Nature-society knowing-doing reassembled through a co-production lens

> *What is new, we would argue, is the actual and potential relation of the academy to what is happening on the ground. Not only are academics becoming more involved in so-called scholar activism but they are increasingly conscious of the role of their work in creating or 'performing' the worlds we inhabit. This vision of the performativity of knowledge, its implication in what it purports to describe, its productive power of 'making', has placed new responsibility on the shoulders of scholars – to recognize their constitutive role in the worlds that exist, and their power to bring new worlds into being. Not single-handedly, of course, but alongside other world-makers, both inside and outside the academy (Gibson-Graham, 2008, p. 614).*

If knowledge and action are co-constituted, they become at the same time – to know we act, to act we know – then we must have an ethics of responsibility for our knowing-doing. This framing of knowledge and action is informed by the 'language turn' in geography initiated through post-structuralist approaches (Harvey, 1996 & 2007; Massey, 2003; Gibson-Graham, 1996 & 2006; Le Heron, 2007 & 2009). This framing has enabled not only description of but also enacting of the politics of knowledge production currently challenging many in the fields of action learning and cultural, social, and political geography (Woodyer & Geoghegan, 2013). As noted earlier, my contribution is inspired by Gibson-Graham's work on diverse economies; however, rather than turn my attention to less mainstream economic practices I examined the diversity of institutionalising and development practices across science and social science. Instead of focusing tightly on alternative economies I explored the enacting of alternative worlds through research-policy approaches to sustainable development. As outlined in this chapter my focus is on the idiom of *co-production of knowledge and society* and the concept of *knowledge spaces* to these concepts enhance understanding (and thus practice) of knowledge-action relationships.

Information and Communication Technologies (ICTs) have enabled vast changes in the production and use of knowledge. It is commonly argued that this has led to a new era of development in which 'information' and 'knowledge' play a central role, economically, socially, environmentally and politically. There is much debate about the characteristics, coverage and politics of the 'information age' of Castells (1989 &

2012), the ‘knowledge-based economy’ of the OECD (1996), the ‘new modes of knowledge production’ of Gibbons et al (1994), the ‘learning society’ as articulated by the OECD (2000), and the ‘information society’ as examined by Webster (2006). Accordingly, ‘knowledge’ and ‘information’ have themselves become units or categories of analysis explored, codified, valued and circulated through the social sciences. In this way, knowledge and information have also become actors making environments.

> *The ‘neoliberalization of nature’ works… at an ontological level. There is more than an ‘as if’ at stake here: there is the actual crafting of entities that did not exist beforehand, like the patented gene with its organic-informational ambivalence… There is nothing fictitious in these commodities: they are commodities, their ‘reality’ is nothing else than this (Pellizoni, 2011a, p. 799).*

If we think of knowledge spaces as both material and discursive, then the effects of power become apparent through numerous arrangements such as people in a meeting room; words and numbers in a text; soil, plants and concrete in the ground. As outlined by Thrift, Whatmore, Wylie, & Latham (2004) paying attention to multiplicity is also an ethical choice “in favour of the richness of the possible” (Guattari, 1995, p. 29). Representing multiplicity has been one of the significant contributions of post-structural social theory. Sustainable development has come to be understood as much more than rational contestations (between, the state, capitalist landowners, the market and consumer or citizen interests) over the value, ownership, use and conservation of nature. For example Foucault’s work on practices for classifying, standardising and disciplining bodies, minds, and forms of life has informed insightful work in water management (Healy, 2005) and climate change (Oels, 2005; Bulkeley & Newell, 2010). Focusing on the ethics and politics of knowledge-action has thus focused my enquiry on process AND category, the heterogeneous sense of the material AND, consequentially, an ethical commitment to the interconnectedness of the material AND the discursive. Through this focus, spatial variation becomes constitutive of political practice. Accordingly, this dissertation takes on the methodological challenge of intervening in the politics of

knowledge-power relations and not just participating as a docile subject of it (Thrift et al., 2004).

Reading across disciplines writing about research and sustainable development it seems there is much agreement about the need to re-present human-nonhuman relations. Additionally many authors emphasise the importance of working with context-specific and contingent social constructions of knowledge. However, the challenge appears to be how to enact this, what methodologies reveal science and the world as co-produced. Typically, authors make theoretical claims for exploring constitutive processes; however, the turn to make empirical or normative claims is often constrained by methodologies struggling to deal with arising epistemological and ontological challenges.

> *In short, there is a basic discord between neoliberal and EM [environmental management] ontologies. This discord accounts for the ambiguous implications (contrasting or supportive of neoliberalisation) of the environmental reforms advocated by EM scholars. In turn such ambiguity may be regarded as a reason for the latter's reluctance to engage in a close confrontation with neoliberalism (Pellizoni, 2011a, p. 801).*

There are numerous metaphors framing nature-society and knowledge–action relationships in sustainable development discourses; for example, work on adaptive management, the three capitals (natural, social, financial), the four well-beings (economic, social, environmental, and cultural) and integrated systems (of the social, economic, and ecological). Conventional practices of thesis arguing would have me categorising each of these, and comparing and contrasting them with my new framing. I shall not do that here, as it does not serve an argument that there is no one framing of knowledge–action that will achieve the goals of sustainable development to which people aspire. The point I wish to make and indeed the point of co-productionist approaches is that each of these frames does particular types of work and they all rub against each other in various places and at various times. It is how they work, the constraints and possibilities of these metaphors (and their categories), and what emerges through their enactment, that is of interest to this thesis.

2.9 Knowledge as participation in the world

In 1990 Latour argued that scientific facts are not discovered but achieved. The world is constituted through relationships (networks) between people and between people and things (actors). Agency is dispersed throughout this network between actors – the network is constitutive. Thus knowledge of the world can be understood as created through a relational complex. Ascribing constitutive knowledge-power to non-human as well as human actors, Latour (2004a) argues for a non-representational epistemology. Sense making can be worked with an open and dynamic engagement with the world. Healy (2005) presents this as "the dynamic character of meaning reflects that of the 'relational complex' from which it originates and is reflected by the verbal and textual performances that embody, generate and convey it" (Healy, 2005, p. 245). Thus knowledge is conceived as participation in the world, not representations of it. Haraway (1991) and Harvey (1996) have shaped understandings of the embodied geographies of knowledge. Research and selves (or actors) can be thought of as interactive texts (Miles & Crush, 1993). Just as we know the world through our acts, we become in the world through our knowing. This ascribes an affective register to knowledge. That is to say our emotional and embodied engagements with the world are integrally linked to how we know the world. I have been fascinated by Gibson-Graham's (2006) discussions of this for the ethics and politics of research. They argue that the disposition of the researcher, for example critical or hopeful, is a central aspect for consideration in research and is formed through the perspective brought to knowledge production. Pile (2010) discusses the challenge of presenting or indeed creating geographies of affect when the concept itself refers to something that is beyond being represented. This dissertation works with affect as physical and emotional responses (a sense, a gesture) embodied in and between people and things.

And there I was the hopeful social scientist keen to participate in refreshed enactments of social science and sustainable development.

> *It is through this recognition of the performative that I would argue that we can avoid being doomed to a future in which there is just one homogenous knowledge space... A knowledge space comprises a complex heterogeneous*

> *blend of knowledge, practice, trusted authority, spiritual values and local social and cultural organisation (Turnbull, 1997, p. 560).*

Non-representational approaches to understanding socio-environmental change provide accounts of how nature and society are co-constituted. Environmental problems are co-produced along with the science, technology, policy, culture, and values that identify the problems and suggest solutions. This approach calls for more critical analysis not only of science and policy interfaces but also of the performance of social science in relation to science and policy:

> *the current deficit of basic methodological clarity in environmental science-policy studies, which tend to provide detailed explications of theory without always outlining its exact implications in terms of the methodological approach adopted...increasingly social scientists are just as much a part of the extended science-policy interface as any other actor, and are involved and influence the very networks and assemblages that they study...it brings into focus the positionality and reflexivity of researchers, which are also fundamental methodological issues (Chilvers & Evans, 2009 p.359).*

Having established that both humans and non-humans act, this perspective can now be refined by arguing that both humans and non-humans also learn. This statement is important for revealing what the object of research on co-learning might be. Learning understood as individual, collective and in relationship to material things allows us to address the challenge to participatory research approaches, which argue individuals can be empowered through collective learning, positing obdurate agency. Exploring the co-production of spaces of co-learning involves thinking about co-learning as performative. Thinking about social practices as performance – what individual subjects *(and objects)* do, say, 'act-out' – is

> *…subsumed within, and must always be connected to, performativity, to the citational practices which reproduce and subvert discourse, and which at the same time enable and discipline subjects and their performances. Performativity then, involves the saturation of performances and performers with power, with particular subject positions (Gregson & Rose, 2000, p .441).*

Extending Gregson and Rose's (2000) idea of performance spaces to the context of social science for sustainable development, illuminates that it is not only social actors (researchers, consultants, managers, farmers) who are produced by power but also the spaces in which they perform. Performances do not take place in already existing locations, for example the farm, the research project, the community meeting room – these stages do not pre-exist their performances, rather specific performances bring the stages into being. What then does this conceptualisation make visible? Thrift and Dewsbury argued that:

> *looking at the theory and practice of performance will not provide us with neat conclusions but it might bring our theoretical talk into closer alliance with our research and thereby create exciting new hybrids (Thrift & Dewsbury, 2000, p. 430)*

Provoking inquiries into social-natural hybridising practices, Haraway (1991) showed that methodologies are thinking technologies. What and how we are able to think is made im/possible through the thinking technologies we use. So in order to enact a refreshed social science, appropriate technologies for thinking and doing differently are required. Accordingly, a methodology was deployed to enable the explicating of spaces of knowing–doing sustainable development, the 'spaces of co-learning'.

The stories I heard, read, wrote, and observed through participation in spaces of co-learning had already begun well before I encountered them and continued (or not, or sort of) in various ways after I encountered them. That seems a very obvious statement. However, this is a point of constant challenge in qualitative research. A challenge to do more than capture stories, and through abstraction detach them from sites or previous articulations to make them widely applicable. Conventional framings of the case study, or field work or ethnography can (intentionally or not) represent the narratives, subjects, and objects as fixed in time and/or space. Arrival at or engagement with the sites, practices, actors, and concepts constituting spaces of co-learning had been initiated well before my body 'arrived' in these spaces.

> *This is not the arrival of an active voyager in an awaiting passive destination, but an entwining of on-going trajectories from which something new may emerge. Movement, encounter and the making of relationships take time...An*

> *encounter is always with something 'on the move'. The voyage is not the only active one. Origin and destination have lives of their own (Massey, 2003, p .108).*

As noted earlier, performances of nature–society knowledge are addressed through the spaces of co-learning I was associated with in my capacity as a social scientist working for a CRI with a mandate for progressing sustainable land management. This chapter shows that there were three conversations spanning nearly 20 years (with personal, institutional, and academic reference points) that informed the interfaces of policy, science, and social science visible through this analysis of spaces of co-learning. First, as discussed above, across geography literatures there has recently emerged an exciting and illuminating body of work revealing the multiple knowledge and power relations constituting socio-ecological change. This work encouraged me to explore opportunities for non-representational approaches to my research practices. Second, for many years now I have been exploring with supervisors, peers, colleagues, friends how the contexts in which I have worked shaped how I practised social science and what projects I worked on. These two levels of conversations informed a third, more institutional, conversation with employers, funders, and broader national and international peer networks (including assessors) about how social science for socio-environmental change has been performed in Aotearoa New Zealand and about possibilities for the future.

I found when social science was positioned as facilitating co-learning its potentialities were constrained and in some cases made obsolete. Dialogic spaces already exist, so what social science and I can contribute are refreshed enactments of the socialities of the categories we are at work on, be it the environment, development or rain gardens:

> *how we know alters what can be understood in any room, and of any moment; moments and rooms are inhabited simultaneously; rooms as deliberative spaces always give access to moments whereas an analytics of moments cannot give access to the detail of rooms; rooms are points of entry into temporary coalitions of actors seeking to perform or enact worlds; policy and academic knowledge is the product of contingent outcomes of performance*

> *and practice; and greater recognition needs to be given to understanding sequential and episodic participation in both intellectual and policy trajectories (Le Heron, 2009, p. 149).*

A conversation in a room, a column in a budget, a paragraph in a local government strategy, a research team, were all co-producing knowledge and social order. Through these spaces knowledge claims were articulated, legitimated, invested in, and contested. Relationships between and across human and non-human actors were constituted and how the world might become was opened up once more. This was how relationships between knowledge and action were constituted through social science in a science organisation in New Zealand. This thesis presents details showing some of the ways spaces emerged co-producing knowledge and social order. More specifically the formation or assemblage of sustainable development spaces is illuminated as well as the content of these spaces (that is what got left out of a research publication told me as much about the world as what was put in the publication). The enactive approach taken recognises that scientific and technological products also do metaphysical work making and remaking boundaries between self and other, structure and agency, state and citizen. Accordingly, this thesis provides

> *resources for thinking systematically about the processes of sense-making through which human beings come to grips with worlds in which science and technology have become permanent fixtures (Jasanoff, 2004, p. 38).*

The challenge of working with relational framings of knowledge is showing how the relational complex or assemblage might be articulated through the practices, discourses, networks that become 'scientific knowledge'. Actor Network Theory (ANT) creates a useful disposition, viewpoint or perspective for doing this work (see a fuller discussion of this in Chilvers and Evans' 2009 *Geoforum* editorial, p. 359). ANT offers geographers a way of identifying and entering into science-policy relationships or the socio-material practices constituting knowledge of the environment. If science enrols non-human actors into networks, and explanations are then added to networks there is no distinction between explanation and reality. So again we see that to ask is to act, to become in the world (Latour, 1990). To many this appears to be stating the obvious, many scientists acknowledge their discoveries

of the world are highly embedded in and limited by relationships to the people, places, and concepts with whom they are working. However, collapsing the distinction between epistemology and ontology Stengers (1997) broadens the possibilities for how science (and social science) can be performed and knowledges legitimated and leveraged.

As alluded to by Chilvers and Evans (2009), the methodological implications of ANT are little explored. How does a researcher develop a relational methodology, what questions does one ask? The literature (Healy, 2005; Jasanoff, 2004) points us back towards methodologies that already prioritise relationships between people such as participatory-action research. However, these methodologies have typically engaged with highly structural theories of knowledge and power (Cameron & Gibson, 2005; Kesby, 2005). What would it mean to undertake PAR where the non-human is also understood to act? What does it mean to learn and act with a stream? Who does a researcher then become? Also, what of place and space – how can scale and networks be understood? Does this perspective help PAR develop beyond reification of the local and incorporate multiplicity further?

The untidy, uneven processes were explored through which the production of social science became entangled with practices as diverse as providing chocolate biscuits at a network meeting, naming streams in stormwater asset management plans, and accounting for carbon emissions on a wine label. My sense making developed through iterations of questioning. The three conversations this research contributes to, span institutional, intellectual, and personal aspirations for 'research making a difference'. These conversations all frame the question of how research does/can make a difference slightly differently. Looking back over the path my questioning took I am struck (again) by how the process of forming a question bounds and frames, presents a subject or process as important, and already establishes particular sets of relationships. Questioning frames and makes visible/invisible and turns our attention in one direction, already setting the stage for our engagement, already performing the world. So what is more important – the questions or the answer? In the process of establishing a research question, this dissertation also examined the work that asking this question might do.

As a point of clarification, this thesis connects to debates of action-learning and organisational-learning by exploring perspectives for understanding knowledge and action. However this dissertation does not utilise the technical language that is available to describe action and organisational learning processes. Instead the following pages are informed by the conceptual resources available through geography and poststructuralist literature. Limitations of these resources are discussed and steps are taken to link arguments across action learning and geography literatures. In addition, while the thinking in this thesis could well be useful to the evaluation of sustainable development processes and outcomes a systematic evaluation of research for sustainable development was not undertaken. This thesis is neither an impact evaluation of the research projects with which I was involved, nor is it a process evaluation of co-learning practices. Additionally, although a self and a practising researcher (Alison the CRI social scientist) are examined through analysis for enactive social science, this thesis is not presented for readers to evaluate the research practices discussed against a set of best practice criteria.

In the next chapter methodological discussion is refined further to show how the PhD project became an explication of knowing about knowing, by being situated through practices of social science in a science organisation mandated to support sustainable development. Two questions of importance to geographers, social scientists and other sustainability knowledge-practitioners were addressed: *What was social science becoming through the co-production of knowledge and sustainable development?*

To answer this question an experiment was developed to see how refreshed frames of social science might be put into circulation. This involved consideration of how social science practices and processes can be assessed, enacted and validated all at the same time. The second question addressed is *how were social science and sustainable development co-produced?*

This question was addressed through initiatives trying to represent institutional settings, to enable political action. Further experimentation was developed with how the circulation of categories can be traced. This involved inquiry into how diverse possibilities for practices, institutional arrangements and investments are generated. In response to the challenge and opportunity of co-producing knowledge and possible

worlds, this thesis contributes to post-structural understandings of the political economy of social science in New Zealand. It also illustrates epistemological and ontological assumptions of action oriented social science. Traces of the work of methodologies producing the many social relations or socials (emphasising a plurality) of sustainable development are presented along with a situated engagement with the making of social science through a science organisation. All of these are enactments of an ethics and politics of knowledge production.

Chapter 3

A knowledge production strategy for enactive social science

The globalising world is complex, elusive, ephemeral and unpredictable. It is enacted that way without our help. But if social science is to interfere in the realities of that world, to make a difference, to engage in an ontological politics, and to help shape new realities, then it needs tools for understanding and practising the complex and the elusive. This will be uncomfortable. Novelty is always uncomfortable. We will need to alter academic habits and develop sensibilities appropriate to a methodological decentring. Method needs to be sensitive to the complex and the elusive. It needs to be more mobile. It needs to find ways of knowing the slipperiness of 'units that are not' as they move in and beyond old categories (Law & Urry, 2004, p. 11).

3.1 Enacting an enactive geography

Making new realities, understanding and practicing the complex and the elusive; these are the challenges this dissertation responds to. An engagement with the sense of possibility registered by Law and Urry (2004) this thesis explores the making of knowledge of knowledge, the making of methodologies, and ways of being in the world. An exploration in and of ontology, it works with notions of the co-production of knowing and knowledge, an idiom that Jasanoff (2004) suggests can be a strategic instrument in the hands of knowledgeable social actors. The question for this chapter is how might and should such an exploration be developed and conducted such that it might stimulate enactive research and an affective environmental politics.

Le Heron and Lewis (2011) and Carolan (2005, 2006, 2007 & 2009) suggest disturbing the binary between knowing and doing: to recognise methodology as ontological and in turn to know by doing and to enact change by knowingly doing. Consistent with this ontological premise, I have followed and examined my own work as a would-be enactive researcher, its expansionist trajectories and its relationalities - an approach to which I came through the conduct of my paid employment. At its core my approach is firmly after-Latour (see Carolan, 2009) and builds on both the insights of relational ontology that link Jasanoff (2004) and Law

and Urry (2004) and the work of feminist geographers on situated knowledge (Gibson-Graham, 2011). In short, I examined the projects, networks, and situated theorising that comprised my own work in a New Zealand CRI to ask two key questions: *how social science and sustainable development were being coproduced* and *what was social science becoming through the co-production of knowledge and sustainable development?*

This auto-ethnographic study of knowledge-action performances in rooms and across moments was undertaken through situated theorising away from the research projects I worked on. Reading beyond the rationalities of specific projects I worked on I created detailed documentation and analysis of how rooms shaping research-policy-practice were assembled. Auto-ethnography is a heuristic well suited to the challenge of refreshed thinking-doing and doing-thinking. Through auto-ethnography narrative placement of self in context can occur and the situatedness of knowledge-practice can be explored[6]. In the SAGE Handbook of Qualitative Geography (2010) David Butz provides a useful overview of auto-ethnography as sensibility. He argues that auto-ethnography provides a "productive epistemological resource" (2010, p. 138) which re-writes self and the social and performs experience textually. Auto-ethnography is a political undertaking, a persuasive act that must seek a receptive audience, and be responsive to power relations. Butz (2010) cautions that auto-ethnography must concede something in terms of idiom, rhetorical style and content of the circuits of authorised knowledge in order to be persuasive.

> *This means that auto-ethnographic self-representations cannot be too self-absorbed; to be effectively persuasive – and in order to succeed in rewriting the social – they must situate themselves in relation to a wider social field that incorporates an intended audience (Butz, 2010, p. 138).*

Over time I have gained greater clarity that this was a task of re-writing, re-making, and refreshing the social, through a relational methodology for knowing-doing, enacting, sustainable development. This dissertation is positioned, to "get a worm's eye view of possible landscapes of sustainable growth" (Gibson-Graham, 2011, p,

[6] Ian Cook provides a very useful discussion of auto-ethnography in Cook and Crang (1995)

25). This position enables a tracing of how institutions of science and governance were being co-produced through sustainable development knowledge spaces. Practices of social science are explored to show the enactive potential of knowledge-action and relationship building.

The concept of a knowledge space (Turnbull, 1997) was crucial to enactively researching my own increasingly enactive research. The challenge was to find a knowledge category capable of capturing the knowing and doing and the relations being built in the open but institutionally framed contexts in which I was working, and a category that would in its own utterance begin to frame the potentialities that I sought to identify in the world and to imagine and enact through my own work. Turnbull usefully described knowledge spaces as a "complex heterogeneous blend of knowledge, practice, trusted authority, spiritual values, and local social and cultural organisation." (1997, p. 560). Providing this definition he helps to illustrate the potentiality of representing knowledge systems or traditions not as bounded entities in opposition to each other but as comprising both representational and performative elements that often overlap. He argues it is through the points of connection across knowledge systems that diverse ways of being in the world are enabled (Turnbull, 1997, p. 561). The term 'knowledge space' was (at this time, and in this context) a useful way to think about sustainable development knowledge-action as it allowed for the blurring and messy connections of the multiple knowledge systems that are enacted through discourses of sustainable development.

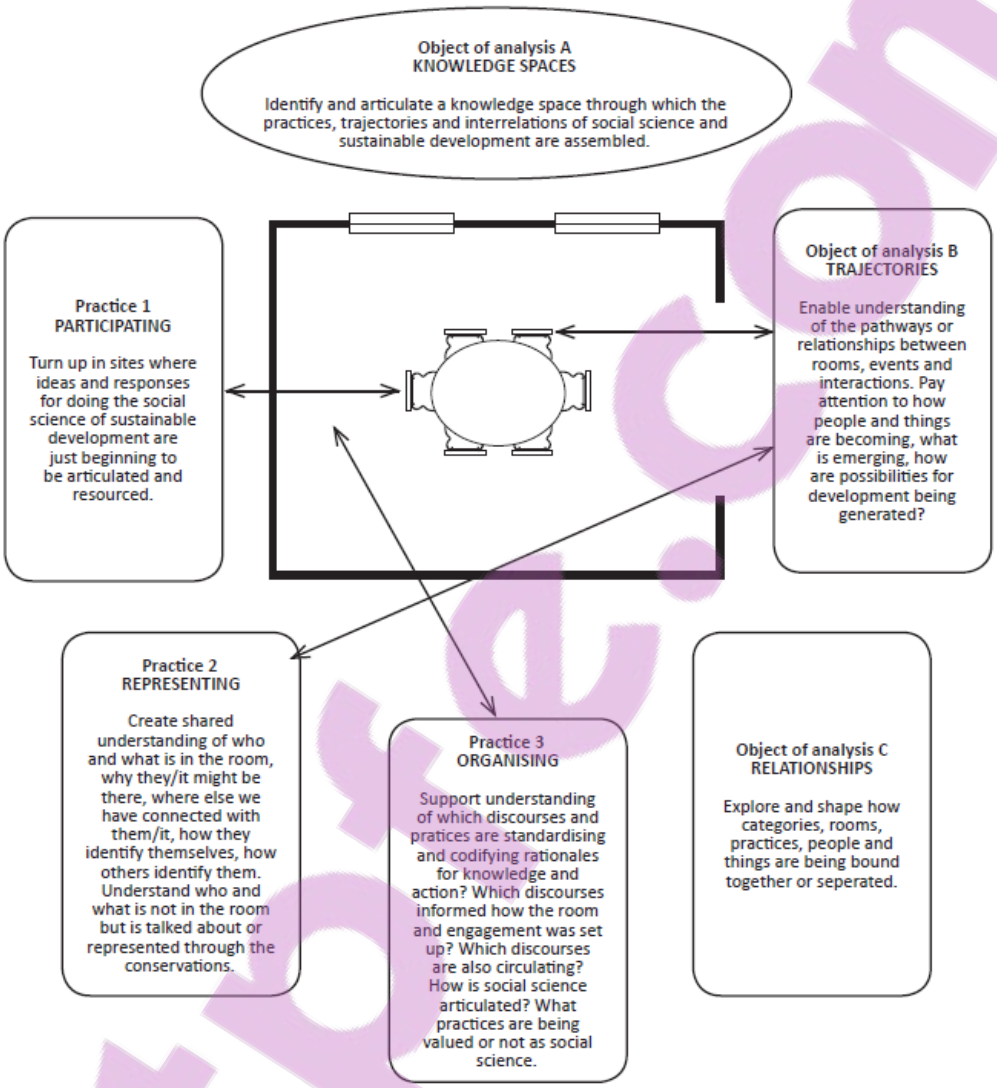
3.2 Getting a 'worm's eye view'

Figure 3 below depicts how situated analysis was developed from the research projects I worked on in my capacity as a social scientist within a science organisation mandated to achieve sustainable land management. Making an account of my-self, by asking 'who am I becoming', 'who calls me to account', and 'how can I account for myself', opened up useful ways of understanding the complexity and contingency through which capacities to enact sustainable development were being made possible. I began to narrate differently the co-production of social science and sustainable development in a CRI via detailed unpacking of notions of qualitative, action

oriented research, international academic geographical conversations, institutions of science in New Zealand.

I explored both the material and discursive relationships linking me to my peers, to places and rooms, the organisation that employed me and some of the institutions through which my work was governed. Attending to my situatedness and to situating myself enabled explication of the relationships, practices and institutions through which I worked and which were at work on me, co-producing knowledge in New Zealand. This involved critical analysis of the discourses and materialities of sustainable development, collaboration, integration, and evaluation I identified and engaged with. Figure 3 also depicts how working with categories, rooms and moments (not identities, systems or structures) allowed me to make representations from the specific to the general and to trace trajectories of representation over time.

Figure 2 A methodology for enacting social relations of sustainable development



3.3 Explicating situated globalising processes of co-constitution

From the worm's eye view it became possible to identify aspects of how my social science practice was being arranged, funded, presented and advocated for in relationship with science and sustainable development. This co-constitution was evident materially and discursively through the networks of relationships, practices in rooms, investments made as well as through words spoken and written. Specifically my social science participated in and represented a number of activities in sites including a farm in Marlborough, a council meeting room in Otara and my office in Tamaki. Key to this co-constitution were practices of networking, integrating,

collaborating and implementing; all of which were being standardised and codified both in New Zealand and elsewhere as technologies of governance.

3.4 Four research engagements

The people, places and ideas examined through this dissertation were encountered through work in four distinctly funded research programmes in my capacity as a social scientist with Landcare Research. These programmes and related research and government funded initiatives are presented in Table 2. The four programmes were titled:

- LIUDD: mainstreaming low impact urban design and development in New Zealand.
- ONAC: how the Otara Network Action Committee worked
- Knowledge networks rendering climate change governable
- Magnetic South: assisting the rebuild of Canterbury

The Low Impact Urban Design and Development programme was funded for 5 years by the New Zealand government through FRST. My role in the programme was to support the implementation of alternative stormwater systems in urban areas throughout Aotearoa New Zealand. The team working on this programme included people trained in hydrology, planning, anthropology, environmental economics, fresh water ecology and botany. We worked across disciplines and with a range of urban development stakeholders in order to increase the number of 'low impact' devices and designs included as part of brown and green field developments. This was a highly applied research programme, with an adaptive management focus. The work I did extended to supporting the ethnographic research being undertaken with stakeholders, and facilitating opportunities for people to share stories, evidence, and experiences as they implemented low impact techniques and adapted their practices and their frames for problem solving. Core to this work were notions of scale and rescaling, with emphasis being placed on catchments and neighbourhoods. I was frequently confronted by conflicting understandings of, the performance of research, and how social and environmental change occurs and can be measured.

I worked with the Otara Network Action Committee (ONAC) October 2005-2007. We formed a co-research relationship in order to undertake a story telling project looking at '*How ONAC works'*. ONAC is made up of an ever changing group of people who coordinate projects for the broader Otara Community Network, in Manukau City, New Zealand. Since establishment in 2000 ONAC has played a significant role in Otara developing principles and protocols for collaborative ways of working in Otara that support visions of community and sustainable development. Positioned as a co-researcher I supported a process of reflection on how the committee had been working and enabling people to act together. We facilitated three workshops. I conducted 12 semi structured interviews and developed resources for the group to reflect on and build stories about how they operate. A core focus of this project was exploring how networking enabled self-determination in Otara[7]. This case study emerged in Otara amidst initiatives for community e-learning and community and economic development and debates on the relationship between community, the voluntary sector and government and best practice community based research.

Between 2005 and 2008 I worked with a colleague (she was trained in environmental science) to document how climate change was being 'rendered governable' in New Zealand. We explored national and regional level policy development, media coverage and research practice to provide an account of how regional authorities were developing and implementing policies on climate change as a result of the 2004 Energy and Climate Change amendment to the Resource Management Act (RMA). This work directly engaged with policy development and implementation in Marlborough and the Waikato. We found discourses of integrated policy-science research were strongly linked to work being undertaken on climate change internationally. This work provided an opportunity for exploring policy/management and science relationships as well as discourses and practices of community engagement and behaviour change. Between 2009 and 2010 the work and researchers in this programme changed along with my fields of reference and I became involved

[7] A central organising idea expressed through ONAC was their desire to be able to shape their own destinies. This came partly as a response to loss of employment opportunities in Otara as well as through discourses about the Treaty of Waitangi.

with initiatives to broaden and strengthen social science contributions to climate change research. In 2010 I helped to host *Degrees of Possibility: igniting social knowledge around climate change* a workshop hosted by the New Zealand Climate Change Centre (NZCCC).

On June 24th -25th 2011, *Magnetic South* a 24 hour online event was held in response to the Christchurch earthquakes. It attracted 858 online participants; co-ordinated (in a rushed 3 months) by a team occupying a Landcare Research seminar room in Lincoln, New Zealand. The software used for this is called the Foresight Engine. It was developed by the Institute for the Future (IFTF) -in Silicon Valley, California – and is described as an online public laboratory for developing and sharing cutting edge ideas about the future of science and technology. This software was designed to support multi-party deliberation through techniques of futuring, crowd-sourcing and game play. It was the capacity of the software to represent spatial-temporal relationships that the Magnetic South team were interested in and the immediacy with which we could get a large number of people involved in a conversation about the rebuild of Christchurch. Ideas for sustainable ways of rebuilding the city dominated both our online conversation as well as the broad range of contributions profiled through the media.

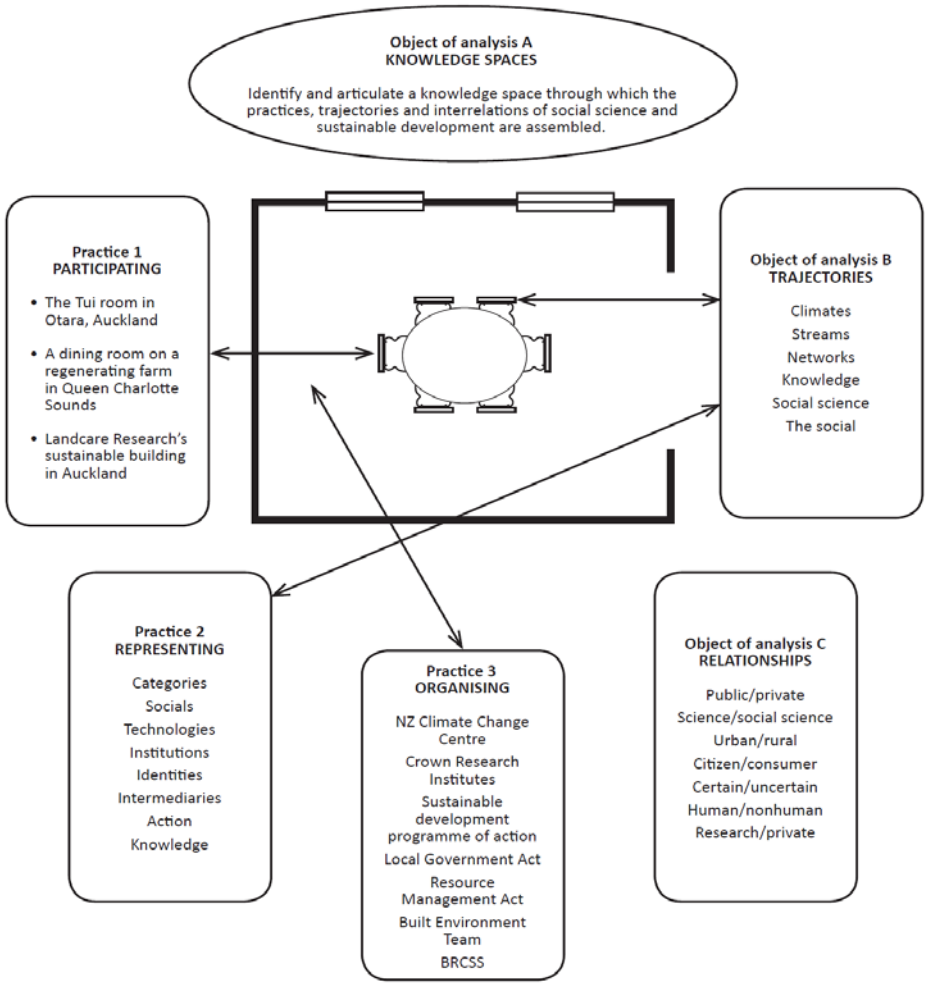
Table 2 Chronology of social science projects examined in this dissertation

Year	Research projects	Other social science	Other government initiatives
2003	LIUDD programme funded by FRST Building Capacity for Sustainable Development funded by FRST	BRCSS launched Centre for Sustainable Cities initiated Biological Industries programme funded Housing NZ Community Renewal programmes Integrated catchment management in Motueka	Sustainable Development Programme of Action Whole of government directive Community network mapping Community ICT programmes Community, Iwi and Voluntary Sector process Treaty Negotiations
2004	Exploring how to evaluate or tell stories of Project Twin Stream, Waitakere	Waikato nitrogen budgets	Glenn Innes community renewal Project Twin Streams RMA Amendment
2005	How ONAC works: Otara	Carbon certification programmes	Flat Bush redevelopment
2006	Regional responses to climate change		
2007			Connecting research and practice ASCP
2008	Not involved with projects, was on Maternity leave, LIUDD and Building Capacity programmes ended.		
2009	Geographical Society Conference	NZCCC Adaptation conference	FRST changed to MSI
2010	Degrees of Possibility Magnetic South	MSI Running Hot conference Canterbury water forum	CRI review Igniting potential report Christchurch earthquake recovery authority

Details from each of the research engagements discussed in later chapters are provided in Figure 4. These are presented through a representation of the conceptual framework for this methodology. Since categories circulating through rooms are central to this dissertation research I have used a plan of a meeting room to add some physical dimensions to the conceptual framework. Figure 4 shows knowledge spaces as an object of analysis supporting enactive social science through spaces of co-

learning. Across the chapters the narratives develop trajectories of climates, streams, networks, knowledge, and social science to connect sites and times and to illuminate flows of the ideas, people and things discussed. Relationships have also been explored with particular attention to how divisions, difference and boundaries were being made. All this work was achieved through three practices of turning up in and participating in rooms linking policy-research-practice. For example the Tui room in Otara, a dining room on a regenerating farm in Queen Charlotte Sound and in Landcare Research's sustainable building in Auckland. The dissertation research was also achieved through practices organising how these rooms and many others were assembled. For example the research engaged with how the NZCCC was organising events; how CRIs were relating and organising social science projects; how the Sustainable Development Programme of Action connected research and policy; how streams and carbon were being organised through the RMA and Local Government Act (2002) (LGA); how Landcare research organised a built environment team and a collaborative learning group and finally how a network of social scientists were building research capabilities across New Zealand.

Figure 3 Examples of the social relations co-produced through this methodology

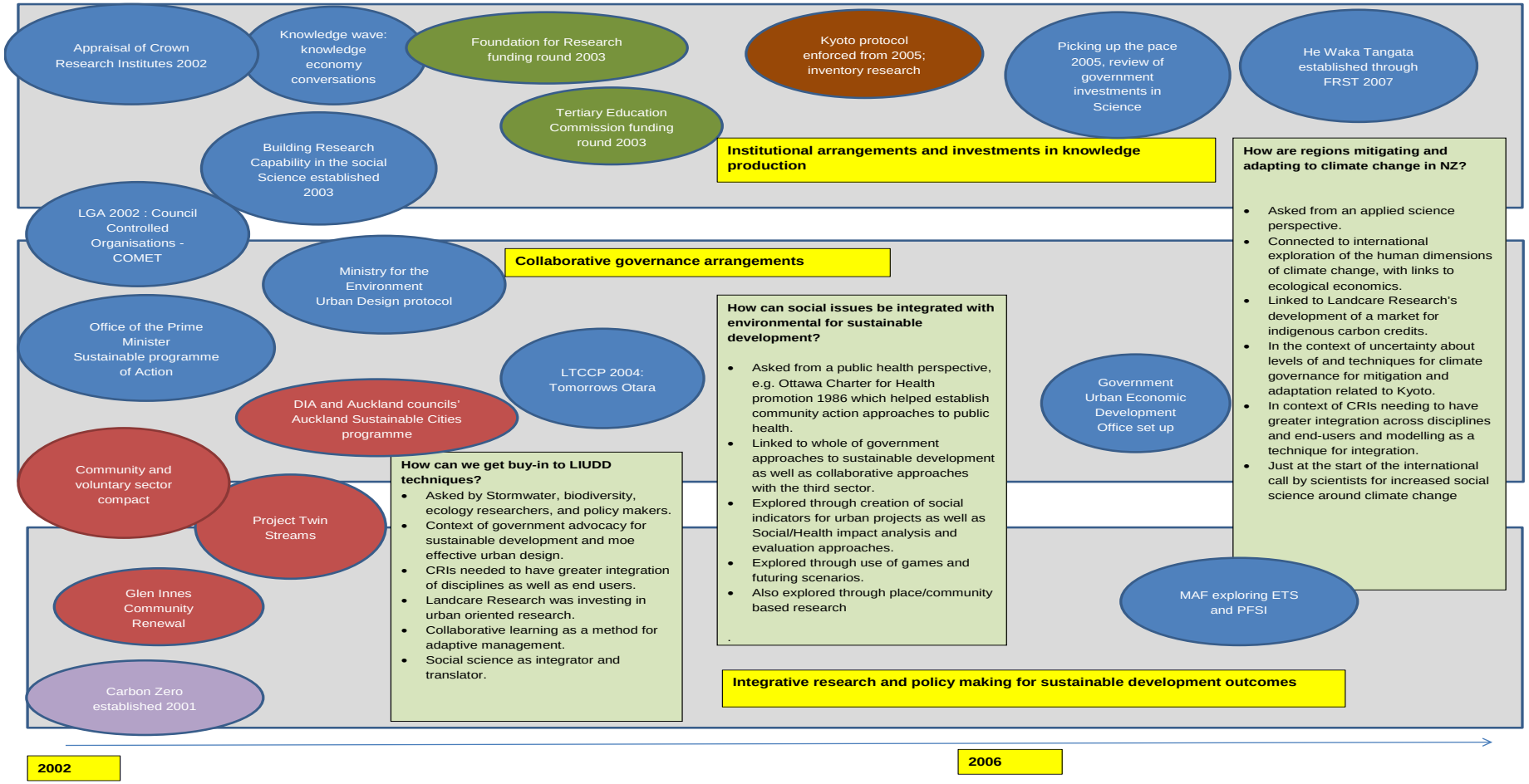


3.5 Representing context and complexity

Figures 5 and 6 below show some of the discourses and institutional relationships shaping the research projects documented in this dissertation. These diagrams help us to step out of a frame of thinking which prioritises the official logic of the projects I worked on. We can then re-narrate these as being assembled through particular sets of practices, discourses, intellectual and political projects (Lewis, 2011). The green boxes below present the research projects I was working on, the main questions shaping my employment, my official role in Landcare Research and research approaches I engaged with. The ovals represent a number of initiatives external to Landcare Research. These initiatives co-created end-users, research partners, budgets,

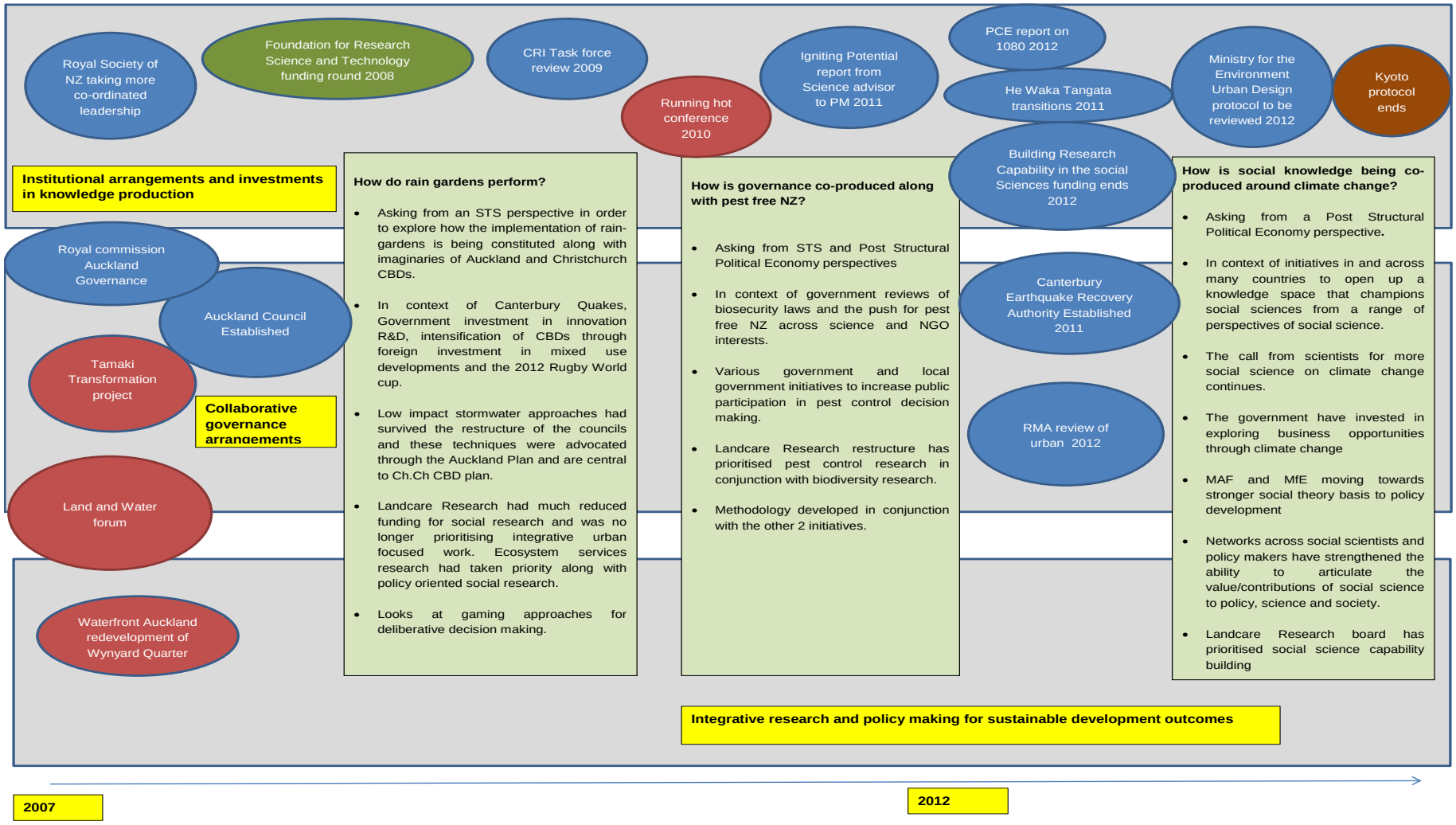
activities and policy processes. They are grouped to illustrate assemblage through three political projects at work on New Zealand. The first was the knowledge economy project, which was reconfiguring institutional arrangements and investments in knowledge production. The second was the governance project, which was reconfiguring citizen-state relationships through technologies of collaborative governance. And the third was the sustainable development project which was at work on imaginaries of research, policy and practice for growth and development. Discourses, institutions and practices assembled through these political projects are discussed further in chapters 5, 6 & 7.

Figure 4 Discourses and activities shaping social science 2002-2006



Key Activities are shown in circles: Blue= New Zealand agencies, Brown=international agency, Red=Auckland specific, Purple=business, Dark Green=research funding. Discourses are shown in yellow boxes. The Research focus is the Light Green boxes.

Figure 5 Discourses and activities shaping social science 2007-2012



3.6 Finding relevant and refreshed frames of social science to circulate

It is noted in chapter 4 that ways of legitimising and creating credibility for social science were highly contested at this time. Therefore a core aspect of this research has been identifying and engaging with refreshed frames of what social science is and can be and then seeing what is enabled through this work of reframing, revaluing and repositioning social science. I have followed debates and expressions of the values of social science across various international (Felt & Wynne, 2007) and New Zealand literature (Lewis, 2010). As will be elaborated in the next chapter I participated in initiatives organised through the BRCSS network and He Waka Tangata (a social science advisory group to the Ministry of Science and Innovation). Linking the thinking from these primarily university based conversations back to conversations with colleagues in CRIs was also very important for exploring the possibilities of social science in this context; where the work of social science is largely framed through ecological science discourses. I discuss this further in chapter 6 where I extend this post structural political economy contribution to the more dominant social-learning or behaviour change frameworks.

3.7 Exploring spaces, traces, trajectories, and boundaries

> *If space is a product of practices, trajectories, interrelations, if we make space through interactions at all levels, from the (so-called) local to the (so-called) global then those spatial identities such as places, regions, nations, and the local and the global, must be forged in this relational way too, as internally complex, essentially unboundable in any absolute sense, and inevitably historically changing (Massey, 2003, p. 1).*

Working with the concept of spaces of co-learning developed a sense of how rationalities can be contained and meanings fixed via the circulation of categories through research projects. I was able to identify material and discursive trajectories shaping how research projects were being enacted by whom, and where. In chapters 5 and 6 I explore what became of the initiatives I was involved with and the people involved and where the ideas or relationships shifted to, that is I trace trajectories of actors, thought, organising and material actions. Tracing the co-production of knowledge and social order can be done in many ways, from investigating supply

chains, to illustration of new sociotechnical relations, to explication of the work of scales in environmental governance. Braun (2006) usefully outlines these and more ways of tracing socio-ecological assemblages. Doing so he points to the utility of ethnographies of micro-practices for tracing the ever emerging socio-ecological relations.

> *Environmental knowledges turn out to be neither monolithic nor settled, commodity chains never escape heterogeneous projects of space and scale-making and global conservation takes shape only through the friction of encounters and interactions between residents, nature lovers, scientists and policy-makers alike (Braun, 2006, p .652).*

The notion of space shows the coming together of discourses and rationalities. Spatial references frame how and where people act, for example the much reified urban-rural divide. Considering space provides a way to think materially (for example about rooms, things, actions taken) as well as discursively, (for example in language and text, the conceptual frames used). Thinking spatially helps people to go beyond the instrumental or normative aspects of social science (what the steps are and what makes it work well or not, and how it ought to be used, when and where) to consider questions of where social science is at work and where it is not. Of particular interest to this dissertation is how social science was being used, the reasons given for its use and what was actually (as opposed to the stated intent) being enabled through its use spatially and temporally beyond the specific research project initiatives themselves.

Thinking of spaces in conjunction with situatedness and trajectories was a useful heuristic for thinking about how discourses were being embodied and enacted. It also assisted the task of exploring the stages or sites through which various rationalities of sustainable development and social science were being performed and through which these categories performed politically, intellectually and culturally. Spatial thinking provided a resource for exploring the specificities of CRI social science and provided a way to detail the emergence of relationships between knowledge and action.

In chapters 5 and 6 I focus on the question of how the research projects I worked on came about in the ways they did (and not others) and how I was constituted into and through them. I narrate entry points, choices made, paths not taken, boundaries of

actions and the circulation of concepts. This narration of trajectories identifies why co-learning was being practiced through science, social science and sustainable development. I present different discourses framing how co-learning was practised, how these were assembled and what other possibilities were also there. Doing so I lay the foundations for my discussion in Chapter 7 about how these spaces of co-learning became performative.

3.8 Tracing co-production through slippery categories, rooms and moments

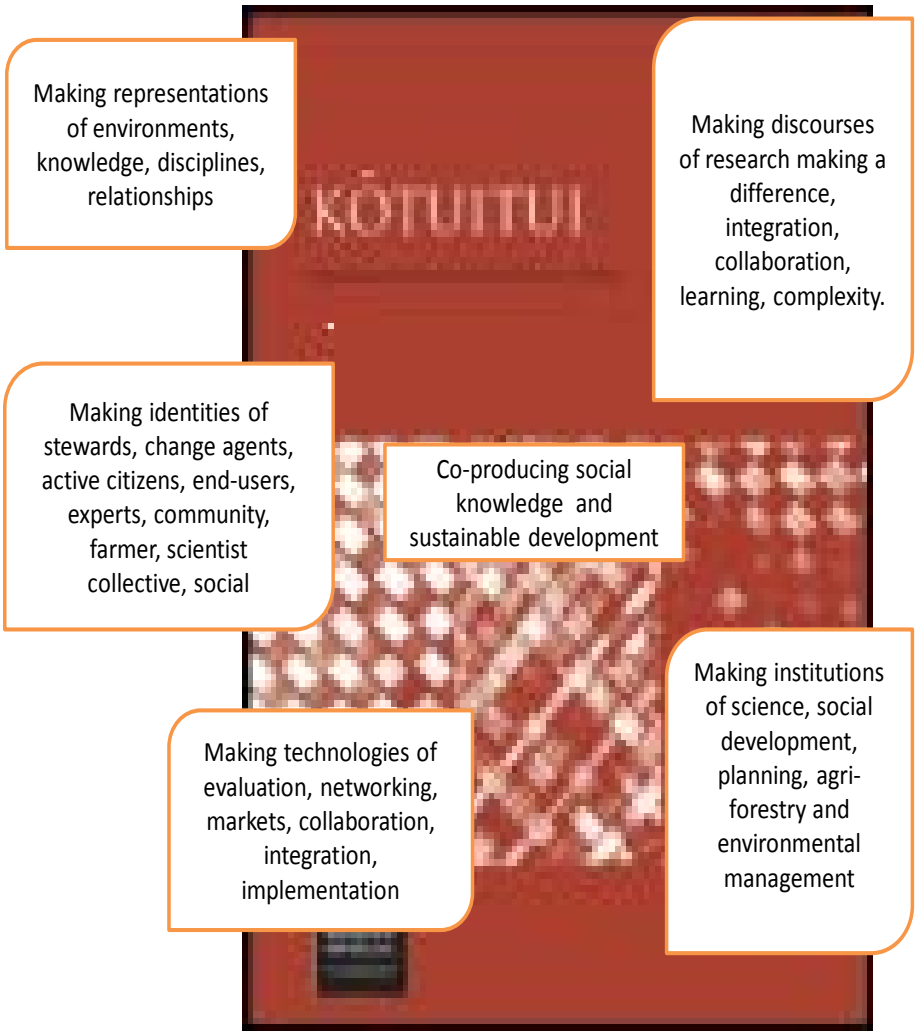
Everyday research practices when framed as enactive (Law & Urry, 2004) generate a broader range of possibilities for organising and investing in social science. Rooms where I turned up as a social scientist or not a scientist or not a policy maker were assembled through a range of research-policy-practice discourses (inspired by Le Heron's use of the metaphor of rooms (2009)). Through these rooms decisions, identities, investments and practices were being made and remade which were partially co-producing discourses of sustainable development as well as science, institutions and policy-research practices. Over the years when writing papers, and thesis chapters I regularly reviewed my note books, emails, web pages, policy documents. I also engaged in discussion with colleagues and peers and I experimented with how I wrote and presented texts. Through these reviews I became sensitive to how categories of *'social'*, *'networks'*, *integration'*, *'collaboration'* and *'learning'* were circulating around me in diverse ways through sustainable development initiatives. In a range of sites and through a variety of practices (meetings, reviewing journal papers, and making presentations) I and my colleagues questioned the ways these categories were used and the effects of their use. This was one way of bringing an on-going examination of co-production processes of representation and identification into our everyday practices of social science.

Five knowledge-power processes informed my understanding of how social science and sustainable development were being co-produced. Performances of social science for sustainable development were analysed through exploration of what Jasanoff (2004) referred to as ordering instruments, the processes through which both knowledge and social order were assembled – or achieved. As depicted in Figure 6 social knowledge and sustainable development were being coproduced through the

making of discourses, institutions, identities, representations and social technologies shaping practices. This dissertation presents a few glimpses of how this co-production was occurring by tracing how each of these elements were emerging and interacting.

In the background of the Figure is the cover of 'Kōtuitui', the Social Science Journal of the Royal Society of New Zealand (RSNZ). Kōtuitui is one avenue through which New Zealand's social science knowledge is generated.

Figure 6 Co-producing social knowledge for sustainable development



3.8.1 Tracing discourses

To recap, this dissertation works with language and discourse not as reflections of the world but as participation in it. Since the 'truth' of scientific statements is achieved through the standardising and stabilising of these statements via their embodiment in specific contexts and for specific reasons tacit and theoretical knowledge are both constituted through complex alignments of people and things. Accordingly this dissertation research engaged with the emergence of knowledge spaces to make sense of what was said, questioned or problematised, how, in which contexts, when, on which occasions and to identify variations in these.

3.8.2 Tracing institutions of science, social science, and environmental governance

As Jessop (2003, 2004) indicates institutions are not a fixed concept. The concept of institutions has been developed through social theory in a variety of ways. I have settled on the description of institutions as the rules, norms and standardised arrangements through which practices and identities are bound, codified and normalised. Accordingly my research became an exploration of how to represent the institutional settings I was involved with in ways which enable accounts of the non-human and of diverse social relations, knowledges and histories. I take up this challenge more in chapter 7.

3.8.3 Tracing representations of social knowledge for sustainable development

Jasanoff (2004) outlines three aspects of representation that have been receiving attention from scholars working on the co-production of science, technology and society.

- representational practices in science (historical, political and cultural influences)
- representations of human agency and how this informs representational practices
- uptake of scientific representations by other social actors

All three of these aspects of representation were performed across the spaces of co-learning my research contributed to. Since my interest for this thesis is on social

science in relationship with science (not just science) I have paid most attention to the latter two aspects. I hook back to the first point by providing an overview of how these two aspects informed the broader representational practices of a science organisation.

3.8.4 Tracing identities for sustainable development

Linked to representational practices is the work of making identities. Identity making (whether they are, individual, collective, human or non-human) is central to knowledge-action practices and works to normalise or make deviant particular identities. Revealing these identities as not fixed as always being made and re-made in relation to other identities, sites and practices has been a key contribution of post-structural insights into understanding agency and what it is to act in the world. Identities are contested and negotiated in the making of scientific knowledge. Social science practices have had a range of influences (re)inscribing identities and in doing so articulating boundaries between research, policy and practice; (for example the practice of forming stakeholder reference groups for environmental management comprised of 'expert', 'government' and 'community' representatives). A co-production focus forces us to tackle the dialectic between unity and difference, sovereignty and interdependence, the self and other. As an inherently political process it required me to be attentive to and participate in the negotiation of how people and things are becoming through practices co-producing knowledge.

3.8.5 Tracing social technologies to govern sustainable development

This ordering instrument is additional to the list Jasanoff (2004) provided. I have added it because I find it a useful contribution from authors exploring governmentality perspectives of power-knowledge (Foucault, 1997; Rose, 1999). The concept of social technologies of governing has been developed to make more visible processes by which rationalities articulated through discourses become performative. Technologies are often social practices through which knowledge is standardised. They assist in the meaning making processes as well in the assemblage of identities. For example literatures exploring accounting and evaluation as a social technology reveal how rationalities are leveraged through calculative practices which align, value, sort and legitimate thus are a site of negotiation and contestation of numerous

discourses. I have focused on practices materialising through social science, science and sustainable development discourses. In doing so I sought to understand and influence the various politics at work through these practices as they shaped the conduct of both humans and non-humans.

3.9 Narrating and analysing co-production

Doreen Massey, discussing spaces of globalisation, asserts that the most crucial aspect of the term 'space' is the dimension of multiplicity. "One vital thing that that insight gives us is the insistence, even within globalisation, on a plurality of positionalities" (Massey, 2003, p. 21). The challenge then becomes how to show this plurality of positionality in ways that also illustrate a plurality of potentialities. Narrating co-production through an auto-ethnography is one way to do this. This 'self-conscious' study (Ellis, 2004) provides a relational geography (Massey, 2004, p. 1). I provide a glimpse of how social science positionalities were put to work in multiple and often conflicting ways through sustainable development and knowledge making discourses. This landscape was shaped by globalised discourses of the knowledge economy, collaboration, integration, policy relevant science, participatory democracy, behaviour change and making a difference in the world. However, how these discourses materialised was specific to the rooms and moments in which we were making knowledge and practices for sustainable development.

3.10 Illustrating a situated politics of identity formation, being and becoming

Using techniques of auto-ethnography I have undertaken an "exercise in writing the self and the social" (Butz, 2010, p.138). Understanding identity as *being* (Massey, 1994) and *becoming* (Deleuze, 1994) I have come to think of this as an exercise in producing the social through representations of myself, Alison the social scientist at work in the world. It is a way of critically reflecting culture, "an act of seeing the self through and as other" (Butz, 2010, p. 138) recognising that my identity and practices are highly governed, and I am at work on the world through diverging and converging political projects of social science, science and sustainability.

The narratives in the following chapter about research projects I was involved with make visible trajectories of relationships and discourses of knowledge-action through

which the objects and subjects of research was co-constituted. Writing these narratives coincided with production of tables and diagrams to help understand spaces of co-learning. I gave thought to the everyday practices, concepts and sites of knowledge-action that I had been associated with. The tables not only helped to provide empirical evidence of co-constitution but aided the analysis by providing the opportunity to see relationships across the spaces as well as explore what discourses had been more or less dominant within them and the possibilities for action that were not taken up. The narratives of research pathways and relationships as well as the constitution of spaces of co-learning address how *institutions, identities, representations, material investments, affects, discourses and technologies* were working through these spaces and were re-negotiated or contested.

Working with actors' reflexive awareness of their own constraints and contingencies I was able to explore how people know through collective performances in rooms. By shifting my conceptual and pragmatic practices away from a focus on doing co-learning to making social knowledge I discovered how to re-situate my engagements with knowledge production in trajectories co-constituting social science. This involved engaging with multiple sites where the making of social knowledge was being enacted and re-scripted. It also took continued attention to the *how, where, when of knowledge making processes* and *how these were represented and invested in*. I sought to find and show the potential for the performative in the everyday, making and re-telling stories that are not commonly being told.

3.11 Generative knowledge

This argument for doing enactive research is not a claim of having found or made nirvana – there will always be a need to escape from other's agendas and to do informed action and reflect on this. Insights gained from targeting specific political or intellectual projects as objects of inquiry and lessons learnt are the practices and possibilities for acting. This is about going beyond what is currently institutionally inscribed to shape what else could be institutionalised. For example, speaking to arguments in policy circles about evidence based decision making and evaluation, by questioning whose perspective and who gets to make these worldly claims. Proactive

and enactive social science recognises research and policy claims about the world are an intervention and co-produce socials.

Andy Stirling usefully dissects the dichotomising of participation vs. analysis offering a framing that social appraisal does work which either 'opens up or closes down' policy discourses on science and technology choice (Stirling, in Leach et al 2005, p.228).

> *The only way to seriously address these challenges lies in the more direct, systematic and explicit attention to institutions and procedures for opening up, as well as closing down, in social appraisal. Only by acknowledging the normative value of pluralism and the substantive value of diversity in appraisal may we hope to achieve more legitimate, robust and truly deliberate technological futures (Stirling in Leach et al., 2005, p.231).*

So, sustainable development is an assemblage of political and intellectual projects, forever being co-constituted through our actions to make knowable, to generate, possible alternatives to practices and discourses currently driving development. This encourages us to think about past and present relationships and investment practices informing specific activities. I now understand social science contributes immediately by making available to those involved (or not) in these decisions a range of imaginaries of how the world is and is becoming. This generative work draws upon techniques such as futures scenarios, statistical analysis of commodity lifecycles, mapping the relationships of artifacts, artistic portrayals of historical events, or processes of reflexive questioning.

3.12 Summary: Enacting refreshed socials of sustainable development

Social science practices framing and also narrating the situated co-production of sustainable development knowledge have been outlined above. The strategy presented here came together as I worked out which concepts support exploration of social science and sustainable development as co-produced and what this might mean for social science in New Zealand. I have avoided a linear presentation of this research strategy. Instead I presented a suite of activities and epistemological positions drawn upon to varying degrees throughout the creation of this thesis. Each

of these was practiced with attention to my own activities, dispositions and stances. In the following pages I reflect upon the extent to which I was doing activities in isolation or with other people and to what extent these practices helped me move away from reproducing dominant representations of nature-society and knowledge-action relationships. The lens of 'self' through auto-ethnographic enquiry enabled exploration of a range of sustainable development epistemologies and ontologies. In doing so, I make a contribution to geographical performances of after-neoliberalism, methodologies for understanding complexity, and the politics of belonging (Law & Urry, 2004; Gibson-Graham, 2008).

Chapter 4

Social science shaping sustainable development: situated knowing-doing

> *Although it seemed at first sight that the subject matter of social sciences was easy to locate thanks to the massive and ubiquitous evidence of the social order, it now appears that it is just the opposite: there is nothing more difficult to grasp than social ties. It's traceable only when it's being modified (Latour, 2005, p. 159).*

The previous chapters established the idea of social science as a contested space of knowing-doing, which is being made (and modified) along with sustainable development. In this chapter I argue for enactive social science by locating the thesis in the context of a CRI. This thesis is about the production of social science in relation to science for sustainable development. The problem and potentialities of social science that are discussed are specific to and emerge from discourses and practices making New Zealand science through Landcare Research, one of New Zealand's eight CRIs.

To situate the thesis, I describe how ideas of what social science *is*, what sustainable development *is*, and how they might be *practised* were aligned through regulations, government programmes, science funding, earthquakes, carbon, and the flow of water in cities. This chapter describes how social science for sustainable development was introduced and circulated through a variety of rooms as a response to issues of violence, carbon management, deforestation, water quality, economic growth, social justice, and co- learning. I address how these concepts of social science and sustainable development were presented, organised, and invested in through Landcare Research.

Having established social science for sustainable development as the object of my analysis I need to tell my readers a little of what this landscape in New Zealand looks like. However, for reasons established in earlier chapters, I want to avoid doing too much work that represents 'Social science for Sustainable Development in New Zealand' as a fixed entity. I do not evaluate, classify or quantify the social science undertaken during the period of my study (that is, my discussion is not based on

findings from a survey or interviews). Instead, I use a little of the information already publicly available to show how knowledge of investments for the production of knowledge about social relations (social knowledge) is poorly developed and problematic. I do not present a history of social science for sustainable development, instead I present a partial and emerging landscape – just some of the ideas, organisations, and practices that shaped how the social science with which I was involved was affected by the absence of rigorous political analysis of the production of social knowledge for sustainable development.

4.1 State initiated social science, sustainable development and science

Over the last two decades the alignment of science with economic, environmental, and social well-being has been a central part of government approaches to development. Non-Mātauranga Maori science dominates the New Zealand science system and is often referred to in relation to Mātauranga Maori as Western Science, the colonising knowledge system (Smith, 1999; Harmsworth, Barclay-Kerr & Reedy, 2002). Discussions of science in New Zealand can over-represent both the institution and practices of making science as essentially unchanging and homogeneous. Science, the institution, the people, their practices and products are far from static. Indeed, the production of science in New Zealand, who does it, and its effects on the development of land, are the focus of continued, sustained political, public and financial attention and contestation.

In a 1984 review by the New Zealand National Research Advisory Council, the following definitions were given of science, technology and research

> *Science is – knowledge possessed through study or practice – knowledge that has been systematised and formulated – knowledge arranged under general truths and principles. Technology is – the study of practical or industrial arts – the application of scientific knowledge to practical purposes. Research is – the work undertaken to increase the knowledge available for utilisation by society (National Research Advisory Council, 1984, p. 5).*

I note this definition first because of its articulation of knowledge as possessed and not co-constituted. Second, it is a definition that is still being circulated with much effect. It was used recently in the 2011 report on the Waitangi Tribunal's 262 claim

into the place of Maori culture, identity, and traditional knowledge in New Zealand laws, government policies and practices. Third, the science, technology, research split was the dominant heuristic or central organising framework of knowledge production through which my social science practices in a CRI were assembled.

4.1.1 Social science and sustainable development at work through CRIs

CRIs have regularly been upheld in government reports as central to the creation of knowledge across all aspects of wellbeing. In 1992 the Department of Science and Industrial Research was dissolved and the Crown Research Institutes Act established nine CRIs to conduct government funded research, science and technology. These are stand-alone companies funded on a semi-competitive basis with leadership through government-appointed boards. Importantly, the Act states the term science includes the physical sciences, the biological sciences, and the social sciences, as well as technology. In creating the CRIs, the government

> *…sought to consolidate national scientific capability around key aspects of New Zealand's economic, environmental and social requirements. CRIs were established as Crown-owned companies as it was believed that a company model would encourage efficient, client-focused delivery of research services (Crown Research Institute Taskforce, 2010, p.17).*

The 'Owner's Expectations Manual' (CCMAU, 2007) defines the role of a CRI. Notably, a CRI does not need to focus on financial return at the expense of delivering on its other objectives and statutory purpose, and a CRI does not "act with complete academic freedom, without regard to the needs of stakeholders" (CCMAU, 2007 p.51). The manual also stipulated that CRIs fulfill their role by collaborating with other science organisations ensuring the transfer of knowledge and its uptake by end-users. CRIs have to engage with stakeholders, and serve as a repository of strategic, scientific knowledge. Among other expectations was the need maintain or grow revenue, communicate the value of research, science and technology, and develop the human capital of the organisations.

The 2010 review of CRIs gave greater emphasis to the role CRIs play in economic, social and environmental development.

> *The Crown Research Institutes (CRIs) are a vital component of our overall science system. They employ over 4,400 people and receive around $480 million of Government funding per year. In return, they provide vital science and research that underpins our economic, environmental and social performance (Crown Research Institute Taskforce, 2010, p. 2).*

The role of the CRI as an instrument for well-being was further elaborated later in the report.

> *Research and development generates profound and enduring benefits for New Zealand society. Ongoing government investment is essential. The Government established CRIs to improve the economic, environmental and social wellbeing of New Zealand, and they are delivering substantial benefits (Report of the Crown Research Institutes, 2010, p. 2).*

4.1.2 Social science and sustainable development assembled through research funding

In 2002 the Ministry for Research, Science and Technology (MoRST) initiated consultation on a strategy for biotechnology; work that went on to shape New Zealand dialogue processes, influencing not only practices of science communication but also the study of science risk management approaches. One result was a public dialogue about investments in science and technology and the development values linked to these. This was a key moment marking a cross-sector and citizen conversation about who New Zealanders want to be and how they want the future for New Zealand (MoRST, 2002). It was through this dialogue process that I first began to work for Landcare Research.

Also occurring at this time was a strengthening of links between central and local government sustainability initiatives, sustainability research and CRI social science. In 2002 the Parliamentary Commissioner for the Environment (a government appointed independent spokesperson for environmental issues) praised government funding for sustainability research made available through FRST and went on to assert

> *…if sustainable development is to become a cornerstone of future economic, environmental and social policies, it will be necessary to ensure that within central and local government and within research institutes there is the capacity and people with the capability to make the links between all three dimensions of sustainability (PCE, 2002, p. 17).*

The commissioner also made a case for investment in research about sustainability and human settlements, arguing that since 85% of New Zealanders live in towns and cities the implementation of sustainable development must be human-settlement focused (PCE, 2002, p. 131). In 2003 FRST took up this challenge and funded research about sustainable settlements. It was this funding that initiated a new position for a Social Scientist at Landcare Research, and hence my step away from doing social science for social policy into the more contested landscape of social science for an emerging sustainability science. The 2003 funding round linked ideas of urban growth with sustainability research. It also focused research on energy efficiency and energy security issues.

Understandings of New Zealand cities and how they could develop (urban imaginaries) were much bolstered by the 2003 allocation of between $100,000 - $1.5 million to four CRIs[8] for research into sustainable settlements which generated much research activity in and across New Zealand cities. These programmes addressed earthquake risk for urban infrastructure; indigenous biodiversity in urban areas; energy supply infrastructure; renewable distributed energy production; energy options for Maori communities; low impact urban design; urban air quality processes; new technologies for rural bridges and building capacity for sustainable development.

The social science contributions to these programmes were largely over-defined by environmental management and risk management discourses. Typically, these called for collaboration and learning, inter- or trans-disciplinary research, a focus on tackling 'wicked problems' and complexity through adaptive management, participation, cost-benefit analysis, mediated modelling and systems thinking. As a result the objects of social analysis have predominantly become 'community',

[8] Manaaki Whenua Landcare Research Ltd, National Institute for Water and Atmospheric Research: Taihoro Nukurangi, Industrial Research Ltd (now Callaghan Innovation, and GNS Science, Te Pü Ao)

‘institutions’, ‘households’, and ‘representatives of organisations’, and, more recently, ‘decision makers’. Limited as these social categories may be, they did work to broaden the landscape shaped by social science in New Zealand, and provided opportunities for discussion about rural–urban relationships and the governance of ‘clean green New Zealand”. Funding CRI social scientists to focus on cities influenced and reflected the growing discourse of the knowledge economy.

In 2004 the Tertiary Education Commission (TEC) announced allocation of $8 million to a network of senior researchers across universities to increase the capability of the social sciences in New Zealand. The BRCSS initiative was heralded as a unique opportunity for the social science community to contribute to the well-being of all New Zealanders. With its launch the presence of an actual ‘social science community’ became visible to both policy officials and social scientists outside the universities. Professor Richard Le Heron and Dr Nick Lewis, my PhD supervisors, were central figures in this initiative, shaping how social scientists articulated their work and forging stronger links across New Zealand universities, organisations and disciplines. Sustainability was one of the themes identified for building social science capacity. The sustainability-oriented network provided a forum to critique the growing range of approaches to sustainable development. The networking also built greater understanding of social science interactions with development.

The events above show a range of ways through which research funding connected social science and sustainable development. These discourses circulated widely through research practices, including policy rooms in Wellington and Auckland, new housing developments and individual houses. Sustainable development and social science discourses were also present in rural and urban catchments and on dairy farms up and down the country. In the research projects, social scientists represented these sites through theory development, modelling, hosting workshops, art installations, interviews, surveys, kitchen meetings and also in environment court hearings, lectures, papers, and presentations.

More broadly, social knowledge about sustainable development also emerged both in regional and local government policy rooms and in industry and business meeting rooms. The main issues were urban growth, water quality, costs and benefits, future scenarios, climate change, ecosystems, life cycles and social, health and

environmental impacts. Le Heron, Le Heron and Lewis (2011) argued that sustainability work was occurring across diverse settings.

> *'Sustainability' appealed as a concept across NZ society, but was largely restricted in science circles to concerns with environmental science, land management, and economic growth. In contrast, research in NZ universities adopted a much broader interpretation… research interest in sustainability questions gathered momentum in 2007-09 as the political project of sustainability became more fully expressed in new institutional framings within universities, local government research demands, new research funding opportunities, and interdisciplinary requirements of science funding. This interest was politicised in ways that escaped environmentalism... (Le Heron et al., 2011, p 1405).*

Research projects with a specific focus on sustainable development were typically collaborative arrangements across CRIs, Universities, and consultancies. Disciplinary fields of engineering, planning, hydrology, ecology, management, accounting, economics, geography, and public health were most commonly involved in this sustainability research. The CRI Environmental Science and Research (ESR) had a social science team coordinated under the umbrella of Integrative Research for Sustainability. AgResearch (another CRI) also had a focus on integration and the social impacts of new agricultural technologies and polices.

4.1.3 Social science and sustainable development assembled through regulation

In the early 2000s there were frequent legislative events through which government-funded science, social science and sustainable development initiatives were assembled. The most significant piece of legislation affecting the social science with which I was involved was the LGA. This Act required councils to take a sustainable development approach providing for the four well-beings (social, economic, environmental and cultural well-being) of their communities. As a result social-impact, health-impact and environmental-impact methods became popular research approaches. Debates focused on weak–strong approaches to sustainable development as well as on the difference between sustainability and sustainable development.

In 2003 the Department of the Prime Minister and Cabinet (DPMC, 2003) launched the Sustainable Development Programme of Action (SDPOA). This programme focused on cities and energy efficiency and encouraged a high level of involvement of local government in the research programmes. Social research aligned with the programme focused on health aspects of sustainable development, implementation of new techniques, as well as decision-making processes.

The government's push for local government to take on sustainability agendas such as energy efficiency and reducing greenhouse gas emissions increased investments in renewable energy sources and raised the value of New Zealand's housing stock. The Resource Management (Energy and Climate Change) Amendment Act (2004) required all councils to consider the effects of climate change in their day-to-day activities. This was responded to by an increase in the range of scales at which climate change predictions were made and the variety of impacts and scenarios that were considered in climate models (MfE, 2004). A few years later, in 2009 the Land and Water Forum was established, tasked by the government to come up with a policy framework for resolving the difficult issues in land practices and the state of New Zealand's water bodies (Land and Water Forum, 2010). Collective approaches to governance and decision-making were again a major focus of social science, along with approaches to understand, measure and value ecosystem services.

Government-initiated groupings of social science, sustainable development and science drew on discourses that included evidence-based decision-making, future proofing, making optimal choices, the need for more end-user engagement and facilitation of behaviour changes. Community renewal and neighbourhood planning were prioritised as sites for research-policy-practice engagements, supported by the use of outcome and programme evaluation (see Artifact 3 in the appendix), collaboration, and partnership processes. Energy efficiency debates focused attention on the implications of centralised and decentralised infrastructure provisions and this again raised questions about forms and scales of governance. The creation of social, environmental and economic well-being through research has been a central objective of government-funded science and development approaches. However, at the beginning of the 21st century the values and contributions of social science and their relationship to Mātauranga Maori and economic, social, and environmental well-

being were dominated by public management theorising. Public management frameworks positioned social science almost exclusively in relationship to social policy, education, and health.

CRIs provided one of the few spaces where these relationships between social science and sustainable development could be experimented with and expanded. Right from the inception of CRIs social science has been included as a core component of the science system in New Zealand. But even with such a seemingly clear mandate, the space for social science is still poorly developed, constrained by very narrow framings of how social science contributes to society and state-development agendas. For example, in the MoRST (1997) review of New Zealand's social science knowledge-base, the following fields were noted as shaping the character of New Zealand's social science Economics; Labour, Organisation and Organisation Studies; Political Science; Urban and Environmental Planning; Sociology; Social Anthropology; Human Geography; Population Studies; Psychological Science; Education; Media Studies and Communication; Leisure and Recreation Studies; Maori Studies; Women's Studies; Linguistics; History and Archaeology.

This list reflects the popular social science courses in universities in 1997 and does not reflect much of CRI social research more typically framed as social impact assessment; science and technology extension; resource management and participatory research (Dale & Goldfinch, 2005). In her 1998 review Raewyn Good questions why an emphasis was given to the work of University based social scientists. She asks

> *why the "invisibility"? Are there structural factors hindering cross-sectoral communication and understanding? Is there some belief that limits the definition of a social scientist by where they are employed? Were there assumptions made about what is and is not a social scientist? (Good, 1998, section 4 para 1).*

This 'other' to university social science can partially be distinguished by social science funded through CRIs and also the community and voluntary sector. In 2007, the Tangata Whenua, Community and Voluntary Sector Research Centre

(TWCVSRC) was established with members invited to join by indicating agreement with a Code of Practice for community research. The stated purpose of the Code of Practice was to provide a set of benchmark principles and standards by which researchers doing work, *in*, *with* and *for* communities could measure their work. The code indicates principles deemed to be important when doing research. The basis for the Code of Practice was that researchers should ensure there was minimal risk and maximum benefit to the people, groups, communities, and organisations that were participants in research:

> *Research participants need the right information and tools to make informed decisions about research and researchers. This Code of Practice will help them to navigate the options and approaches available* (TWCVSRC, 2007, p. 1).

Circulation of this code through social policy, community development, and community action research networks was a response to unsatisfactory and even devastating past experiences of research about places or groups of people. The code was the culmination of a process that established principles for NZ government agency's engagement with tangata whenua, community, and voluntary groups. I provide more details about my engagement with this code in chapter 5; here I restrict comments to the introduction of this trajectory of research–policy–practice relationships articulating community development approaches to sustainable development and a strong ethic of emancipatory science; science empowering people to change their lives.

The Ministry of Education's 2007 'Statement of Intent', written towards the end of the government's term in office, shows how ideas of sustainable development were being linked to the notion of a knowledge economy through a focus on education and youth development as well as sustainable use of natural resources.[9]

> *New Zealand's future is dependent on long-term sustainable strategies for our economy, society, environment, culture and way of life.... The government's three priority themes of Economic Transformation, Families – Young and*

[9] In chapter 5 I discuss the policy priorities of youth development, education, and natural resources and see what outcomes were created through these investments.

> *Old, and National Identity are underpinned by an emerging focus on sustainable development and realising youth potential. The overall aim is to create a high-income, knowledge-based economy, which is both innovative and creative, and provides a great quality of life for all New Zealanders (MoE, 2007, p. 15).*

There was no clear consensus in New Zealand or internationally on what a knowledge economy is or how it could be observed and measured. Building the knowledge economy appears to be conflated with increased use of Information and Communication Technologies (ICTs) and investment in human capital through continuing education. In Chapter 5 I discuss how provision of ICT training was part of the network of knowledge economy initiatives shaping production of social knowledge and development in the settlement of Otara. For now we move from discussing how social science has been assembled through government initiatives to look more closely at the sites enlisted in or through social science assemblages.

In 2009 CRIs again came under review (MoRST, 2010). Although social well-being and social outcomes were touched on by the review taskforce, the potential contributions of social science were not. Brief recognition of the short-lived social science CRI (disbanded in 1994) was mentioned in a timeline, and a note was made of a submission being received from the BRCSS secretariat. This submission argued

> *...social scientists are needed to help define the key problems in investment areas, not as 'end of pipe' extensionists at the final stages of the technology development process. This might best be done by establishing further mechanisms to embed team-based social science directly within CRIs* (BRCSS, 2009).

To get a sense of how social science in CRIs was presented to the public I looked at CRI websites, conference presentations, reports and an informal survey of social scientists in CRIs (initiated by Dr Johnston in GNS). I focused on research that was represented as social research. The distinction I am making here is that not all people doing social research through CRIs are trained as social scientists. Also, not all research on social processes is presented as social research (for example work on organisational processes and farm management is presented by some interests as

social research and by others as the practice of science transfer). I found that production of knowledge about processes for and results of 'stakeholder', 'community', 'public', 'farmer' engagement was a core focus of social research produced across New Zealand CRIs. This social research focused on agricultural or science extension as well as processes for learning, dialogue, consultation, and evaluation. The objects of social analysis covered in the social research included integrated catchments, farmers perceptions, community values, mitigation, management, rural, futures, decision making, risk, human sensory experiences, societal vulnerability, farmer stress, teenagers, parents, families, whānau, options, mental health, consultation, dialogue and action research.

4.2 Making social science through Landcare Research

In 2004 the 10-year vision of Landcare Research gave greater emphasis to research for sustainability, with a primary focus on sustainable land use. This goal was acknowledged officially through Landcare Research documents as well as unofficially through the culture of the organisation. There was strong emphasis given by managers for integration of knowledge across disciplines and social sectors, and social research was seen as an important part of this mix. The central framing of social research in Landcare Research positioned it as something other than biophysical science, policy, and economic research. Collaborative learning (Greenaway, Allen, Feeney & Heslop, 2006) and in later years Social Learning, was a dominant frame used with environmental economics, sustainable business, and lifecycle management. Beyond this was a framing of social science as providing knowledge of social processes and institutions.

I found the dominant emphasis Landcare Research gave to social science was for *application of science* achieving sustainable land management. However I also noted both *intellectual and instrumental* social knowledge agendas were supported. Looking at some of the ways social science was framed in the organisation during the period of study, I found three main trajectories of influence on these frames. First, were the concepts of science extension and impact assessment, followed by science communication, with which Landcare Research (and previously the Department of Science and Industrial Research) scientists were used to working. Second, were the growing international discussions of social-learning for natural resource management

and sustainability science for complex problems that linked New Zealand environmental researchers with Australian researchers as well as with those working in the context of developing countries. Finally, there was the growing topic of ecological or environmental economics, which was initially positioned as a field of study external to other social sciences. Over time ecological and environmental economics have come to mark the space of social science.

4.3 Inter- and trans-disciplinary research

The following chapters show how cross-disciplinary relationships not only reified disciplines but also produced new identities for the integrating, sustainability researcher or urban development professional. Here I briefly describe how interdisciplinary research involving social science was organised. In 2006 the TEC contracted a report on the state of social science in New Zealand. A survey of social scientists in universities was undertaken by the Centre for Social and Health Outcomes Research and Evaluation (SHORE). This study found interdisciplinary and collaborative research was common across the social sciences, especially among those working on environmental issues (Witten, Rose, Sweetsur, & Huckle, 2006; Caroll, Blewden & Witten, 2008).

Some of the inter/multi/trans-disciplinary research shaping the context in which I was working from 2004 to 2012 was lead by an unincorporated joint venture between AgriBusiness Group at Lincoln University and the University of Otago. Established in 2003 the Agricultural Research Group on Sustainability (ARGOS) was funded by the Ministry of Science & Innovation (MSI) (formerly FRST) and various industry stakeholders. ARGOS had a mandate to examine the environmental, social, and economic sustainability of New Zealand farming systems. The Centre for Sustainable Cities (University of Otago, established 2005) is an inter-disciplinary research centre dedicated to providing a research base for innovative solutions to the economic, social, environmental, and cultural development of our urban centres. Landcare Research was a founding member of the centre. The Motu Research and Education Foundation is another organisation with which Landcare Research worked closed on interdisciplinary research. It is a charitable trust established in July 2006 that aims to produce and disseminate socially relevant policy research. Promotional material describes a dedication to ensuring the highest standards of economic research and

public policy analysis were maintained in New Zealand. Motu is funded through research grants and sponsorship. Identifying, naming, and working with end-users is one of the central social science practices shaping sustainable development through these cross-organisation and inter-disciplinary research centers.

4.4 Practices of social science for sustainable development

> *Researchers became enrolled in and practitioners of a complex politics of knowledge production…this centring of sustainability had new elements of spontaneous cross connection, rather than 'forced' end-user links through funder decree. As opportunities to participate in multiple and differently framed workshops and conferences proliferated, researchers became exposed to a wider set of sustainability claims and the actors making them* (*Le Heron, Le Heron & Lewis, 2011, pp. 1405–1407).*

Social science was assembled for a variety of purposes through a range of organisations and sites. The social science that came to work on sustainable development was positioned on the boundaries of both social science as well as science, and was emerging as a spearhead for inter- or trans-disciplinary research, linking disciplines and organisations. Another way to understand what social science was becoming during the early new millennium is to assess how people described what social science actually did, the practices of and topics addressed by social science. To do so I turn again to the 2006 BRCSS survey and look more closely at what was not evident in the official accounts of central government research funding.

Over 25% of respondents to the survey of university-based social scientists indicated their main area of research activity was relevant to one or more of the following policy arenas: education and training; social development and social policy; health and disability; and people, family, and society. Other sectors frequently noted were business and trade (18.4%); arts, culture and history (17.2%); Maori (16.1%), employment (11.5%), *environment and conservation* (10.8%), Pacific peoples (10.5%), and government and international relations (10.1%) (Witten et al., 2006 p.6). The BRCSS research also found the most frequently used methodological approaches or strategies in respondents' main research area were face-to-face surveys/interviews. Of the 418 respondents who had used face-to-face surveys or

interviews, over 90% had undertaken interviews collecting qualitative data and approximately 27% had used interviews collecting quantitative data. Other commonly reported methods were analysis of secondary sources (348 respondents), statistical analysis (299 respondents), textual analysis (239 respondents), and analysis of official statistics (221 respondents) (Witten et al., 2006, pp. 37–8).

Details of investment in social science[10] were publicly available through MoRST (2007) reports showing annual budgets for research across the public sector. These reports showed that health- and environment-oriented research received the greatest allocation of research funding. Looking at signals of allocation for social research, in the 2007/8, 2008/09 and 2010/11 financial years, I found $5,860,000 was allocated in the 2007/8 and 2008/9 financial years. This amounted to 0.97% of total R&D funding in 2007/8 and 0.9% of the total funding allocated in 2008/9. These allocations for social research were solely to address topics related to social well-being (which were quite distinct from environmental well-being).

In the 2010/11 budget the allocation for social research was completely removed. There are a number of other categories listed through which social research could have been funded, for example, for policy advice or for broader understanding of the social dynamics of the issues. Indications of investments in social science have been given over the last decade when the contribution of social science to policy has come under government review. In government-funded reports assessing social science contributions the needs for social science were described as:

- Stronger interfaces with (social) policy
- Increased stable funding for long-term researcher lead projects
- Strengthening of access to and development of statistical databases
- More evidence based decision making and evaluation.

These priorities have been developed through regular engagement between government officials and influential social scientists. The ways social science was framed (2005–2012) and boundaries delineated shows social science for social policy predominated. There was also reference to social science as the producer of

[10] Here I refer to funding that is distinct from allocation to Universities by the TEC and Vote Health

knowledge about the characteristics and trends of society, neighbourhoods, communities, households and individuals.

This landscape of social science was marked by dominant state discourses articulating the contribution of social science to social policy, developing indicators, providing evidence, and identifying social outcomes. However, strong and on-going contestation to this dominant framing was also occurring through Mātauranga Maori and histories of scholarly and philosophical enquiry. As well as having a strong applied focus, New Zealand social science was described as interdisciplinary and collaborative. Strikingly collaboration was generally limited to similar social science disciplines or to the social sector (Witten et al., 2006). A distinct and large divide was apparent in expressions of the relationship between science and social science (Rosin, Perley, Moller & Dixon, 2008). This landscape is illustrated more richly through examples provided in the following chapters.

4.5 Why these people, sites and topics: what is the political economy of social science in New Zealand?

There is little published in New Zealand about how fields of social science have developed (or not) and why social science has been done in particular ways and not others. In other words the political and cultural trajectories of social science in *and of* New Zealand are poorly documented. Notably there are some delightful texts (for example Waldegrave, 1999; Davidson & Tolich, 2003) about how to *do* social science in New Zealand. Resources sharing ideas for research methods, the ethical implications of research, the machinations of research-policy interfaces, and also the colonising impacts of research (Smith, 1999) are all available.

However, there are few texts about what social science – the institution and knowledge space - is doing and what is being done to it. There is room for more discussion in New Zealand about how practices of social science specific to New Zealand have come about, how the ways of thinking about social science emerged, and what they were responding to. The few documented and publicly available critiques discuss specific, pertinent issues but do not elaborate on how the understandings, divisions between and practices of local social science have developed and what alternatives there are. Histories of the making of New Zealand

social science are rarely discussed publicly beyond the social science community itself. Through review of grey literature about social science in New Zealand (MoRST, 1997) and observations from 10 years of research experience I found various critical analyses and stories of social science history are held in conversations across practitioners, but are poorly documented. This lack of documentation about the development of local social science reflects many of the ethical and political dynamics at work shaping social science. The following chapters describe these dynamics more fully.

In this chapter I have shown how an assessment of the political economy of social science informed questioning about whose role (or in whose interests) it is to fund research that enquires into how a society understands itself or how society makes knowledge. This line of questioning opened up an exploration of how approaches to narrating histories and projects of social science in New Zealand might support possibilities for what social science is and can be. I return to these points in my final discussion in Chapter 7. For now I describe some of the institutional context in which these questions about the production of social science knowledge for sustainable development arose.

4.6 Making social science work through international research-policy networks

The descriptions above show that social science in New Zealand can be understood as a collective of diverse capabilities. Social science receives attention from policy makers and industry leaders through the creation of knowledge economies.

Yet at the same time social science is increasingly being positioned as central to addressing issues of global environmental change. This positioning work is undertaken through strategic approaches articulating a broad and deep sense of what social science contributes. Representations of social science span a theory-applied continuum and reflect influences of diverse political agendas. In the introduction to the UNESCO (2010) *World Social Science Report*, Irina Bokova wrote

> *UNESCO with its emphasis on the management of social transformation, is concerned that the social sciences should be put to use to improve human well-being and to respond to global challenges. As long ago as 1974, UNESCO's General Conference adopted a Recommendation on the Status of*

> *Scientific Researchers which emphasized 'the need to apply science and technology in a great variety of specific fields of wider than national concern: namely such vast and complex problems as the preservation of international peace and the elimination of want'. Today, the social sciences bring greater clarity to our understanding of how human populations interact with one another, and, by extension, with the environment. The ideas and information they generate can therefore make a precious contribution to the formulation of effective policies to shape our world for the greater good (UNESCO, 2010, p. iii).*

This clear articulation of the contribution of social science is deceptively simple. However the cohesive social science voice and international leadership expressed through the WSS report signals a shift in both intellectual and capability building work. The WSS report presents established social scientists speaking collectively and not solely as representatives of specific disciplines. This collective representation of an international social science community provides a response to both the challenge of disappearing disciplines in an era of interdisciplinary research as well as a cohesive representation of social science contributions after sustained challenges by governments to reduce and constrain investments in social science research and capacity.

Bokova went on to express her concern that

> *…without conscious and coordinated effort, the drift of the global social science landscape is towards fragmentation, lack of pluralism and estrangement between scientific endeavour and social needs. Clearly, institutions matter hugely for research performance. But their strength can hardly be taken for granted in today's economic circumstances. The production of rigorous, relevant and pluralistic social science knowledge requires international coordination, a long-term vision and a stable environment (UNESCO, 2010, p. iii).*

These two statements highlighted to both social scientists and funders of social science the contributions social science can make as well as the risks facing social science at that time. Bokova's statements also signalled an emerging leadership and

organising framework beginning to consolidate ways of articulating and investing in social science contributions. Some of the ideas presented the 2010 report were shaped by and echoed initiatives influencing social science in New Zealand as well as the restructuring of CRIs. These institutes play a key role in shaping the relationship of social science with science in New Zealand, and consequently the possibilities for understanding and responding to environmental problems. Writing in 2009 the New Zealand delegation to the WSS forum concluded:

> *New Zealand has opportunities nationally, regionally, globally to realise its potential and lead a new era of knowledge production that could enhance national productivity and well-being, and respond to international responsibilities. Addressing challenges and realising opportunities require strategic interventions in current science policy that...identify and realise the potential of social science to foster, contribute to and lead the co-production of knowledge by directly supporting social science research, building social science into the centre of a reorganised science system, and enhancing the status of social science (New Zealand Social Science delegation, 2009)*

4.7 Making the social scientist: an unsettled subject

If social science is understood as an assemblage of capabilities, what then of the social scientist, the embodied and capable subject: how might we usefully understand this figure? In this context of contested development agendas shaping what we know as the social relations of both science and the environment, the matter of who and what the social scientist is and who they are becoming is highly salient. To understand how social science contributes to the achievement of sustainable development we can look at the situations in which the figure of the social scientist appears, gains status and produces legitimized knowledge. For example, a person or role can be identified as a social scientist or not, through tangible objects such as research or employment contracts, or verbally in a group setting when representations of people's disciplines are given as a means of introduction. Understanding and thus shaping the range of material and discursive spaces where the figure of the social scientist becomes active influences how social science enactments are performed and what work is done. This requires attention to the epistemologies and ontologies

diversely constituting the figure of the social scientist. The following chapters move towards understanding this figure of the social scientist and some possibilities for how this figure might enact sustainable development.

4.8 Summary

This dissertation is situated in political and intellectual projects influencing how social science was practiced through a CRI and was valued as part of New Zealand's development. This social science – the idea, institution, networks of people, and set of practices – was assembled through government research funding, and through organisations of science and urban development. Social science in this setting was designed to help know about sustainability as well as create sustainable development by building a stronger knowledge economy. This argument for enactive social science examines rationalities for the utility and nature of social science. Common to these were efforts to articulate the contribution of social science to society, an ethic of doing social science, and frames for understanding the relationships of social science to policy, practice, technology, and science. The tension between intellectual and instrumental knowledge production projects emerging through spaces of co-learning for sustainable development was becoming obvious. This tension highlighted but never fully addressed the variety of ways social science was being assembled. Situated within this tension, the following chapters illustrate some dynamics making environments and socialities through social science. I also suggest how a refreshed social science enacting a new politics of the environment might emerge.

Chapter 5

Encountering a gap between enactments of knowledge-power

> *Acknowledging that PAR is enmeshed with power clarifies how it works as a spatial practice and how empowering effects might be spread and stabilised. We can no longer see PAR as a privileged power free mode of research, and must see it as a situated, contestable work in progress. It is nevertheless legitimate (and necessary) to deploy forms of governance like participation to transform more oppressive and less reflexive forms of power. PAR can learn theoretically from poststructuralism and PAR can offer poststructuralism a practical means to achieve radical projects of de/reconstruction in and through its praxis* (*Kesby, Kindon and Pain, 2007, p .25).*

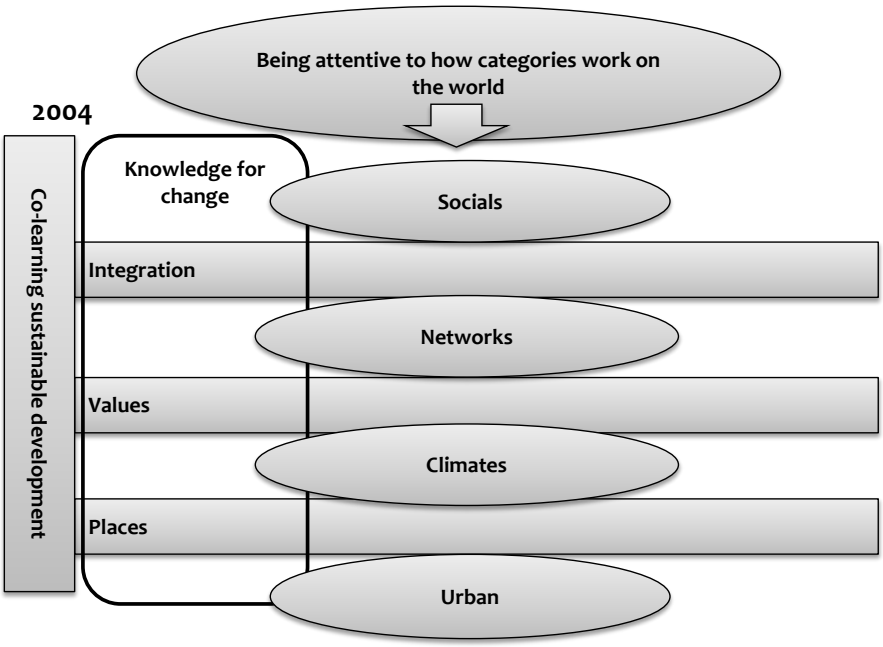
Participatory action researchers are indeed learning from poststructuralist perspectives. The three social science engagements presented in this chapter provide details of the ways social science was assembled to manage uncertainty, create democracy, and/ or support the transfer of knowledge for consumer decision making. This chapter presents my interpretation of the 'gap' between PAR (in the form of co-learning) and poststructuralist perspectives Kesby et al (2007) presented. Over time (and over the pages in the next chapter) I came to experience this gap as a space with generative edges for knowledge production. It became a space to experiment with relationships between epistemology and ontology in order to enact a politics enabling plurality of being in this world.

In this chapter space for critical reflexive analysis is created to gain greater insight into how I, Alison, a social scientist was at work in New Zealand in the name of co-learning for sustainable development between 2004 and 2008. After a scene setting preamble, I narrate (via use of the third person) three sustainable development research engagements to show how the figure of the social scientist was negotiated and constituted *in* and *through* participatory research settings. By presenting the co-constitution of social science and sustainable development in this way this chapter provides a stepping off point for making the argument that PAR approaches are constrained by weak theorisations of knowledge-power, particularly the absence of understanding of how participatory techniques are also at work neoliberalising the

same spaces, identities and practices which PAR practitioners claim to be emancipating (Castree, 2006).

As outlined in previous chapters and shown in Figure 7 below, the first step in this argument is not a departure from most PAR discussions, there is no choice made for research to act or not, to participate or not. Where the departure occurs is through the language turn, and attention to slippery categories. The Figure below shows how examination of the categories of my research stepped my work away from a focus on facilitating integration, identifying values and making places. Increasingly my work focused on situated exploration of how and where climates, the social, networks, and the urban were being represented and codified, and how these categories were also making values and relationships (Jasanoff, 2010). I reflect on how ideas were circulating through the policy and research settings I was participating in and some of the trajectories through which ideas of and practices for development were being assembled. Writing this chapter and learning to tell a less normative and more critically informed story of co-learning sharpened my focus on how social science and sustainable development were co-constitutive. In the following chapter I demonstrate how my colleagues and I were more able to access ways of working with the details of social science and sustainable development which enabled us to think afresh about the possibilities for our research enactments.

Figure 7 Extending beyond co-learning as knowledge for change



5.1 Amidst state facilitated sustainable development 2004-2007

The period 2004-2007 is notable in an account of sustainable development in New Zealand because state investments had been made to foster whole of government interactions across central, local government and iwi and voluntary agencies. Jobs were created through central and local government ministries and departments employing translators, and professional community workers, knowledge brokers, people able to work across agencies and sectors. It was a trend that had been on the rise since the mid 1990s with devolution of state services to community organisations through an era becoming known as 'new contractualism' (Stace & Cumming, 2006) creating 'umbrella agencies' and professionals who mediated state-community relationships. Figure 4 (chapter 3) depicted some of these actors and activities, showing the organisations and projects I engaged with as well as some of the rationalities shaping both sustainable development and social science practices.

In the early 2000s sustainable development advisor positions or portfolios were created across voluntary, private and state agencies. Discourses of 'social entrepreneurship', and 'social change' linked these practitioners to others working internationally and practices such as 'participatory appraisal', 'community asset mapping', 'participatory budgeting' already well developed in conventional 'developing country' settings were appearing in this 'developed country'. New internet connected communities emerged of 'social change agents', making a profession of social change and re-articulating 'development' in numerous settings[11]. Post-structuralist representations of power and agency were being translated and enacted rather ingeniously in a variety of settings. Central to this was a convergence of thinking about the importance of collaboration across multiple perspectives and learning through articulating the theories of change informing assumptions and actions. Storytelling and articulation of theories of change became core to my own and my peers' approaches to social change.

5.2 Constrained by knowledge and practice of others and else-where

The co-learning engagements presented below were all constrained by ontologies positioning the *problem, participants and potentialities* of sustainable development as *fixed, known and structured*. Participants for co-learning sustainable development were humans, in places and often representatives of organisations, ideas or groups.

The problem of sustainable development was known to be about imbalances of economic power. There was an over-representation of politics as driven by people in offices in Wellington, or by groups of people who shared the same ideas, values, ways of eating, and/or company shares. People were working with notions of (dis)empowered human individuals and power as gained through education, awareness, and representation. The power of research was typically framed as an imbalance between the researchers with more power than the participants. This power was represented as being the ability to represent and communicate with decision makers in ways that participants themselves could not. In the following chapter we see how power was worked with as a communicative act of co-constitution. Through

[11] E.g *Regeneration*, *350 Aotearoa* and *CommunityNet Aotearoa*

an instrumental approach to learning I was not able to understand who we were becoming in relation to each other and to non-humans. In the engagements discussed below sustainable development was most commonly worked with as an already established ideal people were working towards that could be researched through alignment of knowledge about the social, the environmental, the economic and the cultural. In chapter 6 sustainable development is worked with as a fuzzy concept; negotiated and emerging in multiple ways moment by moment, site by site.

5.3 Engagement One: Participation in place making, social science enabling democracy

Otara Network Action Committee (ONAC)[12]:

This community forum has been set up to take action on any issues that are discussed within the Otara Network group. ONAC also has a role in leading collaborative and co-ordinated planning on key local initiatives. Individuals and organisations are welcome to attend the ONAC meeting where community leaders and lead agencies gather to progress community solutions and/or proposals. The Otara Safer Communities group meets in the second half of the ONAC meeting to ensure on-going communication pathways are maintained between community networks and crime prevention networks e.g. Police, Manukau Truancy Services, Neighbourhood Police Teams.

Meeting date and times: Every 1st Wednesday of the month, 9.30am.

Venue: Tui room (next to Otara Library)

Employed by Landcare Research in 2004 as a social researcher supporting collaborative learning for sustainable land management Alison was based in Auckland. Her involvement with the Otara Network Action Committee (ONAC) October 2005-2007 was informed by her previous work on community action research on public health issues. So she turned up in the Tui community meeting room in Otara (Figure 8) with a mental model of community change processes informed by a range of literatures and initiatives including the Ottawa Charter for Health Promotion 1986. Her work was also informed by efforts through community development networks (mostly in Glen Innes and Central Auckland) to foster whole of government approaches for responding to community issues. It was not clear to her

[12] *Otara Health Charitable Trust.* Retrieved from http://www.otarahealth.org.nz/index.php?page=meetings [Accessed 28 November 2013]

what the boundaries of this 'whole' were. She was still yet to find a representative from the Treasury or Ministry for Foreign Affairs and Trade at any of the community meetings she attended yet their work had direct visible impacts. The research programme funding her time working in, thinking about and travelling to/from Otara was titled 'Building Capacity for Sustainable Development'. Work developing the carboNZero$^{Cert™}$ company (which provided services measuring and monitoring greenhouse gas emissions and is discussed later in this chapter) was supported through this programme as well as work developing scenarios for New Zealand's futures with groups and organisations working across a range of sectors (an extension of this work is discussed in the following chapter).

At this time Alison was also being asked by colleagues in Landcare Research's built environment team about how to develop social indicators for sustainable urban developments. This was awkward. On the wall in her office was a cartoon she'd found depicting the material-discursive disjoint between outputs in environmental projects and outcomes. Her previous experiences in evaluation had instilled in her the sensibility that indicators were of no real value unless they were developed with the people who would go on to use them or had to account for/with them. The cartoon came from the cover of the "Most Significant Change" (Davies & Dart, 2005) online guide. Storytelling approaches for indicator setting informed how she approached the idea of supporting people in ONAC to tell their stories of change through networking. She was also informed (and constrained) by PAR principles of taking the research out, doing research with and not imposing a pre-set research design on a group of people.

So when Alison was asked by Jennifer Margaret (working in adult education at the Manukau Institute for Technology) and Robyn Allpress (working in community development for the Manukau City Council) to become a co-researcher with them to undertake a story telling project 'How ONAC works', it fitted with a lot of her and her collaborative learning colleagues' pre-requisites for action oriented research.

As stated above in the snippet from the Otara Health website, ONAC coordinate projects for the broader Otara Community Network, in Manukau City, New Zealand. Manukau City is New Zealand's most ethnically diverse and fastest growing city.

Otara exemplifies the city's demographic trends – 42% of population is below 20 years, with high populations of Maori (20%) and Pacific peoples (63%) compared with the rest of the country. ONAC was formed as a result of a strong desire by people living in Otara for self-determination and control of resources and projects shaping Otara. This desire was generated in a context of

> *external organisations and agencies holding on to power by using resources and operating in ways that did not acknowledge or respect the community's aspirations, e.g., poor or no consultation; projects and research that were of little or no benefit to people living and working in Otara. Residents and people working in community organisations in Otara wanted to change this dynamic, and to work with Council and government agencies as equal partners (Greenaway et al., 2007).*

The 'How ONAC works' story-telling project was initiated on the basis of the 'Otara principles', which peopled linked through ONAC developed to outline the values that are important to the community. The Principles (the principles are included in Artifact 1 in the appendix) are provided to external organisations as a basis for relationship building and are constantly referred to by people in ONAC meetings. The research was designed to ensure the first beneficiaries[13] of the project would be people from Otara; that the project was owned by ONAC; that it would create opportunities for growth and development of people in Otara; and that people in ONAC would be empowered through the process of the research. Since establishment in 2000 ONAC has played a significant role in Otara developing principles and protocols for collaborative ways of working in Otara that support visions of community and sustainable development.

Alison, unfamiliar with the work of Latour at this time, understood her role as a co-researcher was to support a process of reflection on how the committee had been working and 'enabling people to network' and 'take action together'. Jen, Robyn, and Alison facilitated three workshops (in a meeting room adjacent to the Tui room in Otara), and Alison undertook 12 interviews and developed resources for the group to

[13] This term comes out of discourses about cultural and intellectual property usually pertaining to indigenous peoples or 'marginalised' groups.

reflect on and build stories about how they operated. This work emerged in Otara amidst initiatives for community e-learning (a computer suite had just been opened a short walk away from the Tui room) and community economic development and debates on the relationship between community, the voluntary sector and government and best practice community based research. Alison, Robyn and Jen published their own reflections on doing community based research as a book chapter in 2007[14]. It is likely the book will have helped authors and the editors develop legitimacy for their 'ethical' approaches to community based research. For Alison it did not obviously, at that time, enhance her capacity for working with the politics re-assembling local relationships.

5.4 Co-learning sustainable development through community networks

Alison was represented as external to Otara, to the network, but not to community development. Her participation was resourced and partially motivated by funding to explore community networking for sustainable urban development. She was looking for an opportunity to explore how communities[15] made links across environmental and social change agendas. What transpired was a multi-layered reflection process that gave insight not only into community networking but also into the way people built knowledge together through community meeting rooms and networks.

Working as 'co-researchers' Alison, Robyn and Jen developed their analyses of the political context shaping the work people in ONAC were involved with. Informing them was a common interest in Paolo Freire's (1970) approaches to structural analysis. Alison and Jen were involved in conversations with members of Kotare, a community activist and education organisation about the influence of Father Filip Fanchette's work on social justice and Treaty of Waitangi work in New Zealand in the 1980's and 1990's[16]. Fanchette brought a Catholic Filipino version of Freire's work here.

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[14] See Artifact 1in the appendix

[15] Alison was thinking place based but was also interested to work with practice or online communities.

[16] See workshop report *Structural Analysis - 'gathering the tools'*. Retrieved from http://awea.org.nz/sites/awea.org.nz/files/Structural%20analysis/STRUCTURAL%20ANALYSIS%20rept.pdf [Accessed 17 December 2012].

Jen, Robyn and Alison explored ways of thinking about networks and networking (notably they were all highly instrumental and not at all quantitative) and what evaluation and accountability meant for ONAC. Alison boiled evaluation down to evaluation for learning, and meeting multiple accountabilities. Whilst shifting away from a more monetary frame of evaluation this did not go so far as to question how multiple value frames could be represented.

They explored some assumptions behind the community development frameworks informing their work and looked at how these were connected to other political projects in New Zealand and elsewhere. At this time Alison was exploring how the term 'neo-liberalism' had become a monolithic catchall for all power relations in New Zealand and was not helping her to engage in hope filled conversations about social change either in Otara or with her science colleagues. Alison, Jen and Robyn all wrote about and used this analysis in different ways, linking it back to their various commitments at the time.

The project provided members of ONAC with a short formal report to share the story of ONAC with stakeholder organisations or other community networks looking to learn from ONAC's experiences. This was archived at the Otara Library and Manukau City Council. The main findings were that ONAC operated as a sophisticated community network and space for learning and caring about Otara, the place and its people. Members had developed a culture of storytelling which enabled new comers to learn not only about events in Otara's history but about the processes and reasoning used for decisions made in the past. This culture was maintained by consistent participation and commitment of a few core members who had been involved since ONAC'S conception. It was named as a space where people mostly (but not always) found their voice and found hope. Through ONAC Otara was connected, compassionate, sassy, politicised and creative, as well as mis-represented, overlooked, and troubled.

Figure 8 ONAC meeting in the Tui community room Otara 2005

5.5 Reassembling state-community relations

The spaces of co-learning Alison engaged with through the ONAC project were all assembled through discourses shaping relationships between the state and the community/voluntary sector. Accordingly a number of political projects were intersecting through the Tui room and Otara Community Hall. The main organisations resourcing activities and people's time were the Manukau City Council, Otara Health (Public Health), Citizens Advice Bureau, Police and Local Churches. State funding was through youth development projects, community economic development, public health, and lotteries funding.

The Labour government had taken on 'social development' as their approach to addressing unemployment. Central to this was a) a transition to work strategy aimed at getting people off benefits and into jobs or training: b) state contracting of community agencies to provide training and transition to work programmes and c)

outcome focused funding through collaborative arrangements across community service providers (community, central and local government). These 'social development' policies maintained the devolved social welfare mechanisms of the 1990s but with refinements to enable greater co-ordination across state funded services to achieve policy outcomes.

This approach worked in concert with a programme of engagements with the community/voluntary and tangata whenua sector aimed at establishing more of a partnership across these sectors. Echoing a similar government-community compact process in the UK the New Zealand Labour government had in 2000 under the guidance of Steve Maharey launched a dialogue process to find out what was wrong with government-community relations and what could be done about it (Ministry for Social Policy, 2001, p .4).

This community-government dialogue process intersected with the 'new public management' discourse emphasising 'funding for outcomes' and improved 'evidence based decision making' for social development funding. Many government funded projects were requiring evaluation of outcomes, a cross departmental research pool was established to facilitate research that would create the desired outcomes of more than one department, and the Social Policy Evaluation and Research unit of government was set up to foster best practice, more standardised and policy relevant social research.

Challenges to the performance of social science were also being made from within the community sector. Evidence based decision making for allocating government funding of community services was being demanded by this sector. The ethics of research funding and practices were challenged with calls for greater community involvement in the design and management of research as well as community influence on setting agendas for what should be researched and where .

These debates about the ethics and accountability of research were informed by a history of contestation over the relationships of social science to policy and how social science should be funded (as discussed in the context chapter). They were of particular importance to people working in Otara as this town had been the focus of numerous research projects shaping domestic and local imaginaries of Otara.

Representation through research had become an object of political contestation, as was enacted through the ONAC research project.

5.6 Making communities accountable

The process of co-learning about Otara and ONAC was highly influenced by the participatory governance and social development discourses informing government funded initiatives in Otara for community economic development (as depicted in Figure 4 Discourses and activities shaping social science 2002-2006). Funding for programmes in Otara across public health, social development, youth development, police and local government all promoted community economic development as having the potential to build the cohesion, skills and economic basis for bringing greater wellbeing to Otara. Some of the main projects people in ONAC were working at that time were organised through the Community of Manukau Education Trust (COMET) and the Otara Economic Development Trust (OEDT)[17].

Alison found that one rationality being circulated through the 'community economic development' initiatives in Otara was that of giving the youth of Otara a chance to get out of gangs, earn some money and use their skills in more creative ways. Initiatives funded through police, public health and social development budgets were promoting youth and community economic development in response to incidents of youth and gang violence in Otara. Histories of violence dominated Otara and the re-presentation of Otara was central to these initiatives. Accordingly members of ONAC were highly skilled at identifying the stories shaping their communities and themselves. They were sensitive to the knowledge production practices of the past and were strategically influencing knowledge of Otara through the use of the Otara principles.

Community governance was a central tenet of these initiatives and became a field of contestation and learning as people involved (and those that became excluded) tried to determine what community governance meant for them and how to practice it.

[17] The *Otara Timeline* highlights initiatives shaping Otara at the time of this research, which ONAC were involved with. Retrieved from http://www.manukau-libraries.govt.nz/EN/ManukauOurHistory/ManukauTopics/Pages/AnOtaraTimeline7.aspx [Accessed 6 August 2013]

Experiences of developing community governance led to a greater professionalisation of practices for 'being in' community[18]. Training was offered through polytechnics and adult education programmes for development of skills for writing strategies, polices, budgets, reports and reviews. This capability building spanned both the volunteers and those paid to work as Chief Executives or Directors of the trusts. Professionalisation was also evident in the ways that people participated in the network meetings.

For many, involvement with the Otara network was a form of accountability as well as a requirement of their job description as a community worker. Managing multiple accountabilities became challenging. People found themselves accountable to a formal organisation (for example council) and to the less formal community meetings where membership changed weekly and there may or may not be memory of decisions made in the past. People's ability to manage interpersonal relationships was critical to their economic development work. Techniques for operating professionally were learnt by being involved in a range of organisations and learning through experience; or by participating in community governance training now being offered through not for profit courses at UNITEC, MIT and other training providers; others drew on experiences in the private sector. Some people selected to co-ordinate trusts were selected for their business experiences. Skills were also put to use for community economic development that had been learnt through involvement with iwi organisations and treaty negotiation processes.

5.7 Rendering participation governable

In 2002 the LGA was amended. All regional and territorial local authorities were now required to produce a Long Term Council Community Plan. This plan identified outcomes that would be the priority for funding from local government and would foster collaboration with the state, private and community sectors to achieve the agreed outcomes. Long term planning was not new for the Manukau City Council (MCC). At the time Alison was working in Otara MCC were reviewing their 10 year plan and planning ahead for the next 10 years -2006-2016 - through the *Tomorrow's*

[18] This was evident through interviews and observations of the meetings but also through the documents ONAC created.

Manukau: Manukau āpōpō' participatory planning process (MCC, 2006). In response to the Tomorrow's Manukau process members of the network persuaded MCC that ONAC would lead a planning process specifically for Otara.

The consultation document set out challenges the city was facing and would face in the future, including growth pressures, population changes and influences on the economy. Key drivers of change in Manukau City (MCC, 2004) were identified as urban growth, through in-migration and population growth. The population of this city is predominantly young and Polynesian, but there are increasing numbers coming from Asian countries (MCC, 2004). Migration to this part of Auckland was being facilitated through a new subdivision at Flatbush[19] to cater for medium income households. Flat bush is adjacent to Otara. The changing population of this neighbouring town and predictions of the future population were all discussed through ONAC and the stories of change which emerged through the ONAC story-telling project.

5.8 Creating an ethics of 'community based' research

In Greenaway et al. (2007) Alison, Jen and Robyn discussed their experiences of working on a research project initiated by a community group that built a co-research relationship with an external researcher. Their aim in telling this story (to peers in New Zealand) was to share both the principles and the process that informed their research relationships. Their intention for the research was to undertake a process of reciprocal learning that was developed with care. They were invited to write for the book chapter – it was not something they sought - and began writing when still partway through doing the research. Because the book was about community based research practices they focused less on the content or their findings of the research project and more on how they formed the research relationships. Key to forming these relationships were the Otara principles and ONAC's processes for assuring a broad mandate for the research. They discussed the background to their research – noting a history of extractive research. Deciding who to involve in the research was a key step, plus the decisions to work with an external researcher, and using processes

[19] This development incorporated some Low Impact Urban Design and Development (LIUDD) techniques and was a site for research in the LIUDD programme discussed later in this chapter.

familiar to ONAC. They concluded in the book chapter that what they had created was a process with many levels of reflection about community, action and social change that continued (for at least a few more months after the project) to inform the various communities of practice (informed by Wenger, 1998) they were engaged with at that time.

5.9 Engagement Two: Responding to climate change, social science reducing conflict

At the same time as she was working with Jen and Robyn in Otara, Alison also started working with Dr Carswell to document how climate change was being 'rendered governable' in New Zealand (a term inspired by Oels, 2005). Fiona Carswell, working as a Forest Ecologist (based at Landcare Research in Lincoln, in the South Island) was one of the founding researchers involved with the Emissions-biodiversity exchange (EBEX21®) project. This project established the mechanisms through which carbon credits could be allocated to indigenous forests growing on the East Coast of New Zealand. Fiona had experienced first-hand the swings in government policy and research direction with regard to measuring and managing greenhouse gases[20].

Alison brought to this work an interest in institutional change. Her conversations with Fiona identified the opportunity to explore insights gained through the EBEX21® project in a broader context. For Alison it meant learning about carbon regulation frameworks and practices. Alison found that carbon became more complicated as it moved from collation of measurements in forests on the East Coast of New Zealand to the content of policy making by the Ministry of Agriculture and Fisheries (as it was known at that time). Alison and Fiona developed three objectives to explore with the aim of publishing their findings in a journal paper and disseminating it through networks in New Zealand. At this time little had been published theorising New Zealand's climate change policy making processes.

First they sought to explore shifts in government policy and government funded research on climate change. The second aim was to understand how regional

[20] See Artifact 2, Greenaway and Carswell (2009) for further elaboration.

authorities were responding to climate change in light of the Resource Management Energy and Climate Change Amendment Act 2004. Thirdly they sought to explore how these shifts in policy and research manifested in actions within two regions of New Zealand, Marlborough and Waikato.

Their approach to this research was to represent their context via triangulated data gathered through mixed qualitative methods. Analysis of media coverage of climate change issues plus policy and funding documents from regional and central government over the period April 2005 - April 2007 helped them construct a narrative of shifts in policy and science directions. Thirteen informants covering a range of sectors (who acknowledged their work had some relevance to climate change issues) were approached for interviews through a snowballing method. Semi-structured interviews were conducted and analysed using discourse analysis (Wetherell et al., 2001; Hajer & Versteeg, 2005) to identify storylines shaping science and policy practices.

5.10 Measuring and managing carbon emissions

Calls for carbon neutrality (or a net zero footprint of greenhouse gas emissions) in New Zealand were strongly facilitated by the carboNZero$^{Cert™}$ programme developed by Landcare Research from 2001, and officially launched in November 2006.

> *The carboNZero branding appeared to have high credibility, here and overseas. This had to be clearly and demonstrably independent, and scientifically robust to withstand international scrutiny. Interestingly, the sales agents surveyed thought a high proportion of customers saw the brand as evidence not just of carbon-neutrality but of sound management and good corporate citizenship as well; it gave a company an opportunity not only to say that it cared about its impacts and ethical issues, but to prove that it does (Gilkison, 2008, p 56-59).*

The branding of products as carboNZero$^{Cert™}$ was underpinned by EBEX21®. In 2006 emissions measurement and management were separated from the certification of carbon credits on regenerating forest sites, resulting in two business entities – the carboNZero$^{Cert™}$ programme and the EBEX21® project, the latter now focussing

entirely on services to landowners. In 2009 a further development in the carbon certification process was made with the launch of the Certified Emissions Measurement and Reduction (CEMARS®) programme. Designed for larger companies who are heavy emitters this programme supports companies to take the first two steps of the carboNZero$^{Cert™}$ process to measure their greenhouse gas emissions in compliance with ISO 14064-1[21], understand their carbon liabilities, and put in place management plans to reduce emissions in their organisation and more widely through their supply chain. Thus they can be seen to be working towards carbon neutral status but won't get the carbon neutral status until they start offsetting their emissions.

It was Fiona's participation in the development of these programmes that ultimately led to the pursuit of case study action oriented research in Marlborough. Additionally in September 2006 a Marlborough based wine company 'The New Zealand Wine Company' (NZWC) became the first wine company in the world to gain carbon neutral status.

> *Its timing was impeccable. The world was becoming increasingly concerned about carbon emissions. Millions of people had already seen Al Gore's movie "An Inconvenient Truth". And a month later, the Stern Review was released in the UK, prompting widespread concern about the economic effects of climate change and issues such as "food miles" (Gilkison, 2008, p 56-59).*

Marlborough in the South Island and Waikato in the North Island were selected for case study research because both regions were early champions of climate change responses, yet the regions differed in their geographies and economic bases. Also Fiona already had good working relationships with people in these regions and they saw that Landcare Research provided a useful point of reference for their work advocating for climate change responses by local government. The local government in Marlborough was a unitary authority, that is it fulfilled both regional and territorial roles. This contrasted the situation in Waikato whereby the regional authorities co-operated with twelve territorial local authorities.

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[21] IS0 14064-1 is the international standard for greenhouse gas quantification and reporting

The research was conducted before and immediately after the New Zealand Prime Minister of the time, Helen Clark, announced her aspirations for a "carbon-neutral New Zealand" (DPMC, 2002). Her speech to Parliament closely followed the visit of Al Gore, with the associated release of the film "An Inconvenient Truth" (Guggenheim, 2006), and the release of the pre-publication report on the Stern Review (Stern, 2007). These moments now symbolise a brief escalation of responses to climate change both internationally and within New Zealand.

Completing their writing in 2006 they asserted (Greenaway & Carswell, 2009) that discourses of integrated research were strongly linked to work being undertaken on climate change internationally. Indeed their work was originally framed through an International Panel on Climate Change (IPCC) lens. Their work provided an opportunity for exploring policy/management and science relationships as well as discourses and practices of community engagement and behaviour change.

The questions Fiona and Alison asked were largely informed from an applied science perspective (how to make EBEX21® work) mixed with interest in discourses of governmentality. EBEX21® was a self-contained trading system that enabled businesses to measure their greenhouse gas emissions, decrease those emissions through energy reduction, and finally offset remaining emissions through purchase of carbon credits accruing to sites of native forest regeneration (Carswell, Greenaway, Harmsworth & Jollands, 2007). When writing about their research together Alison and Fiona acknowledged that their interests and positioning was directly linked to Landcare Research's development of a market for indigenous carbon credits. They described their work as undertaken in a context of uncertainty about levels of and techniques for climate governance for mitigation and adaptation related to Kyoto. At this time CRIs were being encouraged through funding contracts to have greater integration across disciplines and end-users and to use modelling as a technique for integration. Hence a large programme on greenhouse gas mitigation had been funded including a strand of work on economic modelling and a strand on human dimensions of mitigation and adaptation techniques. This occurred just at the start of the international call by scientists for increased social science around climate change.

Alison and Fiona explored national and regional level policy development, media coverage and research practice to provide an account of how regional authorities were developing and implementing policies on climate change as a result of the RMA Energy and Climate Change amendment act (2004). This work directly engaged with climate change and land use change policy development and implementation in Marlborough and the Waikato[22]. As with the Otara work Alison and Fiona were informed by reflexive research methods (Denzin & Lincoln, 2000); they identified an opportunity for exploring policy/management and science relationships as well as discourses and practices of community engagement and behaviour change.

Alison and Fiona picked up Boston's (2006, p. 46) representation of New Zealand's policy development for climate change as turbulent, lacking in certainty and risk averse. They identified the focus on economic advantage from high natural resource capital prioritised market oriented responses.

> *Central government agencies invested most heavily in creating inventories, resourcing practices for valuing, buying and selling of greenhouse gas emission allowances, with a focus on supplying forest sink credits to the international community in an attempt to reduce the country's net emissions tally while maintaining energy security (Greenaway & Carswell, 2009, p. 109).*

As discussed further in Artifact 2 in the appendix, New Zealand joined the United Nations Framework Convention on Climate Change (UNFCCC) in 1994 intending to stabilise its net emissions at 1990 levels by the year 2000 (Ministry for the Environment, [MfE] 1994). However, it was only in the lead up to ratification of the Kyoto Protocol late in 2002 that the domestic policy package was released (DPMC, 2002), and at that time a carbon tax was proposed.

At the end of 2006 a new round of policy initiatives were put out for public consultation promoting tradable permit regimes in agriculture and forestry. Notably, these initiatives were explicitly tied to notions of sustainable land management (Ministry of Agriculture and Forestry [MAF], 2007). By September 2007 Alison and

[22] Through activities ranging from measurement of tree growth, to advice on energy and waste policy, to support for development of climate policy frameworks.

Fiona saw evidence of successful lobbying by the Kyoto Forestry Association (KFA) that represents most of the owners of New Zealand's Kyoto-compliant forest sinks, in the form of full devolution of credits and liabilities within the proposed Emissions Trading Scheme (ETS). Even holders of non-Kyoto forest (pre 1990) were to be offered some credits as an incentive to prevent deforestation during commitment period one (MAF, 2008). Alison chuckled at this concept - that a forest was known for what it was not and where it was not.

The process of domestic policy development showed increasing integration of climate change responses with sustainable development discourses (for example DPMC, 2002; MAF, 2007). Market-based initiatives remained dominant, creating a focus on property rights and thus aligning with existing instruments for managing private land and public good interests through regional authorities. Initiatives for pricing carbon swung from government-controlled to market-driven, albeit with some government-control on the exposure of various sectors to their emissions liabilities. Legislative activity was primarily directed at the creation of property rights for international trade in carbon. Strategies for mitigation and adaptation were targeted initially at the forestry sector (they are the first sector to enter the ETS), then the energy and, finally the agricultural sectors (MfE, 2007), with increasing focus on the role of local and regional government in the facilitation of adaptation.

5.11 Co-learning sustainable development so carbon can work through research-policy networks

By this time Alison had started reading Latour (and more commonly) authors using the ideas of Latour[23]. She laughed with delight at Head's query "hasn't the IPCC read Latour?" (2007, p. 837). She came to understand carbon as acting on the world through a network of relationships linking laboratories in Lincoln, Marae on the East Coast of the North Island, annual reports published online, trees at the top of Queen Charlotte Sound on the South Island and matrices for carbon sequestration negotiated in various spaces internationally. Alison found that the idea of carbon neutrality formed new connections between people, places and activities. These were re-

[23] Artifact 4 in the appendix show's how Alison and colleagues developed a response to ANT perspectives.

presented through scientific symbols and metaphors in a variety of sites, and formed new calculative and collaborative practices in association with revised articulations of the ethics of stewardship. People's behaviours and values became objects of knowledge production in association with the behaviours and values of carbon emissions.

Fiona and Alison found that acting amidst uncertainty was being articulated as if it was a new intellectual challenge. Ideas about mitigation were being detached by New Zealand policy officials and researchers from adaptation practices and budget allocations. Meanwhile on stream banks in Raglan and Marlborough the adaptation-mitigation co-benefits of planting or regenerating indigenous trees appeared to be strikingly obvious. Alison observed that climate science in New Zealand was at this time being undertaken through strategic relationships with iwi with an eye to liability implications for treaty claims, territorial local authorities and private landowners.

Imaginaries of economies and market relationships were central to this highly contingent climate science as well as Alison and Fiona's social research. These imaginaries were partly informed through the Sustainable Development Programme of Action, the Growth and innovation Framework and through IPCC, CRI, as well as Alison and Fiona's interpretations of the human or social dimensions of climate change. These imaginaries were also at work on urban stormwater infrastructure.

5.12 Engagement Three: Urban development, social science and the rational other

Alison's involvement with the Low Impact Urban Design and Development programme 2004-2008 was primarily in a research co-ordination role, leading a strand of research titled "Getting Buy-in". She was involved with a team of social researchers documenting and facilitating the implementation of alternative stormwater systems in Auckland, Nelson, Tauranga, and Hamilton. The LIUDD programme was the focal research activity for the Built Environment Team of Landcare Research. This team worked out of offices in Auckland, Hamilton, Wellington and Lincoln. The programme was presented publicly as a cutting edge initiative working across disciplines and with a range of urban development stakeholders (primarily in Auckland). The aim stated in the funding contract for the

research and which initially rallied the researchers together was to increase the number of 'low impact' devices and designs[24] included as part of brown and green field developments in New Zealand settlements. This was a highly applied research programme, with an adaptive management focus.

Low-impact and water-sensitive approaches to urban development had been evolving in New Zealand since the late 1990s. Their reach is beyond alternative stormwater management to an integrated urban design and development process. Eason, Dixon, Feeney and van Roon in (2003) argued that LIUDD would achieve urban sustainability outcomes through

- more sustainable subdivision design and development (and to a lesser extent, lot design and redesign)
- approaches that maximise natural values and minimise sediment runoff and impervious areas (including roads)
- reduction of the environmental footprint of urban areas on natural and reticulated waters, terrestrial and aquatic biodiversity, energy and materials use and waste.

An interdisciplinary team was formed through collaboration across Landcare Research and the University of Auckland's department of Planning. Subcontractors from other universities, CRIs, an iwi and a consulting agency were also enlisted.

Alison's involvement was originally stated as enabling 'buy-in' of urban design professionals to LIUDD techniques. Initially her approach to the implementation of sustainable urban development was informed by her training in post-development perspectives as well as her experience with ethnographic and community action research approaches. Over time Alison reframed her work as supporting ethnographic research being undertaken with stakeholders; insights about this were published in Scott and Greenaway (2008). Secondly she facilitated opportunities for people to share stories, evidence, experiences as they implemented low impact techniques and adapted their practices and their frames for problem solving. She was frequently

[24] Known as Low Impact Design in the USA and UK, and Water Sensitive Urban Design in Australia.

confronted by conflicting understandings of the performance of research, and how social and environmental change occurs and can be measured. However core to the LIUDD work were notions of scale and rescaling which were useful conceptual connecting points across strands of work. The main emphasis was placed on catchments and neighborhoods.

The LIUDD programme had five objectives covering questions of ecology, technology, design, planning, and social change. The research was designed to enable implementation of technology, knowledge and practices supporting more use of ecological services as urban infrastructure. The knowledge produced was about how organisations and professional practices could change (primarily local government but also developers, plumbers and architects) for increased uptake of the techniques being promoted. Secondly people learnt about how devices performed technically, ecologically and socially in a range of contexts and the relationships between devices and contexts. The rationale for the LIUDD programme was that information on the performance of LIUDD at the development site and catchment scale; the economics of conventional versus LIUDD; and the potential for integration amongst different instruments (district plans and codes of practice) would inform creation of a national set of incentives for developers to implement LIUDD (Eason et al., 2003).

The LIUDD researchers were working amidst government advocacy for sustainable development and more effective urban design. CRIs needed to show greater integration of disciplines and that they were doing their research with end users. The board of Landcare Research had invested in urban oriented research to extend its focus out of conservation estates and farms. Collaborative learning had been used by Alison's colleagues in Landcare Research as a method for adaptive management and social science in the company for the past ten years; hence social science in Landcare Research was at that time largely presented as a process for integration and translation.

5.13 Co-learning sustainable development through urban knowledge transfer

Knowledge-action relationships were communicated by the funding contract for the LIUDD programme through representations of end-user engagement and knowledge transfer. Social researchers from Landcare Research and the University of Auckland's planning department were pulled together through a funding contract objective titled *Getting buy-in.* The Built Environment research team interpreted this directive through a number of theoretical and personal lenses. Social research approaches included facilitation of social-learning processes, ethnographic place based research, enquiries into the political economy of LIUDD, communication based extension of science, interpretive analysis of stakeholder perspectives, and instrumental re-design of planning and evaluation tools.

The strand of research Alison led included a project facilitating a network to learn with urban development professionals about LIUDD, and strategic evaluation and monitoring sustainable development initiatives (see Artifact 3 in the appendix); ethnographic research documenting and facilitating learning about the implementation of LIUDD through a state housing development; tracking changes in the perceptions of stakeholders about sustainable urban development and finally this was pulled together through political economy analysis of the performance of LIUDD.

Common to the social science approaches was commitment to building relationships with urban development professionals (policy, developers, consultants, engineers) and across the research team. Collaborative initiatives took the form of joint presentations, co-design of research projects, sub-contracting, co-authorship of papers, urban safaris (tours of LIUDD initiatives see Figure 10) and co-facilitation of workshops. These practices were shaped by ideas of integrated management and interdisciplinary research, informed by a range of discourses of sustainable development across policy, engineering, ecology, architecture, planning and geography perspectives.

Figure 9 Co-learning about raingardens through urban renewal at Talbot Park

5.14 Integrating through places, outputs and budgets

The idea of 'getting buy-in' that the LIUDD team initially worked with was articulated through environmental management discourses, which attached the social as a strand of enquiry paralleling biophysical and economic research and development. For the first three years of the programme Alison concentrated heavily on creating ways for enabling integration to occur within the research team and with stakeholders. This meant tension arose as people crossed boundaries of what was understood to be research method and what was research management. Alison observed the LIUDD team focused on place, outputs, budgets and relationships as techniques for integrating thinking and practices. She found people were informed by the idea that this would enable new kinds of research projects making links across technical, economic, social and cultural boundaries (created through more disciplinary based approaches). This was driven by the rationale that change towards more sustainable development can only occur if knowledge is created through more robust integrated practices which address the interconnections of complex problems or systems.

5.15 The collaborative turn

Between 2000 and 2008 Auckland's infrastructure planning was also influenced by notions of collaborative planning and action through urban planning, investment in infrastructure and economic development strategies. Alison was paying attention to the 'collaborative turn' and its influences on urban planning and development (Brand & Gaffikin, 2007; Gunningham, 2009). More specifically she was detailing the collaborative influence on imaginaries of streams in Auckland. Through this research she was able to see that the LIUDD programme was on one hand linked into a progressive international discourse coalition challenging dominant and highly embedded urban development norms; and on the other hand it was a site through which new economic subjectivities (for example life cycle analysts and urban design panels) were being mobilised in accordance with imaginaries of a globalised knowledge economy.

This example of Alison's research reveals the specificities of how a discourse promoting low impact development was mobilised in New Zealand. It was highly contingent on understandings of integration and participation being promulgated through two key pieces of legislation, the RMA and the LGA. Secondly it was made possible by alignment with intellectual projects promoting inter or trans-disciplinary research. Also Figure 10 shows the implementation of LIUDD was taking place in the context of drives for more participatory democracy, sustainable development, integrated management as well as increased growth and innovation. This meant that streams became key actors on urban imaginaries as well as actors shaping possibilities for citizen participation in place making and democracy processes.

5.16 Making urban places and urban professionals

A major influence on the LIUDD programme was the Labour government's Sustainable Development Programme of Action (SDPOA) and in particular the Sustainable Cities initiative in Auckland. Through this programme whole of government and place based approaches were encouraged along with greater engagement between research and practice. The sustainable development agenda that lay behind this programme had influenced the criteria for FRST funding for the LIUDD programme and there were expectations amongst stakeholders that the research would closely align with SDPOA activities.

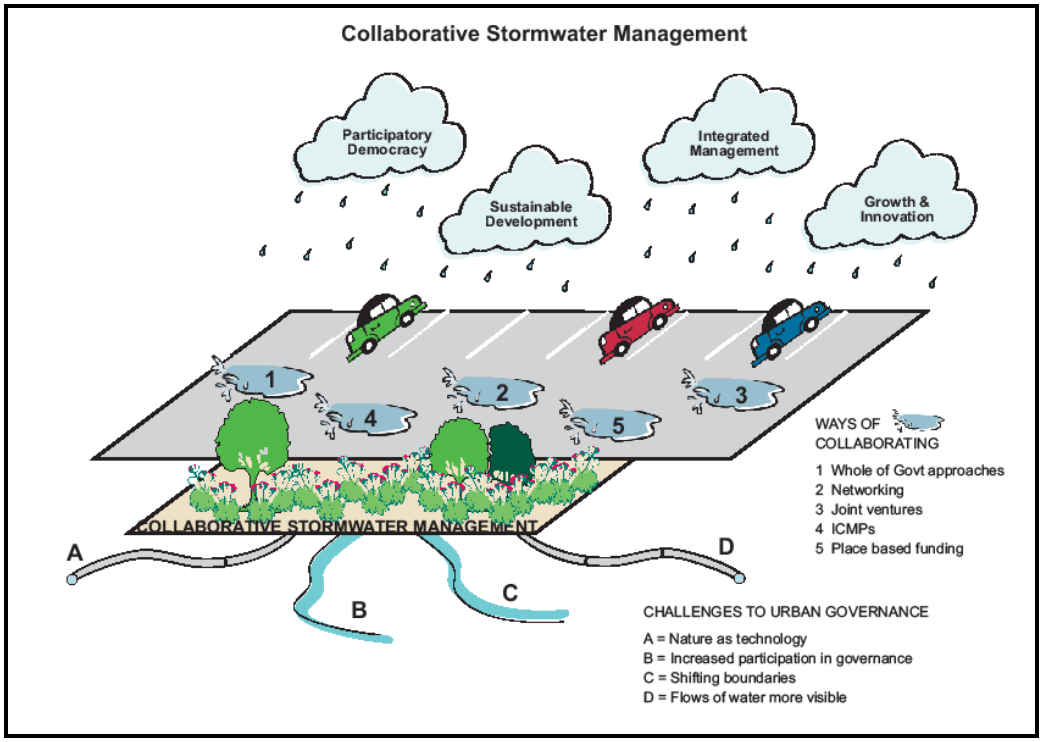
5.17 Making infrastructure governance

A fourth foundational element of the LIUDD programme was a relationship with the Auckland Regional Council (ARC). The ARC's stormwater action team had been formed to promote Low Impact Design (LID) in Auckland and the LIUDD programme had formed a strategic alliance with them with the aim of extending the LID work of the ARC in Auckland and across the country. The Auckland Regional Council (ARC) and seven territorial local authorities had regulatory authority for managing stormwater. A range of policy instruments were used across the RMA and LGA, and stormwater was factored in at a number of planning levels, including district plans, structure plans, policy statements and urban design guides (ARC, 2000). The operation and maintenance of Auckland's stormwater infrastructure varied across territorial local authorities. Some providers were partially privatised in the 1990s while others remained in full ownership of the territorial local authorities. The typical management approach was to pipe water away as fast as possible either into sewers or through separate stormwater pipe systems.

In 2003 the ARC refocused its work to advocate for LID approaches to managing stormwater, incorporating principles of capturing and treating water on site, having less centralised systems, and using topography and bio-physical resources to treat, contain and move stormwater. Territorial local authorities have picked up this approach in a range of ways including incentives for some low impact design techniques. Infrastructure Auckland prioritised investment in 2003 in low impact stormwater techniques. Recipients of this funding included Project Twin Streams in

Waitakere City, Housing New Zealand Corporation's Talbot Park redevelopment, Landcare Research's new sustainable building, and the Auckland Netball Centre. All four projects were in growth areas identified through the Auckland Regional Growth Forum's strategy (ARGF, 1999) and all were influenced by collaborative stormwater management initiatives.

Figure 10 Co-producing stormwater infrastructure through LIUDD



5.18 Creating 'green' assets

Stormwater asset management practice guides in New Zealand were at this time informed by the Infrastructure Management Manual developed by the National Asset Management Steering Group (NAMS, 2004). Traditional stormwater asset management focuses on the number and condition of valves, manholes, pipes, inlets and kilometres of pipe and the levels of service they provide. The NAMS Group (2004) manual, however, encouraged a broader conception of asset, explicitly recognising that infrastructure networks provide the platform for economic and social development, and are increasingly expected to meet recreational, artistic, and cultural needs of communities, as well as respond to strict criteria of environmental regulations. Stemming from this encouragement of a broader characterisation of

stormwater assets, the manual sets out techniques for valuing streams. These techniques have been promoted through Integrated Catchment Management (ICM) planning facilitated by the Auckland Regional Council, and implemented by participants of the LIUDD National Task Force and Talbot Park redevelopment.

5.19 Re positioning CRIs in the new space of urban

Also in 2003 Landcare Research established the Built Environment Team. This was the first time the organisation had created a team that was specifically focused on urban environments. This was to be an interdisciplinary team tasked with problem solving urban issues through an integrated approach. Researchers (mostly early career) were employed from a range of disciplinary and work life backgrounds, including an engineer, a hydrologist, an anthropologist, a geographer, a soil scientist, economists, and architects. Entry into the urban field was in response to greater political focus on urban development and the creation of the sustainable settlements portfolio in FRST. Making this urban space in Landcare Research's organisational structure was quite a challenge to the status quo of single topic focused research – for example soils (which had lost funding at the time Urban gained it). The team was primarily funded from a new funding source and did not require redirection of existing funding.

5.20 Re-presenting the work of disciplines

Members of the urban team all became or at least approached each other as experts in their fields. Taking on the labels given to them by management, the funding contract and each other's expectations of what an interdisciplinary team required. Alison became the social researcher a label that covered a wide range of mixed expectations about how she would lead research into behaviour change, policy change and organisational change. The economists were expected to be able to address a range of micro business level issues as well as macro-economic shifts. Expertise in life cycle costing and analysis became primary. A distinction was made between economists, business advisors and social scientists and a clear division made with technical or bio-physical scientists. Over time after jostling for more realistic positions and roles in the team, people either settled into positions articulated by management or created and articulated their own. For some it meant ensuring strong connections were made

outside the organisation with university staff in order to consolidate and articulate through a strong disciplinary base.

In late 2007, three years into the LIUDD programme and having completed one year of PhD studies Alison stopped advocating for integrative research. She started to pay more attention to who else was advocating it, who wasn't, and what was being leveraged through the use of this concept. Her halt was related to three things: a sense of personal failure at being able to foster integration as she had imagined it; confusion over the different ways integration was being discussed and resourced by her managers, colleagues, and researchers internationally; and encouragement from supervisors and various literatures to enquire into the pathways from which calls for integration were emerging.

5.21 Blurring boundaries through integration

Networks of people situated in research, planning consultancy, housing and local government policy were actively shaping institutionalised norms of infrastructure management, urban planning and science. Technologies of networking, collaboration and evaluation were informed by reflexive research, policy and management practices. The metaphors of systems and design helped to constitute imaginaries of interconnected urban development through which both ecosystem services and policy relationships gained value and could be accounted for. Amidst government directives for sustainable development and policy relevant outcomes, these researchers, consultants and policy officials became implementation experts. These people could translate across research and practice and acted as catalysts or change agents enabling alternative stormwater techniques to be implemented. The pressure to see 'change on the ground' meant that this role was able to be resourced through government funding for research as well as smaller sub-contracts from local and central government for consultants.

Alison found that distinctions between research method and project management practices blurred as the research became driven by technologies of research management (reporting portals, milestones and outputs, review, impact factors). The logic of reporting achievement of milestones and outputs outweighed attention paid to research logics; for example, the alignment between theory, methodology, method

and iterations between these. A further blurring was observed as researchers' growing expertise as urban specialists lead to expectations of increased consultancy contracts in this field. There was a conflating between science and consultancy as researchers took on sub-contracts and shaped their FRST funded research around these sub-contracts. Thus policy priorities for research gained further influence amidst a research agenda already highly constrained by stakeholders' expectations for highly applied research. The research became about implementation and demonstration with very little blue skies, researcher led studies.

5.22 Co-learning sustainable development an ontological tussle

The LIUDD research project was informed by a mix of intellectual agendas and an on-going practice and institutional tussle over whether the contribution of social science should be constructivist and/or interpretive, instrumental and/or intellectual, focused on the science and/or on 'the others out there', about behaviour change and/or social change. As Carolan (2009) usefully points out these 'tussles' indicate points of conflict and convergence of both epistemological (how to know the problem) and ontological (what the problem is doing in the world) framings. I explore these further in the discussion chapter.

5.23 Summary: collaboration and learning for sustainable development

This chapter shows how co-learning was practised in a variety of rooms across New Zealand. Core to the participatory research approaches Alison was working with (and amidst) was an understanding that learning across perspectives through collaboration, integration and networking would enable changes for more sustainable development. The attention given by community workers, researchers and government officials in New Zealand (between 2004 and 2008) to collaboration practices was also informed by the idea that principles, relationships and practices of knowledge production needed to be standardised across government, academic and voluntary agencies.

The stories of change Alison was working with were dominated by discourses of urban growth within limits; wellbeing of the environment, people and economy; innovative production and use of knowledge. These stories were mixed in with the telling of histories of un-sustainability, being overlooked, over represented, over

taken. Social change was separated from environmental change through discourses of social development and science. This boundary was transgressed however through professionalised translators reflexively drawing across multiple theories of change.

The highly qualitative social science Alison was involved with had a focus on facilitating learning across perspectives in order to create knowledge and relationships that would enable change. The categories at work on and through these projects were ‘community’ ‘disciplines’ ‘carbon’ and ‘assets’. As depicted in Figure 11 in the next chapter this account of doing participatory research brings attention to the way that social processes of participation, integration, measuring and managing helped mobilise nonhuman actors of ‘carbon’, ‘streams’ and the ‘urban’.

Common to the formation of all of the co-learning moments presented here were relationships between people in central Wellington and parts of Auckland. There was a movement of documents, money, people, practices and ideas between offices and meeting rooms in these two places, and between local government, central government and community rooms. Central government investment was a dominant influence creating spaces of co-learning. This investment was through many avenues, including initiatives of the Sustainable Development Programme of Action, Economic Development projects, Safer Communities networks, and Public Good Science funding. Working with a co-learning approach to sustainable development was constrained by lack of clarity about the politics at work on and through the co-learning processes and categories and possibilities for navigating them. There was an inability to work with the social categories in circulation across different sectors and scales. The following chapter shows how paying more attention to categories enabled more strategic sustainable development research enactments.

Chapter 6

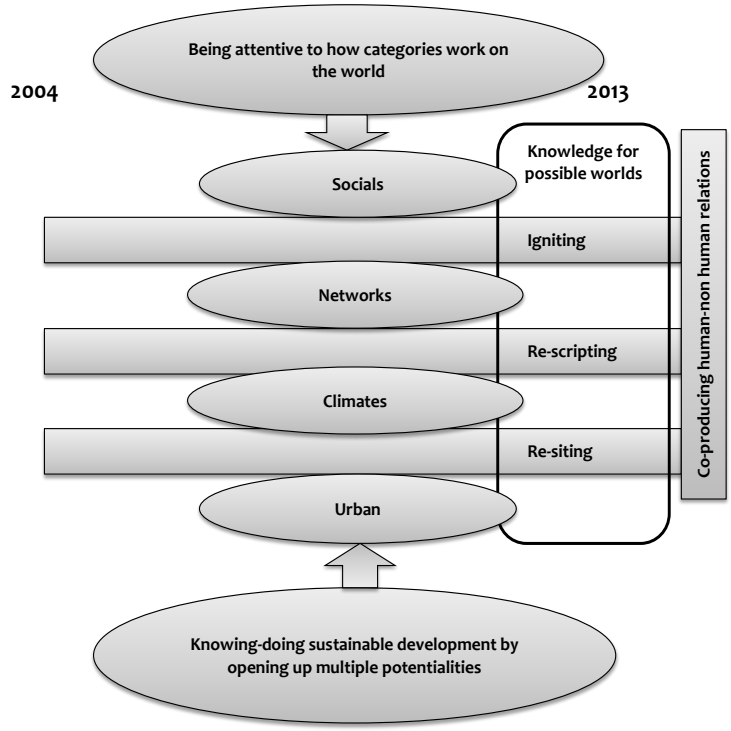
Co-producing socials of sustainable development 2009-2012

The space of knowledge therefore is not self-maintaining, but generative of difference (Crang & Thrift, 2000, p. 13).

6.1 Introduction

This chapter presents three knowing-doing enactments of social science for sustainable development in New Zealand. As with the previous chapter, I do not linger long on specific research findings from projects, or make claims of new discoveries. Instead of focusing on solutions, or the new, the purpose of this chapter is to show the politics of knowledge shaping the social science I was involved with. To achieve this aim the chapter provides an explication of an intellectual inquiry; the sites through which Alison the figure of the social scientist engaged in the making of social knowledge; the subjectivities with which the social scientist and other actors were represented; the objects under analysis in the knowledge making processes; the possibilities for knowledge-action identified plus the traces of the knowing-doing observable at the time of writing which travelled or connect to other rooms and moments (Le Heron, 2009). Movement towards the co-production of sustainable development knowledge-practice is depicted in Figure 11. By being attentive to how categories were at work on the world the research I was involved with shifted from a focus on integration, values and learning. Through situated engagements the research began to ignite, re-site and rescript the who, what and how of social science and sustainable development.

Figure 11 Towards co-producing through situated research enactments



6.2 Sustainable development and state projects of productivity

The knowledge making described in this paper emerged amidst another round of restructuring of CRIs (CRI Taskforce, 2010), Universities (MoE, 2007) and central government ministries (State Services Commission, 2011). Restructuring was rationalised through statements of reducing government debt, an obese public service, and ineffective investments in science. The New Zealand parliament passed bills to gain greater influence over local government processes in both Auckland[25] (2011) and Christchurch[26] (2011). Meanwhile the Land and Water Forum in Canterbury and Treaty Settlements[27] brought greater attention to possibilities for co-managed natural

[25] Seven territorial local authorities were amalgamated into one Unitary Authority, the Auckland Council. Council controlled organisations were created as public-private governance models with the potential for reducing transaction costs across central and local government operations.
[26] After the February 2011 quake the Canterbury Earthquake Recovery Authority was established
[27] See the progress of settlements map as at April 2012 [Accessed April 2012] http://nz01.terabyte.co.nz/ots/DocumentLibrary/OTS-Progress-Settlemt-Map-March-2012.pdf

resources[28]. Funding for social science leadership through the BRCSS and He Waka Tangata had depleted. The future for these networks was being re-negotiated through new MSI and TEC relationships. The Ministry for Agriculture and Forestry (MaF) was on the way to becoming the Ministry for Primary Industries). This Ministry was funding social science around climate change but was struggling to get the quality of proposals official's desired so contacted social scientists across CRIs to develop a strategy for funding social research on this topic. Meanwhile the MfE was developing 100 year strategies including climate adaption strategies. Research on ecosystem services and biodiversity offsets was resourcing staff in Landcare Research and the social science capacity was shifting to include capabilities for economic modelling and policy analysis.

6.3 Sustainable development re-scripting knowledge making

In 2010 a script titled 'Critical and cringe moments of sustainability research and practice' was created for a session on 'Sustainable development performances' in the New Zealand Geographical Society (NZGS) Conference[29] held in Christchurch, March 2010. This script was an experiment for Alison in collegial collaboration, learning across disciplines and doing a performance style presentation[30]. Alison developed the script with Dr Shona Russell iteratively as they shared experiences of working as social scientists[31]. This work became a way of critically reflecting and re-scripting their sense of what it was to be a social scientist and do social science through a CRI. At the time Alison felt vulnerable, a sense that they were doing what university academics perhaps could do, but definitely not what 'public good' oriented CRI researchers do. However it gave them a platform from which they negotiated their social science contributions and fostered more collegial relationships.

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[28] See discussion here for explanation of complexity of environmental management and establishment of the *Natural Resources Sector Network* Retrieved from http://www.mfe.govt.nz/publications/about/soi/2010/page5.html [Accessed 28 November 2013].

[29] Note in 2012 the RSNZ's bi-line was "innovative contributions to Aotearoa and the world", which was also tone set in the 2010 NZGS conference. Retrieved from http://www.nzgs.co.nz/ [Accessed 28 November 2013].

[30] We were informed by the rise of sophisticated champions of change who adeptly use diverse communications techniques. Our next challenge was to produce a Pecha Kucha style presentation on pest control.

[31] This was amidst a shift away from collaborative learning as the organising framework for social science contributions.

6.4 Refreshed performances of the social

This form of critical and creative experimentation was influenced by intrigue with the post-structuralist concept of performativity. Alison was interested in what happens when social science is conceived as nature-society performances. Alison began paying attention to how the social science practices they were involved with performed nature-society relations in certain sites in specific ways. They were looking for ways to articulate what the world was becoming through these social science practices. They worked with the idea that 'performance' infers that something is done, an activity (Rose, 1997; Thrift 2000). Increasingly Alison's work on behaviour change began to focus on practices, what people actually do (Shove, 2010). She and her colleagues responded to this understanding by shifting their research away from making normative claims about how other people's doing can be governed and influenced to examining the multiple ways peoples practices were being governed, ordered and legitimated through the enacting and embodying of both the discursive and material (Butler, 1993).

Performance understood as performativity extends thinking about practices to link with the idea that language does something – that its power -what it does in the world- is not just to represent but to bring about effects, to make our worlds. The idea of performativity is that some phenomena only exist through the naming and doing of them, such as social science and sustainable development. Alison and Shona presented to the conference, and received positive feedback from peers for the light hearted and refreshing reflexive thinking. At the conference they met with other geographers in New Zealand and Australia, exploring performances of sustainable development. There was an idea of writing a special issue of a journal from the conference session but this did not eventuate. After the NZGS conference Alison and Shona presented via video conference to colleagues in various sites of Landcare Research. The presentation opened up a conversation about epistemologies, whether science and social science are produced through creativity and/or methodology. Continuing beyond the 2010 conference was the connection Alison made during a conference coffee break with another CRI based social scientist working at AgResearch.

6.5 Making collectives

In August 2010 Alison and her colleague from AgResearch formed the CRI social science network (CRISS) supported by people involved with the RSNZ's Social Science and the Humanities committee, MSI and BRCSS[32]. Alison's thinking at the time was that stronger collegial relationships across social science in the CRIs could provide a way to understand more fully how social science was being shaped and contested across organisations, disciplines and sites. Alison promoted the CRISS network on the basis that formal networks can assist with building capability, platforms and spaces for those doing social science in order to name what is and could be social science (as opposed to the agenda primarily being set by managers, business interests, policy officials and funders). Through this network Alison participated in conversations about who claims the title social scientist, who can make claims about doing social science, what are the boundaries and relationships between these subjectivities and how do these boundaries get made? Writing about this a few years later, there is now increased momentum towards fostering collaboration at many levels in the CRIs. This momentum is part of a range of agendas articulated as fostering integrated outcomes, efficiency and maximising the science spend, and creating 'best teams' for MSI bidding, as well as continued contested articulation of the value of social science.

6.6 Generating possible worlds

Prior to 2010 Alison and her colleagues had been doing research on climate change that was primarily mitigation focused and heavily influenced by Landcare Research's position as a supplier of greenhouse gas emissions data. Landcare Research has been central to creating New Zealand's inventory of carbon sinks to meet Kyoto commitments and seeking opportunities for sustainable land management through the creation of carbon markets. In early 2010 through a strand of research in the greenhouse gases science programme Alison began to align her research more closely with others in New Zealand and internationally who were exploring social dynamics of climate change. Slowly the perspective of their work shifted from using a human

[32] In 2012 under the banner of CRISS Alison supported a BRCSS bid (through Massey University) for MSI funding to establish a Social Science Knowledge Hub.

dimensions framing to work with a focus on social change processes. At this time a colleague in Landcare Research was working to strengthen collaboration across the CRIs and was getting involved with the Asia-Pacific Science, Technology and Society (STS) network and the formation of the New Zealand STS network.

6.7 Turning up in contested spaces

By turning up at an STS and climate change workshop (8th March 2010, Wellington) Alison realized that colleagues in other CRIs were also looking to influence how social science around climate change was being framed and undertaken. Some had been advocating through the New Zealand Climate Change Centre (NZCCC) to follow up the Climate Change Adaptation conference with one that engaged more fully and broadly with social science theorization around climate change that was coming out of sociology, geography, and political studies. The NZCCC executive had taken on this suggestion and a project was initiated to bring together social scientists working in CRIs associated with the NZCCC to host a conference. Alison negotiated her way onto the organising committee for this event and discovered that strategic links had been made with social science networks providing leadership in articulating the values of social science to New Zealand (He Waka Tangata, BRCSS, RSNZ and MSI).

6.8 Reframing contributions to climate change

On Friday 11 June 2010, sitting in the NIWA (host for the NZCCC) board room in Wellington Alison was humbled and intrigued by the intellectual actors assembled in the room. There was also a sense of relief, inspired by the sophistication with which people in the room engaged with, critiqued and opened up the starting proposition for a conversation about social science and climate change. A generative and inclusive proposition was developed. Coming into the room the topic at hand had been articulated as getting the social sciences on board with tackling climate change issues and having dialogue with biophysical scientists. A first draft of a notice stating the background and purposes of the workshop emphasized a deficit of social research about climate change.

> *Climate change related research, thinking, and discussions, are increasingly infiltrating into society and people's everyday lives. While social scientists have attended to a number of related research areas to date only limited attention has been directed specifically to climate change in New Zealand. More recently, there has been increasing interest in this area from various individuals and organisations. As a result discussions have taken place about organising a dedicated event that would bring together researchers from the social and biophysical sciences and end-users interested in this research area. The workshop could potentially attempt to identify policy-relevant research challenges for New Zealand, or to at least provide some insight into what the research community can offer. The workshop will facilitate dialogue between social scientists (and with biophysical scientists) on the social science issues around climate change. It will identify the potential role and research gaps for the New Zealand social sciences in relation to climate change (draft NZCCC workshop material June 2010).*

On leaving the room the group had shifted the framing and language for the workshop notice towards

> *Supporting a broader, more in-depth conversation around climate change and ways of imagining what it may mean: what are the challenges and how to respond, with a focus on mobilising social knowledge to re-frame climate change (draft NZCCC workshop material June 2010).*

The focus of the work in the room shifted away from social scientists having to dialogue more with biophysical to creating a dialogue in society, which would have implications for policy, research and other interests in society. The term Social Knowledge had been introduced, drawing attention to how categories such as climate change have a social life. They are constituted of and through sets of social relations and are knowable by societies beyond the sciences and social sciences.

6.9 Opening up possibilities for climate change

With this broader perspective in mind the organising committee set about naming the event and booking a date for it. After tossing around a few ideas they agreed on the

name *Degrees of possibility: igniting social knowledge around climate change*. The first part of the title reflects the strong influence of Gibson-Graham's (2006) work on Alison's contribution to the climate change agenda. The social scientists wanted this initiative (the workshop plus pre and post meetings) to be generative, supporting many possibilities for responding to climate change challenges, rather than closing down possibilities by fixing to prescribed, dominant categories generated by the climate science or climate policy discourses. The second part of the title located the workshop in its political context by making reference to a recent report written by the Prime Minister's science advisor, Sir Peter Gluckman (MoRST, 2010).

At this planning meeting two of the people invited as representatives of partnering organisations expressed interest to continue to help co-ordinate the event. Together the workshop conveners found a way to focus the workshop on the processes through which social knowledge of climate change is produced. Prior to this the day was being designed around streams of theme based presentations. This approach would have been more likely to produce content based discussions based on the findings about social aspects of climate change. Instead they created space for more critically informed conversations about the work that climate change is doing and can do making institutions; how research practices and skills are and can be developed for this field of work and the affective politics of a social science of climate change.

On Monday 6th December 2010 the *NZCCC Degrees of Possibility: Igniting social knowledge around climate change workshop* was held in Wellington. Invitations had gone out mixing the two lines of thinking developed through the organising group. The original organising idea about social scientists needing to catch up with climate science had shifted in tone and emphasis to

> *climate change-related research, thinking, and discussions, are an increasing part of society and people's everyday lives. While social scientists have attended to a number of related research areas to date only limited attention has been directed specifically to climate change in New Zealand (final NZCCC workshop invitation).*

Below this, reflecting the more critical content of our discussions was the statement that the workshop would address themes of

- The art and politics of climate science
- Changing climates: reconnecting selves
- How are New Zealand communities making sense of climate change?
- Our tools for responding to climate change

6.10 Refreshed globalizing agendas

Elizabeth Shove's[33] live presentation via video conference to the 110 participants at the Degrees of Possibility workshop, informed discussion on how to ignite social knowledge of possibilities and practices. She encouraged people to support multiple, diverse, interconnected understandings in society of what the future might be and ways to get there. She proposed this as the work of revealing and valuing diversity and difference in lived experiences as well as knowledge making practices. There was also discussion about how to build and support knowledge of social practices. This is the work of understanding how high resource dependency practices come into existence, (for example air conditioning or product packaging). Emphasis was given to making visible contextualized relationships between technology, identities, science and behaviours.

In the post-workshop report disseminated in April 2011 (Cronin, Doody & Greenaway in Nottage, 2011) Dr Amanda Wolf (having been asked to share her reflection on the discussion during the workshop and then document these in the report) noted

> *many discussions of 'reframing' at the workshop seemed to slip dangerously close to reinforcing the role of social science as helper. These discussions glossed over questions about who is doing the framing and for whom, as well as why it is thought that a single reframing is what stands between the status quo and some improved condition (Cronin et al., 2011, p 51).*

Dr Nick Lewis, stated in his reflection piece that the workshop

[33] Dr Elizabeth Shove was leading a programme funded by the UK Economic and Social Reseach Council about climate change and everyday life. Retrieved from http://www.lancs.ac.uk/staff/shove/transitionsinpractice/tip.htm [Accessed 18 Nov 2013]

ignited social knowledge of socio-environmental change and performed a different politics of knowledge production…this requires a social knowledge of possibilities and practices as well as a knowledge of social practices (Cronin et al, 2011, p 57).

6.11 Negotiating the socials of environmental change

Almost a year after the workshop Alison attended two meetings with MfE and MAF to find out how the report had been received and the current state of thinking on the topic. At these meetings Alison heard expressions of the importance of social science. It was stated that social science was likely to become more influential in shaping up science policy priorities and science development processes. They were told that attention was being paid to the evidence base for investment in science and technology transfer. One person spoke of how

social science helps by packaging, transmission of, communication and ability to put science into the political process. This is best done through bundling up co-benefits, and reframing to reveal links and connections, alternative ways of doing things (*Alison's meeting notes November 2011).*

Others spoke of how social science keeps the focus on outcomes, on what is intended to be achieved, how and what actually does get done in the world. Another spoke of how

clever social science realises the constraints on what happens to a document when it reaches a ministry and must be read by a varied audience. The attention of a policy analyst is given to presenting numerous views and not telling policy or sector interests what they should do. Instead the document should illustrate what they are doing and the range of potential ways there are for doing things differently in the future. Don't expect the document to do too much work; it's the conversations that are wrapped around the text that will do more of the work creating and revealing changes (*Alison's meeting notes November 2011).*

It was at one of these meetings that Alison also heard for the first time about the Natural Resource Sector initiative which was communicated as

providing strategic direction across ministries and fostering integrated work programmes. The cross government NRM social science network is providing a platform for integrative work. They are addressing how social theory can be more influential on policy processes (Alison's meeting notes November 2011).

Reflecting on the workshop and subsequent meetings Alison realised when social science questions are framed through climate science they are not only governing behaviours on farms but they also work politically to shape the possibilities for what social science is and can be.

6.12 Asking generative questions

Alison's entrée into the *Degrees of Possibility* initiative was largely because she wanted to make sure the social research she was involved with through the greenhouse gases programme was useful and would be considered robust by social science peers. The reading of Latour she had been doing (see discussion in Russell et al, 2013) enabled her to frame and justify (through internal reporting procedures) the turn she and her colleagues had made away from ideas of mitigation and adaptation and the behaviour of farmers, towards concepts of knowledge networks and the production of social knowledge through social science practices.

Taking a perspective of social change: climate change brought to the fore the politics of knowledge production. It highlighted to Alison in numerous ways (from the process of people gathering, to the creation of policy jobs) how affective it was to ask questions about processes. Process became the category as opposed to questions about content whereby categories were left unquestioned and the discourses through which they arose were not named or critiqued. In response to this interpretation, paying attention to the categories in circulation Alison then got involved with convening a workshop with members of the Cross Government NRM Social Science network to explore current approaches framing environment-economy relations and possibilities for policy-making practiced in this context.

6.13 Co-producing sustainable futures

Futures thinking is an anticipatory practice (Anderson, 2010) advocated for through a number of inter-disciplinary approaches including post-normal science and

sustainability science (Funtowicz & Ravetz 1993; Frame, 2008). It is used by a range of organisations in New Zealand including CRIs, ministries, local government and businesses, to pre-empt and govern risks, crises and threats. Formalised futures thinking also establish the presence of 'what has not happened and may never happen' (as elaborated in Massumi, 2007).

Linked to the growing interest in nature-culture entanglements and performances, and generative knowledge-making practices Alison was involved with an exploration of futuring techniques. Alison and her colleagues were interested in how the future can be folded into the present without re-inscribing dominant ontological and epistemological perspectives. In 2011 after devastating earthquakes in Canterbury, Landcare Research and the Christchurch City Council hosted an online futuring discussion about how to rebuild the Central Business District, called Magnetic South (Magnetic South, 2011).

This was one of the many responses to the earthquakes made by staff in Landcare Research. Most were involved directly with the quakes because the Landcare Research head office is in Lincoln, Canterbury. At 1pm on Tuesday February 22nd 2011 Alison was sitting in the Landcare Research Tamaki (Auckland) video conference room, looking at the television into an empty video conference room, with a Lincoln sign hanging at an angle on the wall. She was waiting for colleagues to join her for a meeting about a social media project they were all working on. They had planned to do some further work in response to Shove (2010), attempting to develop a workshop process for thinking through regimes of practice with regard to water and also pest control. After a few minutes Alison returned to her desk to find an email saying Landcare Research was evacuating their Lincoln site due to a magnitude 6.3 quake.

6.14 Co-producing sustainable development through ethical responses

Later when they were able to talk to each other Alison and her Christchurch based colleagues discussed what each thought were appropriate professional responses. They had hooked into conversations circulating through Christchurch and beyond about a fear that researchers would swarm Christchurch adding to the trauma, as had

been done in many traumatised places, many times around the world. Emails were circulating discussing codes of practice for social science amidst the crisis.

Alison and her colleagues got involved through the New Zealand Centre for Sustainable Cities with contacting researchers and scientists with knowledge of urban research and policy processes. Using the developing social media skills in their team an agenda for an urban research workshop in Christchurch was set. A web-based exercise ran for a week which was well subscribed producing a convergence of ideas for further discussion which were then summarised into ten themes. These themes formed the basis for a 28 April 2011 workshop in Christchurch, which was attended by close to 100 people involved with researching and making policy for Christchurch. The workshop was addressed by several speakers and participants worked in groups to summarise the knowledge in the agreed themes. Rapporteurs in each group wrote up the discussions, which were analysed in a report titled Christchurch's Regeneration: research and science based insights (Howden-Chapman et al., 2011). This report was designed to help address the urgent need for timely, research-based ideas and policy suggestions to inform pragmatic action steps to regenerate Christchurch. The report was written for Christchurch Earthquake Recovery Authority CERA and its careful articulation of the forms, relevance and approaches to research provides a useful illustration of various contested aspects of the social relations of social knowledge production that were being articulated at the time.

> *The research community can contribute ideas about how to create the forums and connectivity to ensure that community voices are gathered, heard and attended to in the process of re-creating the city. They can also contribute to the pool of ideas – everything from the overall design of a sustainable city to the uses of the healthy housing index in the design of residential buildings – which Christchurch citizens can draw on in deliberating about how their city should be re-created and rebuilt. Finally, the research community can contribute to the monitoring of the process and its emerging outcomes…Two-way communication with community groups, local government and CERA, in order to negotiate research*

framings that meet needs, as well as the needs of social research, is important (Howden-Chapman et al., 2011).

6.15 Co-producing sustainable development through foresight

As well as working through the umbrella of the New Zealand Centre for Sustainable Cities, Landcare Research also officially teamed up with Christchurch City Council, StratEDGY Strategic Foresight, and the Institute for the Future to run a social media Foresight Engine (formerly known as Scientific Lab) game to host a discussion on the future of Christchurch and inform strategic planning for the city. The resulting Magnetic South game sat alongside other City Council initiatives and Landcare Research interests in transformative engagement techniques. Social research activities became very diverse at this time as Landcare Research's social scientists:

- attended public events run by the Christchurch City Council to compare/contrast with the possibilities of the Foresight Engine
- looked at scenarios, trends and predictions for the future, especially cities
- developed a scenarios about the future of Christchurch
- practiced writing blog posts through an internal wiki site
- compiled invitation lists
- identified key roles within the Foresight Engine format (game testers, game guides, promoters, key players)
- wrote micro forecasts (the main unit of analysis for the conversation within the Foresight Engine game as contained within the format of a card).
- compiled records of other earthquake initiatives
- participated in the research related workshops around responses to the earthquakes

6.16 Co-producing sustainable urban development, hosting Magnetic South

Over the 24 hours June 24th -25th 2011, an online event called Magnetic South was held, attracting 858 participants. It was co-ordinated by a team occupying a Landcare Research seminar room in Lincoln. The software used for this is called the Foresight Engine. It was developed by the Institute for the Future (IFTF) in Silicon Valley, California as an online public laboratory for developing and sharing cutting edge ideas about the future of science and technology. Landcare Research had established

a relationship with IFTF prior to the quake. This computer technology was designed to support multi-party deliberation through techniques of futuring, crowd-sourcing and game play. As presented in one of the original Magnetic South blogs (Figure 12 below) sent out to participants during the game, it was the spatial-temporal capacity of the software that the research team were interested in. The immediacy with which they could get a large number of people involved in a conversation about the rebuild of Christchurch.

Figure 12 The Magnetic South hub

Bob Frame (back) reviews micro forecast cards online while Stephanie Pride (centre) and Alison Greenaway (front) finalise a blog post for the Magnetic South blog site. The large screen in the background displays an online message board used to communicate with the Institute for the Future in California and Landcare Research staff throughout New Zealand.

A post from the Magnetic South blog (Magnetic South, 2011) by Stephanie Pride

As Bob says in his post, the middle of a crisis doesn't immediately seem like the best time to do your long term thinking – we tend to use different parts of our brains (and our hearts) for responding to emergencies from those we use to think expansively and deeply about the future. As for playing a game about the long-term future when there are such serious real-world issues to deal with, what's the story with that? Shona and Helen have both described the reality that life in Christchurch is going to be uncertain for quite a lot longer – that uncertainty is the "new normal". Yet every day we are all having to make decisions in an environment that's more complex than it was nine months ago, because the future we'd all assumed we'd be having is no longer there. The more complex a situation is, the harder it is to think it through on your own, and the less likely that there is just one solution. Using a gaming approach to think about the longer-term future helps us to do several things. It gives us a chance to get away from the shaky present, for 20 minutes (or twenty hours depending on how long you want to play), and step beyond today's problems to think about what we'll want and need in 2021. Using a futures gaming platform like the IFTF's Foresight Engine also allows lots of us to bring our diverse ideas and knowledge together quickly, so we can think together about the future and work out solutions collaboratively. Games create a high energy, low-risk environment for testing out lots of possibilities and that allows us to learn quickly about what might work and what might not. After Magnetic South, we can bring the understandings and insights we've created together back to today's real world decisions. As Helen said "we don't control the earthquakes, but there are a whole lot of things we do control and taking advantage of the opportunity for serious gaming in Magnetic South is one way to take back control of our future".

6.17 Co-producing sustainable development through online conversations

Alison approached this work as a form of 'hosting a conversation' because the software allows for one idea to be responded to by another person. This was quite different to the Share an Idea[34] style of idea collation that the Council also had in progress at the time. Social media applications which facilitate interaction are heralded as being useful for addressing complex problems, including those relating to long-term urban planning (Fitt, Frame, Greenaway, McDowell & Russell, 2011). They allow many users to engage with each other in real time and across dispersed geographies. The Foresight Engine is a social media application that was specifically designed to facilitate online 'conversations' about society's complex problems. The Foresight Engine is formatted as a 'game' in which users score points by suggesting and developing ideas for the future; prior to Magnetic South it had been used to address issues including the use of personal satellites, energy use and water scarcity, and reinventing the process of medical discovery (Fitt et al., 2011).

The Foresight Engine application included a scenario narrative describing plausible dynamics at play in the future. For Magnetic South it was "In 2021, when talent and investment are in even shorter supply than clean energy, what will you do to attract them to Christchurch?" On the website was an introductory video, with actors narrating the scenario and introducing how the game worked. One video contained footage of Christchurch Mayor Bob Parker encouraging viewers to play the game, and the other, consistent with previous Foresight Engine performances, contained details of the scenario and the question posed to players. The players wrote 'micro forecasts' of 140 characters to make forecasts enriching the scenario or asking questions. They could probe each other's forecasts and extend the micro forecasts on the website (played by themselves or by others) in four directions:

- Momentum – players can forecast what might happen next,
- Challenge – players can suggest something that might happen instead,

[34] An on line consultation platform which can be viewed at http://www.centralcityplan.org.nz/info/share-an-idea.aspx [Accessed 5 July 2013)

- Local adaptation – players can forecast that things might turn out differently in a specific area,
- Question – players can ask a question about a micro forecast

These directions were informed by de Bono's (1985) typology of thinking styles in group settings. From these directions further extensions were possible so a conversation could build. Each player saw navigation tools on their screen so they could navigate through the website. Game play was prompted and moderated through all the above elements plus through the attention of game guides who commented on ideas being discussed or added ideas through blogs to try and facilitate the conversations to enable more enquiry or deliberation.

6.18 Speeding up social science

In the room at Lincoln were skills of narrative inquiry, futures thinking, data visualisation, PR communication, sustainability planning, ecology and information technology. The ideas at work in the room were about doing an experiment or intervention that would be a humble yet generative response to the quake devastation. The team had two stated goals for the Magnetic South game, to hold a crowd sourced online public discussion around the medium-term future of Christchurch that would yield useful insights for policy and planning processes; and to assess use of the Foresight Engine software as a tool that supports public participation in examining complex problems (Fitt et al., 2011).

Affects of hope and humour emerged through the use of futures thinking and gaming. For those in the co-ordinating 'Hub' in Lincoln, the game was fun, fast and at times frantic! Visualisations were created turning the narrative content into diagrams. Participants' logins were geo-tagged and maps produced within the first few hours. As well as the telephone and email, the research team used free online spaces for communicating across sites. The design of the software meant the team were under pressure to produce critical and constructive analysis quickly communicated through the blog process. As a result in a brief period of 24 hours a large amount of data was produced, collated and collectively analysed through new spatial-temporal configurations, and technologies of collaboration and creativity.

6.19 Folding the future into the present

Through these responses to the Christchurch earthquakes social knowledge was co-produced about crisis relevant research, participatory democracy, strategic practices, playful research and urban change. Inviting people into a discussion about 'the future' was not at all challenging (or alternative) in the context of the devastated city. The conversation facilitated through the Magnetic South moment was not dissimilar to the dominant discourses circulating through Christchurch. The future was being folded into the present (Anderson, 2010) in many conflated ways at the time (including us practising with technology for future positioning of our research). The ideas posted in Magnetic South reiterated and extended many of the points made through other avenues as well as dominant discourses of planning and urban governance. Whilst there was opportunity for reflexive comment to be made, deconstruction of the dominant modalities of urban governance did not become the primary level of conversation. Potentialities were found in humorous posts, but unfortunately most of these settled unremarked into the abyss of 9000 posts (each up to 140 characters long). Working as an extension of a high profile public consultation Magnetic South became an avenue for validating the range of 'green' ideas being proposed for the re-build for the CBD. After the Magnetic South event, Landcare Research colleagues went on to materialise many of these ideas in the form of the Transitions[35] exhibition garden at the 2012 Ellerslie flower show in Christchurch.

6.20 Summary: knowledge-power performances co-producing sustainable development

This chapter details everyday research practices demonstrating how social science was entangled with and momentarily shaped development initiatives. Significantly it also shows how a range of socials were co-becoming through the production of knowledge about environmental change. A methodological shift was being made by the central social scientist figure and some of her colleagues to take the focus of their social science away from 'that social life out there'. Instead they were beginning to find ways to tentatively, falteringly knot the social back to nature through a social

[35] Which can be viewed at *Ellerslie International Flower Show, Christchurch 2012*. Retrieved from http://ellerslielive.co.nz/tag/transitions/ [Accessed July 2013].

science attentive to being in the world (Latour, 2005), and the co-becoming of worlds (Stengers, 1997).

To conclude, this chapter shows that social science can be usefully understood as much more than the practice of specific, legitimated methods to produce new, relevant and credible knowledge. Indeed when understood as a contested and performative space of representation, making identities, discourses and institutions, the performative possibilities of both social science and environmental change become apparent. I have provided a few small examples of how social and knowledge innovations were generated through practices of collective strategising across multiple sites and multiple agendas. Knowledge of and for social change was co-produced along with practices for ordering and organising cities, research, and climates. Hence the final contribution of this chapter is to signal a refreshed understanding of the politics of the environmental change agenda and knowledge making in New Zealand.

Chapter 7

Social science makes possible worlds and worlds of possibility

> *Much of the debate about public engagement in issues concerning science and technology has been cast in terms of the oppositions between participation and non-participation, scientific expertise and lay knowledge, quantitative and qualitative, reductionist and holistic…a more salient distinction is between whether processes are 'open' or 'closed', drawing attention to considerations of power, transparency and accountability in policy justification and appraisal (Leach, Scoones, & Wynne, 2005, p. 217).*

7.1 Potential and actual achievements of social science for sustainable development

In this chapter we explore how the outcomes or the material achievements of social science for sustainable development can be assessed. Reflecting back on ideas discussed at the start of the thesis this chapter directly addresses the questions of *how were social science and sustainable development co-produced* and *what was social science becoming through the co-production of knowledge and sustainable development?*

Central to the first question is the idea of research as performative. Chapters 2 and 3 explored how this perspective works with reality, or the actual as enacted through practices. Chapters 5 and 6 showed how co-learning approaches were being enhanced through a growing appreciation of knowledge, social science and society as being co-produced. These chapters illustrated social science and development as becoming together through sites and practices of assemblage.

In chapter 5 the figure of the social scientist was working with an instrumental approach to co-learning, facilitating and enabling knowledge for change. In chapter 6 the central social scientist figure was working more closely with the categories circulating through science and development initiatives. She paid more attention to the diversity of representations and possibilities of climates, the social, networks and cities. Chapter 6 is distinct from chapter 5 because it shows how the social scientist and some of her colleagues began to work with a more creative and critical analysis

of their context and the situatedness of the research agendas they were entangled with. The break between and the naming of these chapters does not set up a comparison between the two approaches of co-learning and co-production. Instead the division marks the point at which new capabilities for thinking were refreshing the doing of social science.

This achievement is not expressed as a shift from one state to another (for example from research that makes no difference, to research which makes a difference in the world). Alternatively the achievement of this enacting social science is most usefully understood as capabilities for more diversely making institutions, identities and discourses of development. These capabilities may or may not endure beyond the site and moment of their enaction. The challenge is to sustain the potentiality for difference. Thus achievement can be understood not as looking back to see if the flame of possibility is still ignited, but as knowing that the capabilities for re-igniting the flame are sustained.

7.2 Methodologies were saturated with politics

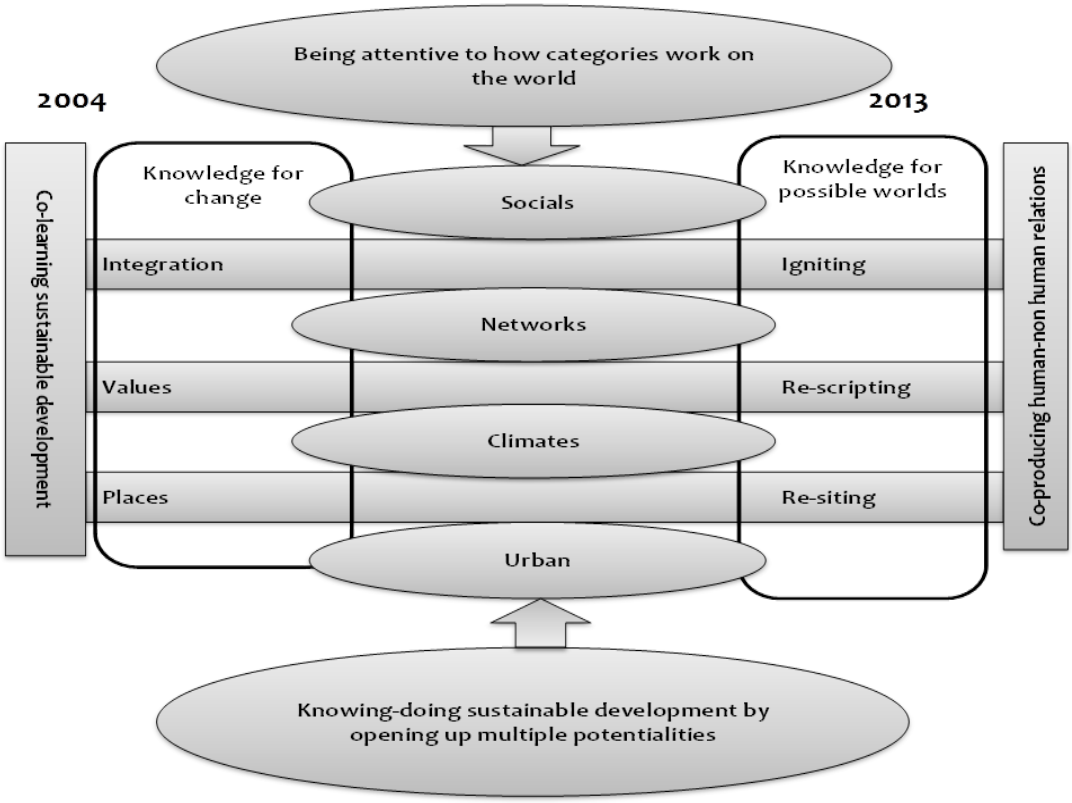
By now we can see that methods talk does indeed liberate and deepen the conversation of environmental politics, more effectively connecting politics and practice (Barnes et al., 2007). Furthermore, extending the talk of methods to exploration of the work of methodologies has provided the opportunity for critical analysis and modification of how social science gets caught up in the work of developing New Zealand.

The previous chapters showed how social science methodologies supported diverse possibilities for institutions, discourses, representations, technologies and practices. This was achieved by developing capabilities for enactive research which introduced non-human actors as participants in research. This enactive research was critical of and creative with how social science was making institutions of science, social science, and development.

Here I pause to illustrate how moving from a focus on producing knowledge for change to knowledge enacting possible worlds opened up what sustainable development in New Zealand was becoming. Figure 13 demonstrates an extension of

co-learning (portrayed in chapter 5) through attention to the co-production of knowledge and the work of categories in the world (portrayed in chapter 6). The diagram shows how social science practices moved from a focus on co-learning, through integration, understanding values and working in places, to co-producing through igniting, re-scripting, and re-siting the social science work. The social scientist was able to be more alert to how categories are at work on the world, making nature and society together.

Figure 13 Repositioning politics knowing-doing the environment



7.3 Stabilizing the social through practices, ways of organising, and representing

As with all social science this dissertation research has been involved with the shaping, constraining, and enabling of institutional arrangements across universities, government ministries, and CRIs. Chapters 4, 5 and 6 narrated how discourses of

progress, change, and possibilities circulated and performed practices making cities, social science, and climates. In Chapter 2, I outlined the argument that what we know (what we don't know) and how we know it, is stabilised through the making of, *institutions, discourses, technologies, identities and representations.*

Characterising knowledge–power processes in this way as instruments or assemblages momentarily ordering society is useful for thinking through the ways science, social science, and sustainable development are co-constitutive – they make each other, in response to each other. Jassanoff's (2004) use of the term ordering instruments focuses attention on what social science is becoming for and with science. I found new sites and actors were being co-constituted along with knowledge production practices. Assessment of the co-production of knowledge (Jasanoff, 2004) highlighted the standardising and stabilising work occurring as 'new' knowledge of the urban, climates and community decision making was being codified through institutionalising practices. This idea of ordering instruments helped to explore connections with a broader range of intellectual and political trajectories of sustainable development in which my research was being embedded. This approach informed the focus in chapters 5 and 6 on the ways some knowledge and development projects were achieved and others were being constrained.

7.4 Institutions of development were being shaped through co-learning

Through our writing, responding to the IPCC, through principles of community-based research, and production of green infrastructure manuals colleagues and I saw how new structures of scientific or expert authority were emerging in New Zealand. This finding resonates with the idea that *institutions* (networks of people, computers, accounting systems, and notice boards) think, they confer identity, and standardise and stabilise new knowledge (remembering and forgetting).

Chapters 5 and 6 show how the social science with which I was involved was mobilised through political projects, making the knowledge economy, changing democracy through collaborative governance, as well as emplacing new sustainable urban development initiatives. The LGA and the Resource Management Energy and Climate Change Amendment Act (2004) were key to the *institutional* reconfiguring that occurred in this period, enabling actions that anticipated more distant futures and

more diverse understandings of community governance and evidence-based decision making. As a result new imaginaries of the subjects and objects of sustainable development emerged in the form of carbon, streams, the urban, networks, integrators and indeed social science.

7.5 Possibilities for collective action reduced by over-representing dualisms

Representational practices attributed cultural, political, and historical meanings (for example, the ONAC principles). Models of human agency and behaviour informed representations of knowledge production and the use of knowledge along with the uptake of science representations by other social actors.

The social science of this context was constituted through the conferring of *identities.* The end-user, funder, planner, discipline, stream, emitter, network, translator, and integrator were all actively achieving both knowledge and new development practices. Common to these identities was a revaluing of integrated research and planning, representing conventional and historical research and planning as not integrated enough (often overlooking where integration had been tried and thwarted or was indeed working well but for less desirable purposes). *Identity* was most usefully understood as how people were restoring sense out of disorder. Most prominent was the identity of the expert "that quintessential bridging figure of modernity" (Jasanoff, 2004, p.39) and the collective identity of the research community. I found that routine everyday research and policy *practices* enabled the uptake of identities, assisting the discursive to become material, making visible and useable some objects and subjects of knowledge and not others.

Both the science and social science documented in this dissertation were organised through CRI funding, management, and cultural practices to produce knowledge in relation to an 'end user', an information or knowledge transfer subject able to use the information produced. Just as a writer performs in the presence of an imagined reader, a researcher may perform with an imagined user of the research. This is a challenging shadow with which to work. The 'end-user' is not able to be fixed in time or to specific sites. Once the research is underway the imagined end-user may no longer exist, may have already got the information they needed in another way, priorities or staff may have changed, so might the organisation's structure. It is in

response to this multiplicity of intentions that we recognise knowledge production as not merely a product of research alone, indeed it is being co-constituted; knowledge is performed and becomes performative.

Assessing and shaping ways people name, and represent themselves and others are key practices in action-learning approaches. Making identities was central to the work documented in chapters 5 and 6 (and indeed throughout this thesis). The Labour government's project of transitioning New Zealand towards carbon neutrality was linked in various sites through the conferring of identities of experts, integrators and champions, to the economic project of positioning New Zealand in world markets. Chapter 5 also illustrated how nature became infrastructure in some rooms and in some asset management plans. Carbon calculations through certification programmes created additional evidence councils, companies and Landcare Research could use to track production and consumption activities. Certain and uncertain were becoming important identifiers for managing climates, as were references to Al Gore and the Stern review.[36] Uncertainties were responded to quite differently across epistemological scales. Knowing–doing sustainable development through the performance of a specific rain garden in Auckland was quite different from knowing–doing the sustainable development among foreign investment accounts for commercial developments in Auckland.

Social theories of environmental modernism and knowledge networks helped us begin to express the complexity of neo-liberalising practices (Bulkeley & Newell, 2010; Oels, 2005; Bäckstrand & Lövbrand, 2006). Chapter 5 and 6 show the mobility of urban, climate change and community governance policy rationalities across sites and sectors. Being attentive to how these rationalities were circulating opened possibilities for connecting or disconnecting discourses when framing research approaches and identifying sites and practices with which to engage.

Among all this, the identities and practices of the figure named social scientist were also being reworked to enable trans-disciplinary, policy relevant and technologically enabled immediacy. Most commonly, the figure of the social scientist became

[36] See Artifact 3 for reference to the movie Al Gore championed and the Stern review.

someone who could translate science, assist with making good, fast policy decisions, and facilitate democratic decision making processes across a range of scales. But from time to time the social scientist was also an intellectual or thought leader engaged in social change, illuminating more diverse responses to the politics of the environment.

Giving attention to discourse is making sense of what is said, how it is said, in which contexts it is said, when it is said, on which occasions it is said, and also identifying any variations in these. For example, the discourse of 'research making a difference' is commonly used across sustainable development work. It acts as an intermediary discourse, linking perspectives of knowledge and action across sites and practices. Stories of research making a difference were circulated through the sites with which I was engaged via narratives of Mātauranga Maori, Te Tiriti o Waitangi and climate change, participatory research, performativity, implementation of low-impact development, and ethical research. Yet rarely were we able to tell what was actually – materially and discursively – at work on the world. Our approach did not help us to understand what was actually at that site and in that moment impossible work. This was not due to a lack of research, or, as was commonly stated (Feeney & Greenaway, 2006) a lack of evaluation. The linear impact-outcome approaches we were resourced with did not help us to explore the multiplicity of performances at work through our collaborative efforts.

7.6 Networking to integrate systems and disciplines: the objects of knowledge shaped both social science and sustainable development

I found that science became understood as detached from yet attachable to policy and public decision making processes through the bounding work of social science and economic development *discourses* and *practices.* Specifically discourses and practices of *networking* and *integration* were central to the production of knowledge I was associated with. The practice of networking to enable integration for sustainable development drew upon heuristics of *systems* and *disciplines.* I explored how these heuristics were being used (as elaborated in chapters 5 and 6 and the constitutive work they were doing.

Chapter 5 showed the standardising and codifying work being done through *practices* of natural asset management, environmental certification, and community-based research. These were becoming normalised as measurable ways of knowing-doing sustainable development. In addition the organisations discussed in chapter 5 such as the Manukau Institute of Technology, the University of Auckland, CRIs, and Councils were being repositioned (variously through their different identities and bodies) through rationalities of the knowledge economy. These rationalities were linking work on community, information technology, and urban places. Through this production of sustainable development knowledge there was also on-going contestation over the value of social science. I found that managerial and investment practices conferred and contested social science identities through research team meetings, research and infrastructure funding processes, local government planning, literature on interdisciplinary processes, and documents referring to IPCC framings of human dimensions research.

The notion of social technologies, as discussed in chapter 2, draws attention to the practices through which knowledge is standardised. Technologies assist in meaning-making processes and also assemble identities. For example, we can understand the accounting and evaluation of carbon (see discussion of carboNZero$^{Cert™}$ in chapter 5) as a technology which values, sorts, and legitimates specific carbon consuming practices. Approached as social technologies I came to know and do *systems* and *disciplines* as knowledge production approaches which were being actively achieved; they were neither pre-existing nor predetermined. By presenting these technologies as in-progress, opportunities for influence were identified from a mix of viewpoints across collective relationships engaged in various intellectual and or political projects.

I found that *integration* was an idea and practice circulating through both social science and science discourses. Newell et al. (2005, p. 301) discuss conceptual blending through integrative research as the process of constructing new world views. For Norgaard and Baer (2005), it is how different organisational structures and interaction processes and rules facilitate collective understanding. It appeared to me that integration was an accepted good, to be strived for and which was somehow currently lacking. However, for a number of years it seemed my colleagues and I

were rarely able to discuss what was actually being integrated, for example, was it budgets, offices, emotions, authority, research questions, methodology, methods, and/or data sets? I found that most commonly models were presented as the technology for integration – usually through a layering of data. This often included broader data sources than researchers had used in the past. It was the modeller and the model that did the work of integration. The notion of integrative research was used to encourage researchers with different disciplinary training to work together on projects and for the research to be integrated with 'end-user' needs. Others distinguished this along the lines of inter and trans-disciplinary research.

Integrative research was also referred to as a way to link work across disciplines. Examples shared in chapters 5 and 6 support Schoenberger's (2001) argument that interdisciplinarity over-represents *disciplines*. The constant work I and another social research colleague did to communicate what we researched and how we did it found us drawing more on our disciplinary framings than we had in past research roles. We were also aware that we carried assumptions of our colleagues linked to the specialist positions they had been designated by management, for example, economist, soil scientist, hydrologist, and architect. Confusion and sometimes tensions arose when people found others doing work that they thought was their specialist area (for example, can an architect do interviews and can these inform an ethnography?). However, most people drew on a suite of methods, techniques, and perspectives, maintained strong relationships with peers and stakeholders and did not seem very wedded to detached reductionist approaches to science. Some referred to this as the growing capacity for Post Normal Science (Funtowicz & Ravetz, 1993; Kastenhofer, 2011); others discussed this as commercially viable capability. One colleague pondered if there was a distinction between science and scientific technique. This led us to further considerations both of who and what are the scientific community in New Zealand and of the people who traverse its margins.

Notions of epistemic communities (Norgaard, 2004) or *disciplinary cultures* (Schoenberger, 2001) are useful when thinking through my unease about the over-representation of disciplines and to what this might have been linked. Disciplinary culture is tied up with questions of identity – or who the researcher understands their

role, work, status and validation practices, in an organisation, a project, or indeed the world.

Schoenberger (2001, p. 373) introduces a generative line of questioning by asking "whose inter-disciplinarity?" I found the need for inter-disciplinarity was being normalised through funding, organising of teams, and the team members' past experiences. Not as transparent was the reasoning for which disciplines or aspects of each discipline were being valued – why, how, and by whom. The valuing of disciplines was occurring within our teams as we positioned ourselves and represented each other's work, as budgets were set, and as new teams for next rounds of bidding were formed and funded. This was occurring within both the CRIs and the universities, with the loss of disciplinary departments and the rise of multi-disciplinary schools.

The heuristic of *systems* was linked with calls for integrative research through climate, ecosystems, and catchment discourses circulating across CRIs. Metaphors of feedback systems and emergent behaviours linked ways of working across disciplines. This discourse also created a focus on people's formal and informal theories of the dynamics of systems. I found that systems perspectives drew attention to relationships and revealed interconnectivity. They were also useful for working with notions of complexity across many parts of the named system. However, the parts were often made to be static – not multiple in themselves, for example, the multiple functions of soil, or the multiple identities of stakeholders. Thus the practice of systems mapping acted to re-enforce dominant discourses of cause and effect or relationships between organisations, and between knowledge subjects and objects. However this practice when undertaken carefully to ensure the politics shaping systems are made visible was also able to show the hybridised relationships between humans, technologies, sites and institutions.

Social science practices have had a range of influences (re)inscribing identities, and in doing so articulate boundaries between research, policy, and practice. Clearly evident was an approach to forming stakeholder reference groups or networks for environmental management comprised of 'expert', 'government', and 'community' representatives. I found our social science work of representing *networking* itself also

re-inscribed networked relationships and the practices of networking. This is an example of knowledge developed to understand dynamics in the world becoming instrumental and normative as it shifts sites and reworks identities of actors and languages of social change.

Most obvious through the LIUDD programme, but also apparent in the ONAC and climate change work were narratives and practices of networking, ascribing agency to various development actors (notably these were predominantly human). Scientific imaginaries such as *systems* with nodes and peripheries and topographies, were re-sited and taken up by other actors in policy through catchment management and ecosystem service assessments.

Practices of quantifying and calculating the strength and efficacy of networked relationships have developed a language and frames for prescribing networking practices and how to make interventions for social change. A vast array of resources were available through the spaces of co-learning for naming, imagining, and participating in networks and identifying how they work and what work they are doing. At one point I was invited to a speed networking event. Based on the format of speed dating, each participant would have 2 minutes to introduce themselves so that people interested in talking further could make contact later. I helped design a workshop titled "I'm just here for the chocolate biscuits", where community development practitioners reflected on why they networked, when, where, and how. Colleagues were also involved with using a Social Network Analysis method to understand the development of EBEX21®.

7.7 Refreshed frames of social science were in circulation, enacting new collective possibilities for sustainable development

In chapter 2 I posed the question what changes when we understand social science as a contested and performative space? The following chapters address this question by considering how refreshed frames of social science were put into circulation and how social science practices and processes can be assessed, enacted and validated all at the same time. We found that when social science was ignited as contested and performative space collective enactive possibilities for *institutions, discourses,* and *practices* emerged. To elaborate this finding further I provide Table 3 showing some

of what changed when social science moved from working with a co-learning lens focused on facilitating dialogue and understanding across sectors and disciplines to a co-production one focused on the making of social knowledge and sustainable development performances.

Table 3 From representing the social to making worlds of possibility

Epistemology-ontology	From enabling co- learning	To co-producing socials
Knowledge of knowledge making	People and their attitudes, values, opinions, choices and/or norms are the central unit of analysis	Categories, practices and actors are the central unit of analysis
	Emphasis is on changing people, perspectives and frameworks through learning together	Emphasis on the changing elements of practices and creating new possibilities for knowing- doing in the world
	Conflict and uncertainty should be resolved or reduced, efficiencies can be created and improvements made	Practices are constantly changing and being contested along trajectories that may negate efficiency and improvements, co-producing uncertainties
	Knowledge is translated between technological development, science and society	Technologies and social systems are co-constituted through practices
	Change is orderly, predictable and controllable	Change is emergent, dynamic and often uncontrollable
What's at work on the world	People have agency	Practices, people and things have agency
	Rational actors design changes and create choice environments	More-than-rational co-creators of responses and environments.
Social science practices	Sites for engagement are physical spaces	Sites for engagement are knowledge spaces
	Purely instrumental	Mixing curiosity, intellectual inquiry, and pragmatism
	Disengaged theorising, split from applied	Relevant, creative and responsive, situated theorising, requiring humility
	Competing action research consultants	Critical and politically enabled, ethical stances discerned, creating collegiality
	Managing differently	Experimenting
	The issue is tackled only once	The work is on-going
	Co-learning, action research, integrated research	Co-production of political and intellectual projects
	Representations of how the world is	Preparation for the next round of engaging – creating strategic devices
	Participant observation	Being an enacting participant observer
	Methods are key e.g. impact assessments, evaluation and monitoring, most significant change	Methodologies are key
	Producing tools	Producing approaches
Boundaries creating differences	Social scientists/economist/biophysical scientist/adviser/analyst	Identity boundaries become more opaque and actively shaped
	Research/policy/operations	Fixed vs. generative spaces of knowledge production
	Rational and emotional	Effects and affects
	Facilitator/participants	Lobbyists/ actors
	Multi/trans/inter disciplinary	Fixed vs. generative knowledge

7.8 Refreshment One: Extending epistemological and ontological capabilities

The co-production idiom has enabled explication of both the epistemological and ontological work of social science for sustainable development. Table 3 above helps recap what has been demonstrated through the dissertation so far. First, the thesis is a response to the premise that epistemological and ontological conventions have constrained possibilities for how social science can be performed by sorting ways of knowing the world (and thus being in the world) along human and non-human representational divisions. Second, this dissertation and the Table above show that by working with the idea of co-production, capabilities have been developed for refreshing the performance of both science and social science. Specifically, we have seen how this thinking shaped performances of social science and sustainable development through a CRI in New Zealand – collectively experimenting with how to know afresh human-non human relationships. Situating this dissertation through the CRI context enabled a response to three dominant propositions about the relevance of social science to society that were in circulation between 2004 and 2012:

a) The 'challenge of certainty' narrative that argues that social science will assist the state and its citizens to take the best course of action to avoid impacts of future shocks such as climate change.
b) The 'quest for democracy' narrative, that social science can support public participation in decision making about the places in which people live, which will lead to a more sustainable, competitive, and liveable future.
c) Finally, there was the assertion of the 'the rational other'. That social science assists the transfer of scientific knowledge so that consumers will make informed choices taking into account the current and future environmental impact of their consumption.

Amartya Sen, writing on 'Development as Freedom' (1999), argued that poverty is best understood as deprivation in the capability to live a good life. He states that development is best understood as the extension of capability. This perspective helps to focus on what capabilities were being built through social science performances for sustainable development. The previous two chapters showed how methodologies

of both co-learning and co-production built capabilities for collective action. But the identities around which collectives were formed and the range of work they were doing (for example creating a 'them' and 'us' in Auckland, as Auckland itself was being re-positioned internationally), were not always well understood or openly contested. Capabilities were being extended through trajectories of both social science and sustainable development, through the politics of category making, for example carbon neutral. However, in most of the rooms presented little work was achieved building capabilities for navigating the political dynamics making and remaking collective and individual identities. We struggled to address the question of what we needed to know to understand how knowledge making was changing and thus how the generation of subjects and objects of action was changing. What was emerging, however, was the capability to make visible the work non-human actors are doing to create social relations and social knowledge.

7.9 Refreshment Two: working on the world through new actors and relationalities

Streams, Carbon Emissions, and Networks were actors in New Zealand's sustainable development performing into the world (materializing, or bringing into being) new imaginaries of planning, infrastructure governance, market relationships, and research. These actors emerged because their metaphorical capabilities conveyed possibilities of integration and linked people across sectors, discourses, sites, and practices. Their emergence was partially a response to the limitations of framing an economy detached from the environment, social development detached from environmental well-being, and science detached from landowners and consumers.

Additionally, relationships between the urban and rural were reconfigured (in some ways momentarily) through greater illustration of relationships between drivers of cars and heaters of houses and trees. Landscapes, wind, and stream paths were factored into asset management and district plans with greater attention. The presence of the future was also a strong relationality shaping all the spaces of co-learning. My social science was predominately caught up in normative approaches to sustainable development, fostering a knowledge economy and re-making Auckland and Christchurch. These were all thick with imaginaries of inadequate pasts and uncertain

futures. But our focus on naming what should be happening (through collaborative processes) to be more sustainable meant that we did not recognise the loss of potential futures that was occurring in that moment. At the same time as we were representing possible futures, our capacities for more-than managerial responses were in some sites being diminished.

Relationships between central Wellington and parts of Auckland were common across all of the sustainable development initiatives discussed, because Auckland itself (and therefore the reason a social scientist was employed in Auckland) was being repositioned economically and politically. There was a movement of documents, money, people, practices, and ideas between offices and meeting rooms in these two places, and between local government, central government, and community rooms. Central government investment between 2000 and 2008 was a dominant influence, creating spaces of co-learning and influencing how non-human actors were shaping New Zealand's development. This investment was through the Sustainable Development Programme of Action, Economic Development projects, Safer Communities networks, and Public Good Science funding. Social science situated in this context became part of an ecology of experimentation. This ecology has relationships linking and shaping afresh practices, sites, and categories. In the context of a science organisation I observed this as the making of the social of science, the making of climates and the making of networks across human and non-human actors (streams, carbon, and cities).

Ecologies of situated practice are experimenting with human-non-human relations and repositioning a new environmental politics. Social science understood as an assemblage was enabling a spatial ontology of the relational ties of knowing-doing which already exist, mediated through technologies across organisations. I agree with Amin and Roberts (2008) that understanding the qualities and potentialities of these existing relational ties should be the focus of communities of practice. Too many intellectual and material resources can be lost through the homogenizing approaches of more instrumental and formulaic communities of practice.

7.10 Refreshment Three: going beyond representational practices

By focusing on social science in relationship with science (not exclusively on science) I paid attention to representations of human agency and how this informs representational practices and the uptake of scientific representations by other social actors. I gave less attention to the representational practices of the science (the historical, political, and cultural influences) with which I was associated. However, I do show how the two earlier aspects of representation informed representational practices within a science organisation. The uptake of instrumental knowledge practices through co-learning was fostered through a methodological individualism of applied science. Co-learning was a practice being used widely by my peers. It is not just a research practice but a community development, organisational innovation, and strategic policy development practice. Its use was linked to the popularisation of theories of social change. This popularisation involved detachment rather than explication from social science and science.

In chapter 3 I outlined how my initial intention was to use participatory evaluation tools to explore social aspects of sustainable development. Challenges of research ownership and balancing the intellectual and instrumental potential of using evaluation tools lead me away from working with people directly involved with the Sustainable Development Programme of Action and into Otara. Through this engagement I participated in performances of representing the place and the people of Otara. This representational politics linked my work to 1980 when the Southdown freezing works in Otahuhu was closed as part of the government's economic strategy of deregulation, creating high levels of unemployment in Otara (Locke, 2012, p.82). I also participated in a performance situated within politics representing an ethic and practice of community-based research. This occurred in the context of increased articulation and standardising of community and voluntary sector engagements with research and policy through increased legitimation of participatory governance approaches. As discussed above, central to these participatory governance approaches was the practice or social technology of networking.

Sustainable development made visible the figure of the biophysical scientist distinct from the figure of the social scientist. We learnt about the ideals of what a 'boundary

riding' 'sustainability researcher' would be in a trans-disciplinary team. CRI researchers gained Research & Development status through the development of technology or tools from our research. Meanwhile, I advocated for an understanding of social processes, (action learning included) to be understood as social technologies. Relationships between universities and CRIs were rearticulated through research funding processes and related collaborative ventures, peers working together (or not), and PhD supervision arrangements. Distinctions between policy, research, and practice were blurred and rearticulated, through collaborative implementation of sustainable (or social, or youth, or economic) development as well as through funding contracts (asserting end use is done by an 'other' to research), through articulations of principles of doing community based research, and through persistent framings of science and social science that separated the natural world from the social.

Work developing or advocating alternative frames of nature-society occurred through some Mātauranga Māori research approaches and analyses of the epistemological foundations of science, planning, technological development, and social science. This work was resourced through FRST funding of social research in larger science programmes as well as through funding of sustainable development implementation research and policy. Support for research developing alternative nature-society frames also came through university-based enquiries funded through the TEC and through MoRST support of He Waka Tangata initiatives.

In the context of this dominant framing of nature-society, theories of knowledge as separate from action were also privileged. However, the central government's investment in sustainable, development-focused research and programmes did create a number of spaces through which these theories were questioned and alternatives attempted. The importance given to networking practices across business, policy and community settings during this time allowed for conversations about theories of change and the limits of growth to emerge in professional settings where they had previously been isolated to informal, subversive or academic critiques.

The integrating, participating, implementing sustainability researcher was co-constituted along with the market for carbon and the standardisation of practices of government's engagement with community organisations (among others). In doing

so, sites for the production of knowledge diversified and new political actors have emerged, such as water, carbon, a meeting room in Otara, farming advisers, professional community workers, contract researchers.

7.11 Summary

The sustainable development project re-presents relationships between nature and society in order to create well-being of people and the environment (however this may be understood). It forces the objects and subjects of science and social science to be rearticulated. This is one of the goals of action-learning practices as narrated through environmental management discourses and practiced through CRI and other applied social science settings. However, collaborative approaches to learning are also practised as ways of gaining strategic influence, re-directing state investments, and diversifying participation in local government planning processes, not all of which may be in line with the aspirations of those promoting sustainable development. Through practices constituting sustainable development, science and social science have been co-produced. New actors such as translators and end-users have integrated, networked, separated, and re-inscribed nature-society relationships into integrative buildings, carbon markets and landscapes.

It is no longer useful to understand co-learning simply as a process to be facilitated by social researchers. Co-learning is an opportunity that arises out of a range of everyday, policy, research, business, farming practices that can be leveraged through social science in order to be part of shaping what becomes through those performances. Thus the challenge for social science, as Latour (1990) suggests, is selecting the sites for engagement. In doing so the social science of co-learning is no longer just instrumental and normatively framed (how co-learning can and ought to be done, when, and where). Social science has now become more interpretive and critical. The passion or engagement with the world that many once feared from such intellectual endeavours has not been lost; indeed it is now much more strategically positioned.

Making social knowledge and making possible different worlds had been enabled by building individual and collective capabilities and capacities. It was possible to shift from doing purely representational to representational *and* performative work. This

was made possible by understanding that Sustainable development cannot be negotiated a priori. Sustainable development is constantly negotiated, making visible things that count. Social science became an actor, making spaces for negotiating a broader range of subjectivities, socialities, circulating categories, at work in and across sites. Situating knowledge enabled this achievement for social science.

Chapter 8

Conclusion: towards enactive social science

While we might feel love for other earth creatures and want to accept a responsibility to care for them, might we also extend our love to parasites, or inorganic matter, or to the unpredictability of technical innovation? And might not an ethics of attunement to vibrant matter produce a more sensitive, experimental mode of assembling within the 'jizz' of our living environments? (Gibson-Graham, 2011, p .4).

8.1 The becoming of a refreshed social science, a goal partially achieved

The goal for this PhD research was to experiment with ideas, encounters, and relationships in ways that would encourage emancipatory development pathways for New Zealand's people and environments. I adopted an approach that deliberately eschews dichotomising representations of the world or the greater financialisation of nature in the name of participatory democracy (Harvey, 2007; Escobar, 1998). My aim was to avoid narrowing the possibilities for sustainable development. Instead I sought to enliven social science so that the politics of development could be more intentionally navigated (Carolan, 2009).

It is difficult to claim demonstrable success against these objectives. They are about opening a world of possibilities rather than meeting pre-set targets or demonstrating material effect. Nonetheless, there is good evidence not only that I and several of my fellow travellers have learned to be affected (see, for example, Lewis et al., 2013b) by this work, but that at particular moments and in certain spaces my enactive PhD research enabled me to participate in and indeed foster enlivened socio-environmental research practices influencing the knowledge generated. More importantly, the enactive research in which I embedded the thesis project (strategically and/or opportunistically and/or incrementally) has opened possibilities to know and do social science otherwise, and worked to keep open others. Over the 7 years since I embarked on the PhD journey I have co-produced social knowledge

from and beyond the specific science oriented projects[37] I was funded to work on. I have drawn from these knowledge making encounters insights that have helped me to develop nascent understandings of co-learning into maturing conceptions of enactive research and to apply these in my work as a social scientist in Landcare Research.

8.2 The strategy in review: enacting spaces for refreshed social science

The PhD project and the analysis developed in this dissertation emerged from an exploration of co-learning in actual spaces in which I was engaged formally as a social scientist to perform the co-production of social science and sustainable development. My institutional work in these spaces allowed me the opportunity to foster a lively dynamism in the co-constitution of the doing of social science and the becoming of sustainable development. The coalescence of strategic, collaborative, critical, and creative knowledge-action and relationship-building practices released the enactive potential of social science thinking, the potentiality of sustainable development practice, and the generative potential of bringing them into relation. Through three narratives, intellectual, institutional and personal, I presented partial but situated accounts of performances of sustainable development research and the possibilities that they generated.

These partial accounts offer a framework for thinking through and writing about the production of nature-society knowledge that makes a world of difference. Importantly, they are not designed to represent in full, capture and close-off the performances that they narrate. There is no effort to detail all that was occurring, or all that was assembled or enacted; or to predict how the events, data or content will be detectable at any other time or place. Rather than thus failing to present a complete and truthful record of the world, they narrate it as it really is – open, emergent and full of encounters, glimpses, possibilities, and challenges that cannot be captured within a single frame or bent to a single aim. Doing and knowing in this account, as they were in the sites where I worked recursively constituted and always incomplete.

[37] Low impact urban design and development; How ONAC works, Knowledge networks responding to climate change, Magnetic South

The conceptual and narrative challenge of accounting for, authorising, and giving purpose to this enactive approach is no less than that of rewriting, and re-living, 'the master story of western culture' (Head & Gibson, 2012, p. 710, citing Plumwood, 1993, p. 196). The urgency introduced by the content of these encounters (doing sustainable development) gives this challenge an added immediacy in the anthropocene (Gibson-Graham, 2011). This is indeed a grand challenge, to which this dissertation has responded and a refreshment of social science doing sustainable development was achieved partially or momentarily. Helpfully, however, the burden of expectations imposed on researchers by this approach is not that of producing a faithful representation of the world that can then be enacted more or less un-problematically by others who are assumed to be able to change things (as is the case with normative frames of co-learning). Rather, it is to engage ethically and helpfully, to foster potentiality, and to help others to learn to be affected.

Constrained by personal, organisational, and inter-organisational capabilities for knowing-doing an enactive social science this dissertation makes - out of necessity (rather than of failure) - a partial contribution. It is written by a professional social scientist working in settings where some of the sophisticated use of language (metaphor and character development) that sustains poststructuralist concepts and gives its theorising its elegance is foreign. My narratives are relayed in a language that slips between this elegance and the more grounded accounts required in enactive performance. This is in the most part purposive, but at times reflects my own on-going struggle to find styles of communication that extend the conceptual and relational openings and possible enactments of hybridised nature-society conjured up by post-structuralist thinking to the rooms and moments where enactive potential might exist.

The sites, research practices, and actors discussed in the chapters above did not always lend themselves to telling the most persuasive story possible for a refreshed social science. I have said little about the large, highly public co-learning initiatives that were taking place in New Zealand at this time and that might be subjected to a more conventional analysis of success/failure (the land and water forum or the development of national and regional environmental reporting systems). Instead I have focused on those sites where I have been working and the more mundane

encounters that I have experienced. The point of this focus is two-fold. First, it gives my narratives a more situated authenticity, and opens access to much more of the detail of rooms and moments. And second, it helps to make the point that potentiality lurks in unexpected places, in the situated possibilities of enactment, and especially in enactive engagement. These two points are of course mutually reinforcing. They lead me to suggest not only that the potential for enactive social science is highly dependent on the formation and maintenance of relationships (discursive and material, institutional and inter-personal) between colleagues working with similar knowledge-action ethics, but that individual researchers have agency to affect/effect change. The challenge remains one of judging whether either by being too close to these encounters or by being unable to reflect upon them at a distance, I have missed opportunities or that I have had effect/affect. As with my struggles with language, there is incompleteness here, an on-going project, but also openness to further co-learning and methodological and episto-ontological consistency.

There is also a hopefulness that is also consistent with the who, how, and what of this research project. This specific enactment of knowledge-action about the work of social science through a CRI in New Zealand was possible due to my enrolment as a PhD student and also through my paid work as a social researcher. As we have seen, this meant the knowledge production was situated across conflicting discourses, organisational arrangements, and practices and thus could have taken form in a great variety of ways. My hope is that when inter-organisational relationships are refreshed across CRIs and universities (for example through a joint summer school, or collaborative writing ventures, or PhD supervision), and when these are focused on understanding how we are coming to be (know-act) New Zealand (that is the evidence, technologies, and relationships that shape what is or is not possible in New Zealand), we will see investment in more diverse possibilities for streams, carbon, and networks making collective identities.

8.3 Co-producing social knowledge for sustainable development

It is now clear to me that the challenge for both social science researchers and sustainable development practitioners (as well as their respective advocates) is to continue to know the world differently, and to develop ways to do this. Social science

can offer insights into individual and collective agency, investment and knowledge trajectories, processes of social transformation, and the organising of action. Providing accounts of the changing social world, thinking about these changes in new ways, and studying the implications of these changes for knowing, organising, and doing, social science can also support innovation in society's knowledge of knowing-doing the world. Of course social science may well study the making of social knowledge as one dimension of the changing social world in precisely these terms, as this thesis has done.

My accounts of social science research in New Zealand suggest that its potential is far from optimally developed and more could be made of it to support innovative practices in knowing-doing better social worlds. The heuristic device below (Table 4) populated with examples discussed in this thesis, offers some practical guidelines to support future investments in social science for sustainable development in New Zealand. The Table identifies three domains of practical value for social science and highlights how these are approached through science funding in New Zealand, from the agencies supporting funding, to the conceptual frames used to understand the domain and the challenges they pose, to the approaches expected by funders and deployed by researchers, to the research questions asked.

As well as providing an encapsulation of the New Zealand landscape of social science as it might be viewed from my research position, the Table helps me to make five points about the value of this research. First, the Table is built around the observation that current research-policy-practice investments tend to address only boxes a) and b). These investments address approaches for managing or operationalizing individuals based on how people and their activities are currently known individually and in response to how these activities are currently collectively organised. Investments of this sort do not address knowledge and practices which are emerging that might change how individuals and social groupings become identified and organised. This represents a suboptimal approach to investment. Rather, my research suggests that investment in the third element, which addresses the relationship between epistemology and ontology – how our knowing of the world is shaping what might be done in the world - is essential knowledge to generate the innovation required in social knowledge for life in the anthropocene.

Second, the Table draws attention to current and potential ways to name and resource epistemological-ontological work. It does the unusual work of emphasising the relations among the how, what and the who in a map of a research landscape. In so-doing, it once again highlights the extraordinary partiality of our attempts to understand social worlds and the necessary incompleteness of any effort to map research capability over prioritised problem space let alone the full scope of social space. Third, in so-doing it emphasises that priorities must be set, but that social science capabilities can be imagined and organised differently, indeed potentially more productively. Fourth, and relatedly, using this device draws attention to collective thinking about particular types of questions, how different questions enable different types of initiatives to be undertaken, and how thinking differently might elicit further innovations in thinking and practice. And finally, Table 4 is a versatile heuristic device. It could be used in other contexts, with other content under these headings, to help broaden and deepen how social science capability is resourced. In other words, this research can transcend its situatedness and reach out to other enactive research settings.

Table 4 Framing, resourcing and organising social science contributions

Contributions of social science to the world	Social research focus	Current organising	Conceptual frames	Approaches	Research questions
A)Shapes what individuals do	Individual activities	MAF/MPI contracted research to CRI or consultancy	•Tech transfer •Policy analysis •Behaviour change	Survey of a representative sample of population Evaluation of information provision programme Place-based study of change over time Multi-method study of specific practices and communities of practice Model policy levers for achieving co-benefits from behaviours	How are practices shaping landscapes changing? How to increase use of feed pads on farms
B)Shapes how people collectively innovate or create changes in society	Theoretical frames organising activities	MSI funding of cross-discipline, multi-stakeholder programmes	•Institutional change •Entrepreneurship or business innovation •Organisational or community development •Eco-systems •Catchment dynamics •Multifunctional landscapes	Case studies of innovation techniques across organisations	What will it take to make NZ a leading healthy nation in 2050? How do companies or research projects innovate to meet market or end-user requirements for sustainability? How can we create an ecosystem of experimentation across social and ecological sciences? What are the co-benefits of specific policy instruments?
C)Shapes how societies understand how they change	Knowledge of knowledge making processes and implications.	TEC funding of University research	•Knowledge innovation	Situated theorising through an ecosystem of experimentation linking social scientists in CRIs, universities with government and private sector thought leaders	What happens when we change our knowing, doing, organising? How is value being created and protected? What if the naming of emerging (CRI) knowledge spaces was informed by more than one social theory? How is natural capital research shaping possibilities for rural-urban governance?

8.4 A refreshed social science through Landcare Research

Landcare Research has significant influence on land management in New Zealand through its provision of science and involvement with decision making, through its development of professionals who are highly active in understanding and protecting their landscapes, and through the creation, maintenance, and protection of values and norms for land and its uses. This dissertation offers Landcare Research ideas that might enhance capacities for achieving mandated land outcomes by creatively and critically addressing the institutionalising and representational work of the company, as well as the specific social science practices it supports.

More specifically, the research should give the organisation some surety about its social research capabilities and its potential to foster research innovation internally and to exercise leadership in innovative social science externally. The work is a culmination of many moments of co-learning, emerging from planned and unanticipated encounters with others and has pointed to the value of the relationships that have been built through it, as well as the value of relationships more generally that may be generated in its research but lie as yet unrealised. The research and the mapping technology of Table 5 offers an approach to mapping other research fields that might also benefit from a critical evaluation of the 'who', 'what' and 'how' of their work, especially when placed under the scrutiny of an overall questioning of their 'why'.

A discussion across the Senior Leadership Team, with specific project/programme leaders; with other thought leaders in the company and in its partnering agencies could generate a broader range of possibilities for the institutionalising work performed through the organisation. For example, Landcare Research's work standardising accounts of urban-rural, public-private, consumer-citizen and science-policy activities through its vast array of interactions (not just research projects) could be explored strategically to track how outcomes for sustainable land management are being achieved and/or negated.

The framing work performed by Landcare Research in representing problems, solutions, identities, nature, society, and places (at all levels and across roles: from the board, to the business managers, to the portfolio administrators and researchers)

could also be explored to build capabilities across teams and collaborations for working with climate, ecosystems, and species as multiple objects. This work, combined with the work above, would enable more strategic use of Landcare Research's practices of advocacy, stakeholder identification, and knowledge production, as well as allocation of social and non-social science funding.

Finally, writing the final versions of this dissertation has led me to focus on enacting possibilities through sites of co-production. These sites have become more multi-disciplinary and inter-organisational (due to political, financial, and intellectual interests in collaborative knowledge production and governance). Listed below are some of the engagements through which experimentation with enactive social science has been maintained. Each of these carries the potential for refreshed nature-society knowing-doing performances. However, each is also highly contingent on the relationships (across individuals, organisations, disciplines and budgets) to which they are a response. Table 5 hints at next steps, identifying flames (of knowing-doing differently) that are still ignited or which could be ignited once more. It points also to the value of the research in this thesis for setting a long-term research agenda that emphasises social outcome both as a corporate imperative in new worlds of research funding and as a moral imperative in shaping a long-term enactive research programme. This might be done alongside funding and research partners, but also might be done internally across research domains to build new mandates and capabilities for inter or even trans-disciplinary research.

Table 5 Traces of enactive social science extending beyond this dissertation

Year	Engagement – co-production sites	Refreshment- how the socials were addressed
2009	Providing ideas for how to evaluate activities of the Hikurangi Foundation	We looked at how people were understanding agency and their capabilities for acting
2010–11	Developing analysis and frameworks with a colleague working in a programme titled 'Old problems, new solutions: integrative research supporting resource governance'	The analysis of knowledge-practices for governing water helped inform my colleague's positioning of her work and is traceable through her editorial in the eBook published from this programme
2011	Informing a bid to the Ministry for Business, Innovation and Employment from across CRIs and Victoria University to address climate change impacts and implications	The growing relationships and maturation of climate change social science across CRIs helped inform a successful bid for 4 years of integrated research. Emphasis was on situating the production of climate knowledge
2012	Creating a strategy (known as RURALS) to guide the Ministry for Primary Industries' investment in social science through the Sustainable Land Management and Climate Change programme	This was another opportunity to strengthen links across social scientists in CRIs and show how broader social change agendas can be addressed in alignment with climate change responses
2012	A workshop with senior staff in Landcare Research about social science contributions	The framework for thinking about social knowledge contributions (Table 4) was circulated. This helped colleagues think about social science for sustainable development as more than operational research
2012	A workshop was co-hosted with a policy advisor from the Ministry for the Environment to support policy analysts working in the natural resources sector to explore potential social science contributions to their work	This workshop circulated more diverse ideas of what social science is and might be and how the socials of the natural resource sector might be known and worked with
2012	Symposium with officials from Waterfront Auckland, Auckland Council and scientists from Landcare Research to address potential performances of the Wynyard Quarter waterfront development	Ideas were generated for making greater links to urban areas through current work programmes in Landcare Research
2013	A round table discussion held with people involved in banking and economic development and the study of these titled 'Deliberating Green Growth'	We practised holding a conversation via business, environmental management, and political economy discourses that acknowledged and upheld the object (green growth) as multiple
2013	Enabling methodological reflection across the Climate Change Impacts and Implications multi-disciplinary research programme	To develop some techniques for continuing this conversation in other sites we practised thinking methodologically together

8.5 A refreshed social science through CRI-University collaborations

This dissertation has refreshed the performance of CRI–university collaborations by extending the supervisor-student relationship through co-learning and re-situating the knowledge project. Siting this dissertation in the trajectory of the co-production of sustainable development knowledge has allowed it to bridge some of the boundaries between theory and practice with which more typical environmental management or political economy dissertations have struggled. This achievement has much to offer the current round of outcome-oriented science funding through the National Science Challenges. The Ministry for Business Innovation and Employment aims to produce robust, relevant, and publicly supported science for New Zealand. Key to achieving the goals of this process will be the formation of intellectual projects and relationships that are able to navigate competing institutional, organisational, and practice priorities. Enactive social science has much to offer this work.

Looking more specifically, this dissertation also shows how to enable the generative potential of CRI-university relations while achieving the different outcomes for which each is mandated. The potential for capability building and co-production of knowledge could be enhanced or generated through current practices of guest lecturing by CRI researchers, collaborative writing and writing retreats, conferences enabling professional development, and networking. Other possibilities are summer schools, supervision of social science PhDs and masters, internships, and more regular informal review both of proposed work and completed research.

8.6 A refreshing and enactive geography

Situated through geography at the University of Auckland I participated in experiments of scholarship and intellectual collegiality spanning institutional boundaries, Universities, CRIs and international geography departments. I found the discipline of geography to be a suite of affective concepts and practices and a conversation across highly talented and humble people. An enactive social science

situated *in* and *through* the geography discipline is now also contributing to political and intellectual projects. I found that geographical techniques helped to articulate histories, trajectories, absences and possibilities without over-representing or reducing these to be the only truths available. Geography is indeed becoming better able to support the making of ethical choices about what to practice, what to represent and what not to, where and when. Thus practicing geography has for me, become about shaping *how I, we* and *they* are becoming in the world and how the world is becoming through *me, them* and *us*. As Gibson-Graham (2008) assert, doing geography becomes experimenting with and through the relationships and the possibilities at hand.

8.7 To conclude

The transition towards more sustainable ways of living on this planet demands revised national and global knowledge production systems that align science and social science to address pressing social and environmental challenges. Situated in the new language of complexity, uncertainty, risk, and opportunity, new research, policy, and implementation practices are altering the balance of what is 'private or public', 'individual or collective', 'human or non-human', 'knowledge or action', and even what is 'science and social science'. This dissertation argues that a refreshed social science of sustainable development is being brought into being in and through the contested spaces generated when questioning the production of knowledge for public good. Stuttering, incomplete, and vulnerable to political, organisational and even epistemological shifts, it is nonetheless discernible in the New Zealand context. Key to this emergence is a shifting focus of knowing-doing away from embedding pre-existing representations of socials and nature to the assemblage of categories (for example urban, climate, end-users, and case studies), relationships (for example networks, systems), and sites (for example rooms, farms, science). New categories of knowledge and knowledge producer are being performed, new relationships formed, and new practices fashioned. The making of sustainable development in New Zealand requires us to keep open possibilities for how we might know and do New Zealand. Enactive social science, attentive to the politics of closing down and opening possibilities, makes a significant contribution to this intellectual and political challenge.

Appendix

Presented below are texts produced for publication from each of the research projects discussed in the core of this dissertation. They are presented as artifacts produced as the thesis research developed. The aim of including them is so the reader can become more familiar with the research projects discussed, and how these research projects were represented. The reader's attention might be drawn to where and how practices of representation fixed people, places ideas and re-produced dominant constricting categories and identities of sustainable development and social science. Alternatively the reader might recognise something of themselves or their work in the narratives and consider what other stories might be told of the co-constitutive work that was occurring. A sense of a learning journey is expressed. This journey was of course not a linear progression, there were points of slippage, and un-learning, some of these have been identified and discussed in the body of the dissertation. All papers are approved for reuse (noting original source) in an academic thesis without gaining written permission. References used in these papers are included in the final reference list.

Artifact 1) An entry into co-learning via story telling in Otara

The text below is from a book chapter written with Jennifer Margaret and Robyn Allpress, published in 2007. It is included as an artifact because it shows co-researchers sharing with peers an ethic and method of doing community based research. It is an example of a representational politics at work at a moment when community development and sustainable development were being re-imagined in relation to economic development. As discussed in chapter 5, this artifact presents an approach to knowledge-practice focused on creating empowerment through narrating alternative histories.

Title

Greenaway, A., Margaret, J & Allpress, R. (2007) Soalaupule - The Sharing Of Power: Reflections on Community Initiated Research. In A. Williamson & R. De Souza (Eds.), *Researching with communities*. Auckland, NZ: Muddy Creek Press.

Abstract

In October 2006 the Otara Network Action Committee (ONAC) initiated a research project to reflect on and document 'How ONAC works'. The project initiated on the basis of the 'Otara principles' was designed to ensure the first beneficiaries of the project would be people from Otara; that the project was owned by ONAC; that it would create opportunities for growth and development of people in Otara; and that people in ONAC would be empowered through the process of the research. An external researcher was invited to be a part of the team leading this project. What transpired was a fascinating multi layered reflection process that gives insight not only into community networking but also the way people build knowledge together.

Introduction

This chapter tells the story of a community initiated research project in Otara, Aotearoa New Zealand. The story is told part way through the research, by the three co-researchers[38] leading the research. We present our reflections through the first

[38] Informed by methods of co-inquiry and action research (see Bray, 2000 and Reason & Bradbury 2001)

person plural personal pronoun (we), breaking out of this collective voice through use of quotes of individual researchers. This enables us to speak collectively and as individuals. Quotes from individual researchers also reveal the positionality of each researcher involved in the project, particularly our shifting insider/outsider positions (Denzin & Lincoln, 2000). We have also woven in voices of participants (and a non-participant) of the research. The act of seeking out participants views about the research aided our reflection on the process, and provides examples of our methods of reflective research (Wadsworth, 1998; Ledwith 2001; Denzin, 2003). Our aim is for you, the reader to get a good sense of not only what we've been doing but some of the ways we've thought about and cared for the research process. We begin by introducing Otara, the reasons for the research and a bit about who we are. We then focus on the research steps taken and some of the ethical concerns we've explored. Underpinning this story and our research practice is a wariness of extractive research (Chambers, 1983); this informs our attempts to foster reciprocity through research (Spoonley, 2003, p. 56).

The Otara Network Action Committee

Otara is located in Manukau, New Zealand's most ethnically diverse and fastest growing city. Otara exemplifies the city's demographic trends - 42% of population is below 20 years with high populations of Maori (20%) and Pacific peoples (63%) compared with the rest of the country.[39]

Otara has a vibrant community that struggles with low incomes[40] and inadequate investment in the area (see Rankine, 2005). People are supported by a long history of community building practices, strong community identities and pride. External perceptions of Otara are mainly derived from the mainstream media in which it is most commonly portrayed as an impoverished and often violent place. However perceptions of Otara are shifting as more stories are told of a community with a positive vision, actively engaged in initiatives to create and maintain it as a safe and great place to live.

[39] National figures are Maori 14.7% and Pacific peoples 6.5%. Figures for Pakeha (NZ European) are Otara 21%, national 80.1%. 2001 Census, Statistics New Zealand.
[40] The median personal income for people in Otara is below that of Manukau City and New Zealand (source Statistics)

Otara has strong community networks. Monthly meetings of the Otara Network provide a forum for information sharing for community members and organisations, local government and social service agencies. The meetings are overseen by the Otara Network Action Committee (ONAC) which has been in existence since 2000.

ONAC formed out of a strong desire from people active in Otara for self-determination and control of resources and projects. These aspirations were generated from experiences of external organisations and agencies holding on to power by using resources and operating in ways that did not acknowledge or respect people's wishes, for example poor or no consultation, projects and research that were of little or no benefit to people living and working in Otara. Residents and people working in community organisations in Otara wanted to change this dynamic; to work with Council and government agencies as equal partners.

ONAC is made up of representatives of community groups and agencies plus individual residents who attend the Otara Network. These people all hold a vision of how they would like Otara to be and are passionate about working for the best interests of the Otara community. Anyone can be a member of ONAC and the meetings are open. Membership changes constantly though there is a core group of thirteen people. Because of its open and flexible membership, sub-groups are formed to work on specific projects and issues such as economic development, community information technology and youth issues. The sub-groups work with the external agencies / organisations to progress action and report back regularly to ONAC.

> *There are three key dimensions to ONAC's work - overseeing community projects and initiatives, community action and strategic planning. ONAC has developed the Otara Principles (appended), which outline the values that are important to the community. The Principles are provided to external organisations as a basis for relationship building and are constantly referred to by ONAC internally. It is because of the strength of the Otara Network and ONAC that projects funded from a range of sources have come to Otara in recent years* (Key informant 2006).

Reasons for the research

After six years in existence ONAC had created a considerable body of community development knowledge and practice. There was a desire from within the group to record ONAC's story to date as a resource for the group and for other communities both within Aotearoa and overseas. It was thought that the process of telling ONAC stories would help to build a strong awareness amongst members of the history of ONAC, plus it would help to share what people have learnt with other communities looking to address issues in a similar way[41]. But who could do this research? The people most likely to were bound up in the work and too close to the action. It needed to be someone with the research skills who could look at things with a clear fresh eye and most importantly work well with the Otara people. The person to do this work required a style of working and values that fitted with the 'Otara Principles'.

Three members of ONAC, Robyn, Jennifer and Nita, were looking for ways to appropriately meet this desire. Robyn is a Community Advisor working for local government, Manukau City Council, in the Otara community. She has a coordination role in supporting ONAC and the action and projects that are undertaken by the group. Jennifer has a community liaison position at Manukau Institute of Technology, a tertiary education institute located in Otara. She began this role in 2000 and has been a member of ONAC since it was established. Nita works as the Injury Prevention Coordinator for Otara Health Inc., a primary health organisation, and has lived in Otara all her life. She joined ONAC in 2002 as part of the Otara Digital Opportunities Project.

In September 2005 Jennifer talked about ONAC with Alison, a researcher with Landcare Research's Collaborative Learning Group. Alison has a long standing interest in community development and social change and she thought there was potential to do some research relating to community networks and sustainability.

> *I discovered they had an interest in documenting and sharing with others how they operate as a committee that coordinates action initiatives for a community*

[41]Our thinking was informed by our understanding of community story telling (see Ledwith, 2001) and process evaluation (see Lewin, 1952)

> *network. I was told of the achievements of this group and their recognition that they had learnt some important things about working as a group and facilitating a network of people attempting to improve their community. At the time I was looking for an opportunity to use some government funded research time (FRST: Building Capacity for Sustainable Development) to undertake an empirical study of community networks and capacity building for sustainable development. It seemed a good fit* (Alison).

After the initial conversation, Jennifer talked to Robyn and Nita about this possibility and introduced them to Alison at the National Local Government Community Development Conference in September 2005.

Research relationships

Robyn, Nita and Jennifer took on a role as go-betweens establishing and holding the relationship between ONAC and the external researcher. The purpose of this group was to work alongside Alison in shaping and undertaking the research process. The first step in this was having the research process and the sub-group mandated by ONAC. Because of their familiarity with ONAC's way of working the members of the sub-group knew the appropriate way in which the mandate for the research should be obtained.

In November 2005 Alison attended her first Otara Network meeting to get a feel for the community, its interests and issues.

> *I sat in the back row for the two hours and said nothing apart from adding my voice to the common 'Amen'. Over tea I said a few hellos and was aware that subconsciously I was adjusting my posture and tone of voice in an attempt not to look like a 'Naive Journalist' or 'Wellington Bureaucrat' (perhaps the only two characters likely to get a colder reception than an 'Ivory Tower Academic'?)* (Alison).

The idea for the research was also discussed with key ONAC leaders in November 2005 at an ONAC meeting without Alison.

> *Within Otara there is a great deal of fear / suspicion of research because of previous negative experiences which have included lots of 'bad press' and processes which haven't honoured what has been shared by the community (people taking but not feeding back). We knew therefore that this could mean some resistance to the idea of researching ONAC and particularly to Alison coming in as an outside researcher* (Robyn)

The research and Alison's role needed to be presented, discussed and accepted at an ONAC meeting. A key factor in it being accepted was that a number of the core members of ONAC who are trusted by the group were suggesting and supporting this process. When Alison was introduced to ONAC at their monthly meeting there were no major issues raised about the research at this meeting because Jennifer, Nita and Robyn had already held discussions with many ONAC members so they had an understanding of what was happening.

Jennifer discussed how she knew Alison and how the research idea had come about. Nita and Robyn both talked about the discussions of the sub group and made clear the idea for the research was driven by ONAC members, rather than Alison, and the sub-group would be guiding process. It was made clear the research would be beneficial to the group.

People asked how Alison was funded, and what her employers and funders would want the research to be used for. Other questions were 'Who would access the information given and the results published? What professional supervision did Alison receive and what structures did she have in place for dealing with ethical issues and considerations of the power dynamics in research?[42]' Ownership of the research was discussed as well as ideas for how to manage the process of the research. People expressed wariness of being researched and frustrations with how researchers had operated in the past. The sub-group responded to these questions. Alison didn't get to talk at all through this discussion and the mandate for the research was given.

[42] These questions were informed by public health and social work discourses as well as an analysis of colonization and the emancipatory potential of adult education.

> *I recognized how important it was for these questions to be openly addressed, the discussion helped me realise how aware people were of the possible detrimental implications of research. Whilst I had come prepared to face these challenges it was great to have the support of the others stepping in to deflect them* (Alison)

It was important that the research questions and the process (what we are doing and why) were simple and that all the sub group members could explain it. This was both about ensuring participants could understand what it was about and reflecting the community ownership of the process. This was a new type of research being done in Otara. ONAC had asked for it and was completely involved in determining the way the research would happen and the ownership of the material.

> *It was important for the sub group to reiterate why the research was happening and what it was about each time we talked about it with the community* (Jennifer)

In subsequent ONAC meetings new comers would ask Alison 'what are we going to get out of this research'. Jennifer, Nita and Robyn would respond, asserting it was an important opportunity to reflect on their work. Alison supported this by stating what she could offer was to help create space for reflection and document what came out of this reflection. Storytelling and oral history are embedded in the practices of ONAC so there was already strong appreciation of this way of working.

Designing the research

Once the mandate had been given we began working together as co-researchers. Jennifer, Nita and Robyn would set the agenda for the sub group meetings, which at the start, were held in the Tui room in Otara (ONAC's usual meeting room). Alison filled the role of suggesting research tasks and methods. For example it was Alison who suggested we do workshops followed by interviews and feed the analysis back to people through a concluding workshop (informed by ONAC's ways of working plus methods of co-inquiry, action and qualitative research, see Spoonley, 2003; Smith, 1999; Bishop, 1996).

The research design emerged out of our initial conversations identifying each other's needs and expectations. We realised the overarching research question was How does ONAC work? It was the processes people wanted to focus on rather than documenting what ONAC does. We also came to realise that we were not at this stage asking the more evaluative question Does ONAC work? We were proceeding on the basis that ONAC does things that the people in ONAC think are worthwhile. This was a good starting point for building a common understanding amongst ONAC members of how those things had come about. We recognised that building a common story of ONAC's processes of operating and relating would be a useful first step for any future evaluative inquiry into the impacts of what ONAC does (see Greenaway & Witten, 2006 for discussion on the role of evaluative research for community projects).

The principles behind this research

There are underlying principles to the way ONAC works, which are documented as the Otara Principles. These formed the basis for the way we worked on the research together. In particular it is important that people in Otara are the first beneficiaries of the research. Otara provides the base, the motivation, and the commitment to its projects, therefore the people of Otara should benefit first and foremost from the outcomes. We are all very cognizant of the power that research can have representing people's experiences. So it was important for us that the control of the project sat strongly with members of ONAC and that the ownership of the research was clearly defined from the outset.

We were also aware of the opportunities for growth and development that could arise through the research. The primary motivation for this research is the empowerment of ONAC by creating space for critical reflection, learning and skill sharing about the processes ONAC has developed for working together.

> *It was important to do this research to better ourselves and our community, and to be seen as an example for other groups and communities to follow. ONAC is an important voice who will speak for the community. We need to know whether it is working and whether our goals are being achieved. ONAC*

> *members are leaders and we are accountable to the community* (Tai – participant).

Another key consideration in designing the research process was how it would impact on the group. We were particularly aware of how we needed to be able to allow tensions / conflict and painful history to be acknowledged in a safe way. Awareness of this influenced how we structured the workshops and the language we used for questions. It was also important to ensure participants felt control over what is shared publicly.

Flexibility on the part of both ONAC and Alison's employers to negotiate deadlines and outputs has been important. Linked to this is the appreciation that this research needs to be productive in a number of ways. We realised we need to show people in Otara, Landcare Research and FRST the benefits of the research immediately through the workshops and the research process, through the final reporting process and eventually through a published paper.

The process of legitimising the research and maintaining integrity of the co-research relationship has meant that we have all taken care with how we present the research to various audiences. Alison is also undertaking PhD research at the University of Auckland. When discussing the research with work or University colleagues, Alison makes a point of emphasising the shared ownership and co-research relationship.

Undertaking the research

Our research is designed to enable people to tell stories about ONAC and reflect on the processes and relationships that are important to ONAC. This meant we wanted to use a mixture of techniques to enable people to talk in a group as well as individually. The research design included three workshops, some document analysis and open ended interviews. A prime consideration in this design was to use activities that ONAC people are familiar with, that draw on ONAC's way of working together, and that would not take too much time to organise or participate in.

We started with two workshops. The first was designed so people would tell their own stories of how they got involved with ONAC. It focused mainly on engagement with ONAC – what motivated and enabled people to get involved and then what kept

them involved. At this workshop we put a large timeline up on the wall of the Tui Room so that people could write on it when they got involved and the various projects they have been involved with. This timeline has been left on the wall of the room and over the months people have slowly added to it.

> *The first workshop jostled our memories of what ONAC had accomplished. By listening to everyone talking, we remembered what had been achieved and how we had been involved. We discussed how we grew from each project. It was very positive and we need to do this more often* (Debbie – participant).

The second workshop focused more on the collective stories of ONAC, looking at the roles, relationships and rules that have developed to form distinctive ONAC ways of working together.

> *The process has been slow and the two workshops have been held a number of months apart. The timeframe has stretched out further than originally planned (we have already extended past our initial deadline of 6 months) but I don't think this is a problem, more of a luxury. It is giving us time to think about the results of the workshops as we go. We're in no hurry. Already some of the material has been used in a presentation to a Regional Networking Forum in Auckland. There is also interest in the results of the research from other organisations such as Manukau City Council and the Community Sector Taskforce* (Robyn).

The research is currently at the phase between the second and third workshops. Alison has undertaken eight semi-structured interviews with a range of people with different connections to ONAC. She interviewed people who have been involved in ONAC quite intensively but are not currently involved, people who support ONAC but are not directly involved and then people who have had difficult relationships with ONAC in the past.

It has been valuable to hear from those outside of ONAC who represent a variety of perspectives on ONAC. Alison as the external researcher has conducted one to one interviews. This provided a less threatening opportunity for people to reflect on ONAC than if ONAC members had done the interviewing themselves.

As stated above there are very strong principles shaping the ethical stance we have taken for this research. We ensured the research design meets not only the University of Auckland's ethics committee requirements but also the requirements of ONAC's principled way of working. In doing, so we have questioned notions of maintaining confidentiality in research. The co-research relationship has meant members of ONAC (Robyn and Jennifer) have access to the interview transcripts and notes.

> *This is unusual as a process because Robyn and Jennifer are 'players' rather than impartial observers, and I have to note that clear definition of roles is one of the issues around ONAC's operation. However, I am willing to roll along for the wider aspiration of better functioning* (Anonymous).

Some of the interviewees had difficulties with the co-research approach to gathering and analysing the data and queried the legitimacy of the research.

> *I would like to participate however on some reflection this is not appropriate seeing this research is not confidential and could in fact affect the validity of the findings as people not just me may have to 'temper' a response to some of the questions hence honest feedback may not be forthcoming* (Anonymous).

Our response was the research gains legitimacy by having both internal and external researchers developing themes and analysis from the interview data. We have weighed off giving interviewees a chance to express their opinions to a 'neutral' listener against ownership of the representation and analysis process.

Deciding who to involve in the research

We had lengthy discussions about who to involve at different stages of the research process. ONAC is an open group but we decided that for the first two workshops it was important that it was just those who had been involved for a long time who participated. This allowed for more depth in the discussions as people were working from a shared history. There was some questioning of this by ONAC members who weren't invited to participate in these stages. They accepted the rationale when learning that the third workshop will be open to everyone so that all members will have an opportunity to participate in the process. Communication about the process

and progress of the research in ONAC meetings has been important to ensure everyone knows what was going on.

The value of an external researcher

The two workshops were designed by the sub-group and Alison. The group has looked to Alison to provide guidance and facilitation. She recorded (on a digital recorder) the discussions with permission of the participants and then wrote up the discussions. The style Alison used in leading the workshops has been very low key and allowed plenty of time for discussion and participation. While there was structure to the workshops there has been plenty of time and opportunity for everyone to contribute and enlarge on themes and talk about experiences. Alison was very empathetic to the community and open to its way of working. While having an unobtrusive style, she has known when to step in and provide guidance or move things along.

> *We accepted Alison because she came in with a different approach. She's come in with us, explained why she's there. She doesn't push her way in* (Yvonne, research participant).

> *Alison doesn't talk in 'research speak', keeps things simple and makes use of a framework that allows full participation. It's all about the group and they have been having fun* (Robyn).

> *For us (the sub-group) the opportunity to have an external researcher work with us is great. It has ensured we give time to talking about our processes, so the research didn't keep dropping to the end of the to-do list. Alison has brought research skills. She has distance from the group and a fresh perspective which has been valuable to our reflective process. Having her facilitate the workshops meant we could fully participate, which was important to us. Also, Alison's skills and experience in community development has meant she has contributed to our reflections and group process beyond the scope of the research* (Jennifer)

The benefits of the research

Our meetings as co-researchers have been a place of learning, analysis, reflection and have contributed to building all of our skills. In terms of the research itself, stepping back from the day to day running of ONAC and reflecting on the group has been really valuable. We can see a number of benefits from the research to date, for example the group building and strengthening.

> *The research has generated enthusiasm for and commitment to ONAC. It has been celebratory whilst also addressing some of the hard issues we have not been able to clearly focus on in the past. The research has created a degree of honesty that has been healing. We have had a chance to talk about our differences and still stick with it* (Jennifer and Robyn)

> *ONAC has been going for seven years and is the steering wheel of everything that happens in Otara. It's good to stop and look back, see if we've made changes and where those changes have been* (Yvonne- participant).

Working as co-researchers

Nita had a change of employment and in her new role could not continue to be involved in the research sub-group. The three remaining co-researchers for this project are all Pākehā[43] women in full time employment. We have regularly reflected on our positions with this research and why it is that we are the ones making it happen. Some common skills and perspectives we share are linked to our being Pākehā women who acknowledge our colonial heritage. We also share an approach to our work that actively seeks to recognise and reconstruct the power relations that shape our work and lives. In addition, we are practiced at operating reflexively and value reflective practice. We have found this project both refreshing and fun and are interested by the multiple layers of reflection with which we have been engaged.

We are just over half way through our community based research process, thus we close this chapter with some final reflections as opposed to a conclusion. Our research process is a work in progress based on knowledge and experience drawn

[43] Colonial descendants

from many fields. We have focused on the attention we are paying to building research relationships of reciprocity based on ONAC principles. We have been able to create a space for fun and critical reflection on ONAC. This chapter outlined how we have incorporated integrity, clear principles from which to work, flexibility, creative insight and appropriate ways of meeting people's needs. In writing this chapter we created another space for reflecting on the research. We feel very privileged to have the time and space to do these many layers of reflection. This privilege (which is also an expectation from members of ONAC) is partially due to our common identity of professionally employed educated women. We continue to actively examine the limits to which this shared identity enables or inhibits learning across cultures.

The strength of our process is also in the levels of co-learning we are engaged with. We are the first to admit that we, the three women involved in the sub-group leading this research, are the ones who are currently benefiting most directly from the research process. However, what we have found is the learning process extends beyond the research project into ONAC and other community and research projects we are concurrently involved with. Thus we are achieving far more than documenting and sharing stories about how ONAC has worked in the past. As we learn together and share this with our networks we are gaining insights that shape how we act in community today as a community of practice (Wenger, 1998)

Next steps in the project

We have just completed the interviews. We will undertake some initial analysis together as co-researchers and then develop the analysis further with the participants of the third workshop. We are still developing ideas of what the 'final report' might look like. Our aim is to produce a report that can be used for a number of purposes and for different audiences. We want an active useful resource that can be used for giving presentations, background papers etc. A range of media will be used so the resource might include photos, slices of interviews, music, artwork as well as written documents. The report will only represent the ONAC story to date so it needs to be stored in a way so other chapters can be added – e.g. a record of the projects so far,

community issues and actions, copies of submissions, histories of people and community groups involved in ONAC.

As well as creating this resource there is a need to think about ways to integrate research into ONAC practice and to take action on the ideas that have come out of the process e.g. ONAC's approach to external relationships, and considerations for interaction within the group. This might take the form of discussions about some of these areas within the third workshop as well as establishing a regular (bi-annual or annual) reflection process for ONAC.

The process has already produced useful discussion for the group and some valuable insights into ONAC's approach and position. It has also led to the creation of resources and opportunities to share the learning, a key one being a presentation Nita and Jennifer (supported by other ONAC members) made to representatives of eighty community organisations at an Auckland City Strengthening Networks Forum in July 2006. We plan to also present at the 2007 National Local Government Community Development Conference and are looking for other opportunities to share ONAC's story. We look forward to learning more through the second half of the research and aim for this also to be a constructive way of enhancing the relationships and processes by which ONAC works.

Conclusion

This chapter discussed our experiences of a research project initiated by a community group that built a co-research relationship with an external researcher. Our aim in telling this story was to share both the principles and the process that informed our research relationships. Our intention for the research was to undertake a process of reciprocal learning that was developed with care. We began writing this chapter when still part way through doing the research, so we have focused less on the content or findings of the research project and more on how we formed the research relationships. Key to forming these relationships were the Otara principles and ONAC's processes for assuring a broad mandate for the research. Having briefly introduced Otara and the Otara Network Action Committee we discussed the background to how this research came about – noting a history of extractive research. Deciding who to involve in the research was a key step, plus the decisions to work

with an external researcher, and using processes familiar to ONAC. What we were able to create was a process with many levels of reflection about community, action and social change that continues to inform the communities of practice we are engaged with.

> *What do l think of the research on ONAC and why it is important? It's necessary for the sole purpose of self-review, evaluation, assessment and yes gratification. Only those who participate in ONAC will understand whether what they have been part of is working. To reflect is to look at your own performance and those who sit next to you. It gives you knowledge that what you and others have contributed to has helped, or not. It also gives direction to ONAC. We can get caught up in the needs of others who come to see us and seek support rather than focussing on the true needs of our community. We are change agents but we mustn't think that we can do it on our own. We always need guidance and this comes from each other. The research is necessary to ensure that we are thinking generally the same, that we want the same outcomes and that we can contribute to achieving the outcomes. The goal is for ONAC to support the process of change for the community of Otara. Does Otara want us to do that? We haven't asked them the question, and we more than likely won't because in the end we (this is me) do it for ourselves because we want the best for our community that we live in* (Nita).

Artifact 2) Co-learning climates, scale and environmental modernism

The journal paper below is an artifact from a moment when climate change discourses in New Zealand were primarily being shaped through rationalities of international governance as well as science approaches to mitigation research. The paper made a contribution to the examination of how climates are governed in New Zealand. My colleague and I had intended to share with overseas peers some insights about how climate governance in New Zealand was promulgating but also in some ways resisting the creep of environmental modernism. This work re-presented monolithic political and economic processes and was very focused on people's identities. We had begun exploring governance as networked but had not found methodologies or a language to explore through our field work practices or our writing practices how these networks were assembled or indeed what things – human and non-human- were being assembled through them.

Title

Greenaway, A. and Carswell, F. (2009). Climate change policy and practice in regional New Zealand: How are actors negotiating science and policy? *New Zealand Geographer* 65(2): 107-117.

Abstract

Regional governance to address climate change is being constituted in New Zealand through domestic policy measures and international discourses. We examine climate change responses in two regions: Marlborough and Waikato. Informants expressed a desire for more transparent government policy; that planning for climate change makes good business sense for farmers and other businesses; that technology is sought to increase productivity and decrease environmental impact; and research networks build capacity for local action, linking sectors and organisations. Often conflicting, these responses to climate change were informed by a mix of discourses shaping New Zealand including participatory democracy, the knowledge economy and sustainable development.

Key words

Climate change, policy, discourse, science, sustainability, governance

Introduction

By 2007 discussion on climate change, both in New Zealand and overseas, had spread throughout media, political parties, business, and community organisations. This contrasts sharply with the situation in 2004 when the Energy and Climate Change Amendment to New Zealand's Resource Management Act 1991 (RMA) was passed. Climate change discussions in the wider community at that time were generally restricted, climate change champions being the exception rather than the norm. Despite limited public interest in the topic, the passing of this Amendment heralded a significant shift in approaches for governing responses to climate change, placing greater emphasis on the regional scale for decision making and action. In so doing, contestation also increased to distinguish between adaptation and mitigation responsibilities.

Legislative change in 2004 signified a change in the responsibilities and obligations of regional authorities in New Zealand, lessening centralised infrastructure management, particularly as related to adaptation to climate change. Responsibilities for adaptation were essentially decoupled from those for mitigation – the former being shifted to local government while the latter remained a central government responsibility. The alignment of climate change with energy also indicated a specific set of central government policy priorities. International literature reveals the importance of understanding responses to climate change as contingent on other political and economic factors occurring within and between countries at the time, as well as on historical land-use policies and practices (O'Riordan & Jordan, 1999; van den Hove, 2000; Oels, 2005; Sarewitz & Pielke, 2007).

We begin by arguing the New Zealand government has shifted its policies from a purely international orientation, to more domestic mitigation strategies in light of updated national inventory showing emissions exceeding offsets. Mitigation strategies remain politically volatile, with strategies that enhance or at least maintain production and consumption being most readily resourced. However, since 2003,

sustainable development and climate change discourses were increasingly linked at national, regional and local levels. Investment in greenhouse gases research also reflects a gradual shift towards mitigation and finally adaptation strategies, increasingly within a context of integration across water, energy, and land-use policies. These shifts in policy and research approaches in New Zealand have been influenced by, and in turn inform, a range of activities in both the Marlborough and Waikato regions.

Research context and approach

Our research was conducted before and immediately after the New Zealand Prime Minister of the time, Helen Clark, announced her aspirations for a "carbon-neutral New Zealand". Her speech to Parliament closely followed the visit of Al Gore, with the associated release of the film "An Inconvenient Truth" (Guggenheim, 2006), and the release of the pre-publication report on the Stern Review (Stern, 2007). These moments now symbolise the escalation of responses to climate change both internationally and within New Zealand.

We have triangulated data gathered through mixed qualitative methods. Analysis of media coverage of climate change issues plus policy and funding documents from regional and central government over the period April 2005 - April 2007 helped us construct our narrative of shifts in policy and science directions. Thirteen informants covering a range of sectors (who acknowledged their work had some relevance to climate change issues) were approached through a snowballing method. Semi-structured interviews were conducted and analysed using discourse analysis (Wetherell et al., 2001; Hajer & Versteeg, 2005) to identify storylines shaping science and policy practices as experienced by ourselves and our informants.

Our interest in the relationship between actors in science and policy[44] lead us to use situated and reflexive research (Rose, 1997). As researchers working on a government-funded programme in an organisation developing climate change solutions we were aware we came to this research embedded within institutions that influence climate change issues in New Zealand (O'Riordan & Jordan, 1999). As

[44] At this time Alison did not understand that actors could also be non-human.

with most situated research approaches (Rose, 1997), our position enriches the research by giving a depth of insight based on experience in the field; however, these insights are also constrained by the bias created by our personal and professional investment in these perspectives. Thus what is presented in this paper remains a detailed account from a predominantly insider perspective (see Latour, 2004).

Marlborough and Waikato were selected for case study research because both regions were early champions of climate change responses, yet the regions differ in their geographies and economic bases. The local government in Marlborough is a unitary authority, i.e., it fulfils both regional and territorial roles. This contrasts the situation in Waikato whereby the regional authority co-operates with twelve territorial authorities.

We have been informed by Bulkeley's (2001) work on the formation of discourse coalitions engaging with climate change linking actors across policy and science. Hajer (1995) describes how 'discourse coalitions' are driven by a range of beliefs, but united by a shared use of language. Therefore in our study we looked for groups of people that used the same language to describe their motivations for action. The process of policy making itself forges alliances in relation to climate change (Hajer & Wagenaar, 2003). The study of climate change policy development and implementation therefore reveals how strategies for tackling climate change are embedded in a range of broader discourses shaping society[45]. Oels (2005) uses a governmentality framework to ask which fields of knowledge, practices and identities the "global climate regime is actually producing rather than assuming that what it does or is supposed to do is known" (Oels, 2005, p. 185). This analytical framework helped us identify how people made sense of climate change in the places we visited and gave insights into how climate change is being rendered governable in New Zealand.

Given strong international discourses of environmental modernism (attempts to price the environment into the economy, Bulkeley, 2001) the frequent reference we heard to "market solutions" was not surprising. However, we were also persuaded by

[45] This was an attempt to work with assemblage

Gibson-Graham (2006) to seek stories beyond the dominant discourses. We asked what else is going on; what is less visible; what might be resisting or contesting the dominant articulations of environmental modernism that we are seeing? As a result, we have gained glimpses of how responses to climate change are far more than conventional market responses, how they are constantly contested, and thus always able to be rearticulated, and renegotiated.

Central government policy directions (1994-2007).

New Zealand's policy development for climate change has been turbulent, lacking in certainty (see Boston, 2006, p. 46) and risk averse. The focus on economic advantage from high natural resource capital ('no regrets'[46]) has prioritised market oriented responses. Central government agencies have invested most heavily in creating inventories, resourcing practices for valuing; buying and selling of greenhouse gas emission allowances, with a focus on supplying forest sink credits to the international community in an attempt to reduce the country's net emissions tally while maintaining energy security.

New Zealand joined the United Nations Framework Convention on Climate Change (UNFCCC) in 1994 intending to stabilise its net emissions at 1990 levels by the year 2000 (MfE, 1994). However, it was only in the lead up to ratification of the Kyoto Protocol late in 2002[47] that the domestic policy package was released (DPMC, 2002), and at that time a carbon tax was proposed.

At the end of 2006 a new round of policy initiatives were put out for public consultation promoting tradable permit regimes in agriculture and forestry. Notably, these initiatives were explicitly tied to notions of sustainable land management (MAF, 2007). By September 2007 we saw evidence of successful lobbying by the Kyoto Forestry Association (KFA) that represents most of the owners of New Zealand's Kyoto-compliant forest sinks, in the form of full devolution of credits and liabilities within the proposed Emissions Trading Scheme (ETS). Even holders of

[46] The idea of "no regrets" derives from the presumption that even if global climate change proves to be a false alarm, one would not regret adopting policies that are protective if there were no additional (or at most minimal) costs and the policies were justified on other grounds (e.g., have other environmental, or social benefits). (See Bulkeley, 2001).
[47] well after the European Union and Japan.

non-Kyoto forest (pre 1990) are to be offered some credits as an incentive to prevent deforestation during CP1 (MAF, 2008).

In summary, the process of domestic policy development shows increasing integration of climate change responses with sustainable development discourses (e.g. DPMC, 2002; MAF, 2007). Market-based initiatives remain dominant, creating a focus on property rights and thus aligning with existing instruments for managing private land and public good interests through regional authorities. Initiatives for pricing carbon have swung from government-controlled to market-driven, albeit with some government-control on the exposure of various sectors to their emissions liabilities. Legislative activity has primarily been directed at the creation of property rights for international trade in carbon. Strategies for mitigation and adaptation have been targeted initially at the forestry sector (they are the first sector to enter the ETS), then the energy and, finally the agricultural sectors (MfE, 2007), with increasing focus on the role of local and regional government in the facilitation of adaptation.

Devolution of climate change responsibility to regional authorities

Moving from the national-scale to look at decision making within regions of New Zealand, we found climate change is being interwoven with discourses of participatory democracy and sustainable development. The emphasis given to regional authorities for adaptation to climate change has led to use of planning instruments integrating across the Resource Management (Energy and Climate Change) Amendment Act 2004 and the Local Government Act (2002), as well as across mitigation and adaptation activities on the ground.

The 2002 climate change policy package gave the first explicit direction from central government to local government on climate change action as it indicated upcoming changes to the Resource Management Act (RMA) and stated that central government would likely pursue formal partnership with local government in the form of a New Zealand-specific “Cities for Climate Protection” (later renamed “Communities for Climate Protection” in New Zealand) programme (DPMC, 2002, p.49). As Day and Chapman pointed out in 2005, effects of climate change “cross all aspects of council functions and responsibilities, which makes climate change integration difficult…The

difficulty comes in knowing where to start, initiating a considered response and implementing appropriate measures" (Day & Chapman, 2005, p. 11).

The RMA was amended inserting three new matters into Section 7 of Part II of the Act. The Resource Management (Energy and Climate Change) Amendment Act 2004 created provisions for "all persons exercising functions and powers under the principal Act to have particular regard to:

i. the efficiency of the end use of energy

ii. the effects of climate change

iii. the benefits to be derived from the use and development of renewable energy" (p.2) ; and

Local authorities were explicitly mandated:

i. "to plan for the effects of climate change, but

ii. not to consider the effects on climate change of discharges into air of greenhouse gases" (p. 2).

This has had the effect, therefore, of passing on adaptation responsibilities to local authorities but leaving the responsibility for mitigation with central government. Arguably, this also has the potential to pass adaptation costs to local authorities without allowing for potentially corresponding income as a result of mitigation actions. As a consequence, councils cannot regulate greenhouse gas emissions through resource consents. The thinking at this time was that greenhouse gases could be regulated more efficiently by central government through mechanisms such as a carbon tax. The flow-on effect of the recently created ETS and the regional role in implementation of the Afforestation Grants Scheme (AGS) is yet to be observed in this area.

Although specific reference is not made to climate change within the Local Government Act 2002, reference is made to sustainable development, which invokes notions of intergenerational equity in environmental decision making. Regional authorities have been using this as a reference point for linking climate change to

existing land, water and energy management strategies. In addition the Civil Defence Emergency Management Act 2002 mandates action by local authorities related to climate change in that natural hazards need to be identified and planned for. The Local Government Act 2002 also mandates "democratic local decision-making", which has led to climate change responses being mandated through the Long Term Council Community Planning process (Greenaway et al., 2005).

Production of greenhouse gas knowledge

The shifting terrain of New Zealand's climate change policy is a reflection of increasing scientific consensus on anthropogenic climate change, coupled with rising public concern. The predominant influence on investment in climate change related research has to date been the evolution of New Zealand's requirements in meeting its Kyoto targets. Operational funding between 1999 and 2002 alone was approximately $23,500,000 (MfE, 2001, p. 32) and was allocated to creating an inventory of emissions and removals, and sources and sinks. Major research funding allocated by the 2007 Global Processes round of the Foundation for Research, Science and Technology (FRST) prioritised understanding causes and consequences of global processes ($19.2 million per annum, FRST, 2006, p 5). Only a modest focus on mitigation and adaptation ($1.2 million p.a. (FRST, 2006, p 5) was supported. Interestingly, a key component of the integrative research (across the science, policy and implementation interface) was in this second pool of funding. MAF is now providing research support for agricultural and forestry mitigation and adaptation with the establishment of a new $40 million (to the end of 2012) research programme (MAF, 2007).

Allocation of domestic research funding reflects global prioritisation whereby the "majority of research funds have been devoted to reducing scientific uncertainties about the physical processes, rather than exploring the social context in which they will be understood and experienced" (Cohen, Demeritt, Robinson & Rothman, 1998, p. 347). Evidence suggests the Intergovernmental Panel on Climate Change (IPCC) has played an implicit role in reinforcing this hierarchy (e.g., O'Riordan & Jordan, 1999). There is further evidence that although mitigation and adaptation have been upheld by the UNFCCC as equally important, international and national climate

policy has focussed mainly on mitigation (Klein et al., 2005; Pielke, 2005; Tol 2005). This prioritisation is based on an implicit belief that investment in adaptation weakens the focus on mitigation (*sensu* Klein et al., 2005; Tol 2005).

Calls for "carbon neutrality" (or a net zero footprint of greenhouse gas emissions) in New Zealand have been strongly facilitated by the carboNZero$^{Cert™}$ programme developed by Landcare Research, and officially launched in November 2006. The branding of products as "carboNZero" has been underpinned by Landcare Research's Emissions-Biodiversity Exchange (EBEX21®) project, which has worked with businesses and landowners since 2001. This project was a self-contained trading system that enabled businesses to measure their greenhouse gas emissions, decrease those emissions through energy reduction, and finally offset remaining emissions through purchase of carbon credits accruing to sites of native forest regeneration (Carswell, Frame, Martin & Turney, 2003). In 2006 emissions measurement and management were separated from the certification of carbon credits on regenerating forest sites, resulting in two business entities – the carboNZero programme and the EBEX21® programme, the latter now focussing entirely on services to landowners. We acknowledge that it was our involvement in the development of these programmes that has ultimately led to the pursuit of case study research in Marlborough.

Negotiating climate change science and policy in Marlborough and Waikato

Having outlined debates and shifts in policy and science approaches to climate change over the last two decades, we turn to look at how these have informed practices in two rural regions of New Zealand – Marlborough and Waikato.

Central to Marlborough's economy are tourism, wine growing and aquaculture. Climate change was presented as both a threat (an extended period of drought) and an opportunity (demand from overseas markets) for people to use their land differently, gain economic advantage, and create new lifestyles. An active, focused network of people, translating across and integrating business, science and the wider community, has formed to champion climate change issues. Relationships with scientists were central to carbon-neutral initiatives. By acting as stewards and not disengaged

observers, scientists have worked in this area to maintain relationships that extend beyond projects.

The main industries of the Waikato economy are dairy farming, forestry, plus energy production and distribution. Hydroelectric dams on the Waikato river produce 65% of all power used in the North Island of New Zealand. Not surprisingly then, climate change is being factored into current policy, business and land use priorities, by linking with energy and water management. Climate change was also seen to be providing opportunities for renegotiating governance responsibilities between regional and central government. The relationships we encountered in Waikato between policy, business and science were heavily invested in enhancing the productivity of land and water as well as minimising impacts of resource use on the river.

In each region we spoke with representatives from the regional authority and regional economic development Trust. In Marlborough we interviewed a land owner, two regional authority policy officials, a councillor, and the CEO of the regional development Trust. In Waikato we interviewed the CEO of an electricity Trust, the environment manager for a power company, a coordinator for an environmental community organisation, an advisor for a regional economic development programme, three policy officials for the regional authority, and an ex-mayor.

Policy negotiations

The government's shifts in climate change policy direction between 2002 and 2006 were perceived by some in Marlborough and Waikato as a backwards retreat and by others as a necessary response. Common to our interviewees in 2006 and 2007 was a sense of waiting for central government to publicise a strong and transparent policy position on climate change. Respondents expressed this as passively waiting for announcements from government; however, it was clear almost all our interviewees were actively lobbying their constituencies as well as government representatives:

Contestation was apparent over the boundaries of responsibility between regional, local and central government:

> *The Government can have a large effect on deforestation in a much quicker time frame, so we'd like to see the Government do as much as they can before we come through and tidy stuff that's left to us that they can't do. We need central government recognition that they have tools that we don't and that we've got tools that they don't, and there is a balance between the two. As a regional council we wouldn't promote regulation solely for climate change benefits* (Key Informant, Local government, Waikato).

Whilst this informal contestation was happening between policy officials these same officials were facilitating public engagement with the policy development processes. Public engagements with councillors had been organised, and councillors from one council were given a private screening of the movie "An Inconvenient Truth" (Guggenheim, 2006). Policy instruments under both the RMA and the LGA were being used to build public engagement, with a range of environmental issues that directly or indirectly link to climate change. In Waikato flexible integrated management was weaving public input through water and energy strategies.

A concern in Waikato was the government's role in facilitating the creation of a carbon market through instruments that put a price on carbon needed to be transparent:

> *What the Government could do is to have some clarity and policy direction with respect to renewables. Last year (2005) they pulled the carbon tax policy. That was a fundamental change to any organisation trying to put renewables in. Now we think there has to be some predictability and transparency in where the Government are going with that, because the value of carbon has a big impact on the use of renewables. The Minister is saying all the right words, that it is really important and that they are going to have schemes and credits and all those sorts of things. But he hasn't done it yet. We think there needs to be some maturity in what is really a very sensitive issue. The Government shouldn't have knee-jerk reactions on this. We think they need to look at where future generation of electricity is going, and be very clear in some of their policy directions* (Key Informant, Electricity Sector, Waikato).

The calls for central government regulatory leadership were sometimes framed in contrast to participatory decision making processes currently espoused through the Local Government Act.

> *One of the things that concern me is the attitude in the public that we can ignore sound planning. People seem to want to ignore the need for roads, power lines, railways, even development. We'll need to change people's head space at the societal level if we are going to continue to run the country how we like it. I don't think people getting warm fuzzies from interactive, involved decision making processes at the consent, council planning level, or Government policy level results in anything. It's going to require some hard calls made by central government, some leadership…* (Key Informant, Electricity Sector, Waikato)

The perspectives above reveal tensions present in New Zealand's management of climate change as responsibilities were devolved to regional authorities and scales of influence contested through encouragement of participatory democracy.

Stewardship makes business sense

The regeneration of a Marlborough Sounds' sheep and cattle farm into indigenous forest is the most radical example we came across of transformation in lifestyle and business practices in response to climate change. The farmer draws strongly on notions of stewardship and, in doing so, is influencing land-use possibilities and sustainability agendas in Marlborough and beyond:

Society is finally getting around to accepting that a good environment is essential for them to survive, let alone maintain a healthy economy. Landowners can help to provide that good environment. They can provide products that do not make things worse or more positively provide products that will make things better. They will need to establish that the business of saving our environment should be like any other in that, where a landowner provides a service for the good of others then the landowner is entitled to a return. And the best way of doing that is by showing that while they may have been part of the problem they are now very much part of the solution (Marriott, n.d.).

While this farmer's work can be seen as land-use change, other people were moving away from a 'land-use management', production-oriented focus towards a more consumption-oriented framework linked to broader sustainable development strategies:

> *It pervades everything we do to such a degree in the positioning of the region, the perceptions particularly from our high value tourists…Germans in particular see us as being nowhere near as environmentally degraded as Germany but that doesn't actually alter how they think. What they're interested in is what our plans are. They have a look at home and their plans are much more advanced and much more comprehensive than our plans for environmental sustainability. So we hang on the clean green image that we have and pride ourselves on that. But I don't think it's as valuable as we think it is, because [the German tourists] don't care if we have screwed up in the past because so have they, what they want to do is be assured that we're doing really good in the future.*(Key Informant, Business Sector, Marlborough)

Respondents referred to market forces and, more specifically, demands from domestic and international consumers as key drivers of their climate change responses. Maintaining the image or brand of "clean green New Zealand" was central to the initiatives in Marlborough.

The stories we heard in Marlborough linked talk of climate change and sustainability. Sustainable development was also being linked with economic development and regional development strategies through discourses articulating stewardship of the land as a market advantage.

The stories we heard in Waikato revealed less vision for harmonising with ecosystems and more market focused opportunism, seeking to gain business advantage while also avoiding potential costs incurred through environmental degradation. Climate change responses in Waikato appeared to be driven by farmers acting as both electricity consumers and potential on-site producers. Opportunities had been identified for reducing costs through use of renewable energy:

> *The pulp and paper industry or Pacific Steel uses a lot of electricity. A 1% saving is a big number for them so they look for ways of reducing their consumption. I believe there should always be a business reason for an environmental decision and I think there always is. It's not only in energy use. If you can change the way, for instance, you manufacture coal then you'd set yourself in a different market bracket. It's a business decision with environmental benefits. Not an environmental decision that can be justified in business* (Key Informant, Electricity Sector, Waikato).

Decisions to take mitigating action in Waikato were in the context of policy shifts that would introduce a cap and trade system for nitrogen with greenhouse gas mitigation as a potential co-benefit. We were told farmers were increasingly conscious of the potential to be charged for their emissions:

> *These companies have on their business spread sheets a line that has a question mark. There's a line there and they are discussing because if there is a dollar figure for these things then they become more viable…I think both energy going up and greenhouse gases issues together produce positive effects - you have to focus on being more efficient* (Key Informant, Business Sector, Waikato).

Notions of stewardship were evident in stories we heard about both policy and research initiatives. In Marlborough we saw the idea of stewardship coming through regional economic development strategies espoused by the Marlborough Regional Development Trust and most radically through the efforts to regenerate indigenous forest on a farm. In Waikato it was most evident in the policy development process, which is uniquely shaped in this region by Treaty of Waitangi claims[48] and histories of caring for the Waikato River.

New technology will assist mitigation and adaptation

Stories of stewardship were overshadowed by discourses of technological determinism (Bulkeley, 2001). The dominant discourse of technology as capable of solving most human problems was present in our conversations in both Marlborough

[48] Tainui and other iwi, the indigenous people of Waikato, are currently working through the resolution of longstanding disputes with the Crown over ownership of the river and land in Waikato.

and Waikato. In Marlborough, new technologies and strains of grapes were being investigated as a way of maximising production when water is a scarce resource. In Waikato, people spoke of the large investment in research and development in the field of biotechnology. Waikato interviewees noted the potential opportunity for breeding cows with reduced methane emissions and associated increased productivity. Informants also spoke of research initiatives that would help farmers move away from production of raw products (such as meat) to high-value biological commodities (such as specialised proteins). Calculative practices (Larner & Le Heron, 2002) allowing people to measure and audit biophysical inputs and outputs on land were also a major focus for councils in both regions consenting land-use activities.

Knowledge of climate change

> *The reason why we said we needed science in the region is that we talk about a knowledge economy and our argument was we can't just be users of knowledge. If we want to fully participate in the knowledge economy then we have to be generating it as well….we felt that while NZ was the most vulnerable region in the world, Marlborough was the most vulnerable region in NZ* (Key Informant, Business Sector, Marlborough).

The notion of translating between languages (primarily science and business) was raised in the interviews along with the importance of having people resourced in organisations who are able to do this. Education was seen to be important for people to learn about alternative approaches and new practices required through regulatory changes, and also to understand the science more clearly. For example, it was acknowledged that farmers engage more when they can share knowledge of the environment from their own perspectives.

In addition, farm advisers, bank managers and accountants were reported to play a role translating information to land owners, thus influencing land-use change through lending policies and judgments of risk. It was also apparent that television, radio, the internet and newspapers have a role shaping the way the debates are presented, and making visible or invisible particular strategies.

In both regions scientists and science funding were upheld as key influences on how people made sense of and responded to climate change. The increased focus of scientists on commercial (non-central-government) funding sources to retain total revenues, and the corresponding increase in operational and locally-relevant research projects contracted by regional and district agencies is shifting relationships between scientists, farmers, land owners, and people in business and policy. In addition, people discussed the level of uncertainty with which policy officials were working and the lack of data available for current decision making:

> *We do not have enough hard data or hard information to be able to confidently advance arguments in terms of the economic value of alternative land-uses, for instance…It's not just us that haven't got the numbers. I don't think the numbers exist anywhere…If you compare [carbon farming with] forestry [and] farming, we've got a hundred years of modelling…Every forestry consultant has an advanced computer-based model for the property which takes in the topography, the rainfall, the wind conditions…Eventually someone is going to sue our backsides off if we've got it wrong* (Key Informant, Business Sector, Marlborough).

However, we also found scientists stepping outside short-term, financially driven commercial research projects and maintaining longer-term relationships beyond their consultancy roles. Two respondents commented scientists were staying in relationship with them longer than many central government policy officials. Scientists were found to hold organisational and policy history and were maintaining trust. The scientists able to do this were legitimising their research through notions of stewardship and participatory democracy. Their science practice increasingly emphasised the relational element and included reflexive awareness of what their practices contribute to.

Conclusion

The 2004 amendment to the RMA signalled not only more devolved responsibility and obligations for governing responses to climate change but also opened new opportunities for making sense of climate change. By 2007 mitigation strategies remained politically volatile, with strategies that enhance or at least maintain

production and consumption being most readily resourced. However, since 2003, sustainable development and climate change discourses were increasingly linked at national, regional and local levels, shifting sites for decision making and making more contestable the roles and responsibilities for mitigation and adaptation.

People working in Marlborough and Waikato were engaging with these discourses to legitimate stewardship practices of land owners. Links across the RMA and LGA supported and gradually shifted towards mitigation and adaptation strategies, through integration across water, energy, and land-use policies. Funding processes were prioritising stakeholder engagement in research, reinforcing claims of property rights on one hand and creating more altruistic, stewardship science practise on the other.

Our review of climate change policy and research initiatives, plus perceptions of actions in Waikato and Marlborough has provided insight into how storylines are coalescing or being contested across science and policy, to inform climate change responses. These responses are being constituted on farms, in forests, homes, meeting rooms and laboratories through negotiation of a range of influences including international prioritisation of research for inventories; tourist preferences for eco-friendly destinations; research contracts that enable long term relationships with stakeholders; legislation assigning adaptation responsibilities to regional authorities; and plans of action linking regulations across the RMA and LGA. Further research will reveal how these influences play out in the longer term and what impacts they have on future land use in these regions.

Artifact 3) Co-learning urban policy making and implementation

Through the conference paper below my colleague and I were positioning our research amidst a large number of urban development political and intellectual projects. We were advocating for reflection on planning practices and the Resource Management and Local Govenrment Acts as part of the design of stormwater focused research. We tried to establish a singular integrative programme logic for the Low Impact Urban Design and Development research programme. In doing so we were activey representing and often overrepresenting disciplines and imaginairies of development and how change occurs in society.

We argued for policy evaluation as a way of tracking and inquiring into transitions towards more sustainable urban development practices. Clare and I presented this work at a stormwater conference attended by a broad range of people researching, managing and operating water and waste systems. This artifact illustrates the co-learning framework I was working with at the time. More significantly as discussed in chapter 5, the paper below is an artifact from the assemblage of a renewed focus on sustainabile cities in NZ. The paper is also an artefect from a moment repositioining CRIs and Universities in the implmentation of infrastrcuture knowledge in NZ's emerging knowledge economy.

Title

Feeney, C. and Greenaway, A. (2006). Policy effectiveness monitoring for low impact urban design and development. *New Zealand Water and Wastes Stormwater Conference*, 4-5 May 2006, Royal Lakeside Novotel, Rotorua, New Zealand.

Abstract

The joint Landcare Research / University of Auckland LIUDD (low impact urban design and development) programme is examining the engineering, ecological and economic effectiveness of more sustainable stormwater management measures, as well as the changes to councils' plans and practices needed to adopt these. It is also building on best practice research both locally and internationally by asking the following questions:

- How do we know we are achieving these research outcomes?
- How will end users of our findings know they are achieving their resource management objectives?

A logical and integrated programme framework is needed to develop indicators that answer these questions. This body of thinking is known as programme theory and this paper explores its application to organisations – especially councils – wanting to adopt the LIUDD research findings.

A history of the development of indicators shows an increasing interest in evaluating the cost- and environmental- effectiveness of policy and management interventions. This international trend is reflected in recent New Zealand research and public policy. The paper reviews some of this thinking and briefly examines some of the barriers and benefits to programmes of taking a logically defensible approach to programme theory and collaborative learning. It concludes that development of a programme theory and framework will go a long way towards meeting the environmental and legislative requirements of councils adopting new methods of stormwater management.

Key words

Low impact urban design and development, policy effectiveness monitoring, programme logic, environmental outcomes, end user engagement

Introduction: Measuring progress towards sustainable development

The growth in the use of sustainability indicators is ‘nothing short of phenomenal’ (Rydin et al., 2003). This proliferation reflects growing interest in the field, and also the different management frameworks and issues in different parts of the world.

A brief history of the development of indicators shows that the emergence of sustainable development indicators is comparatively recent, reflecting growing awareness and concern about the effects of development on the environment and how this relates to social and economic trends. International, national, regional and local undertakings and obligations require monitoring of a wide range of indicators, including state of the environment, quality of life and sustainable development.

However, with increasing interest in the cost- and environmental- effectiveness of policy and management interventions, more recent work is now focusing on how effective these interventions really are.

Growing interest in policy effectiveness indicators is reflected in work by UNEP (the United Nations Environment Programme), the European Environment Agency (EEA) and the OECD – as well as by researchers and policy makers in New Zealand.

UNEP's GEO-2000 programme identified that a 'serious omission is the lack of effort to find out whether new environmental policies and expenditures have the desired results. These knowledge gaps act as a collective blindfold that hides both the road to environmental sustainability and the direction in which we are travelling' UNEP acknowledged that an 'element of uncertainty is associated with most environmental policy measures. Yet indicators of policy effectiveness and underlying observing mechanisms are lacking everywhere, from local level initiatives to multilateral agreements. These deficiencies prevent the monitoring and assessment of policy performance.' This, together with other data deficiencies '… prevents comparisons being made between the current situation and what would have happened if no agreement had been concluded. … Routine assessment of the performance of environmental policies … is therefore urgently needed to fill this gap in the policy process.' (UNEP GEO, 2000). One of its suggestions for action for filling this knowledge gap was to 'implement policy performance monitoring by identifying suitable indicators, developing capacities to handle statistical and geographical data, and ensuring that assessment results are easily accessible to policy makers and the general public.'

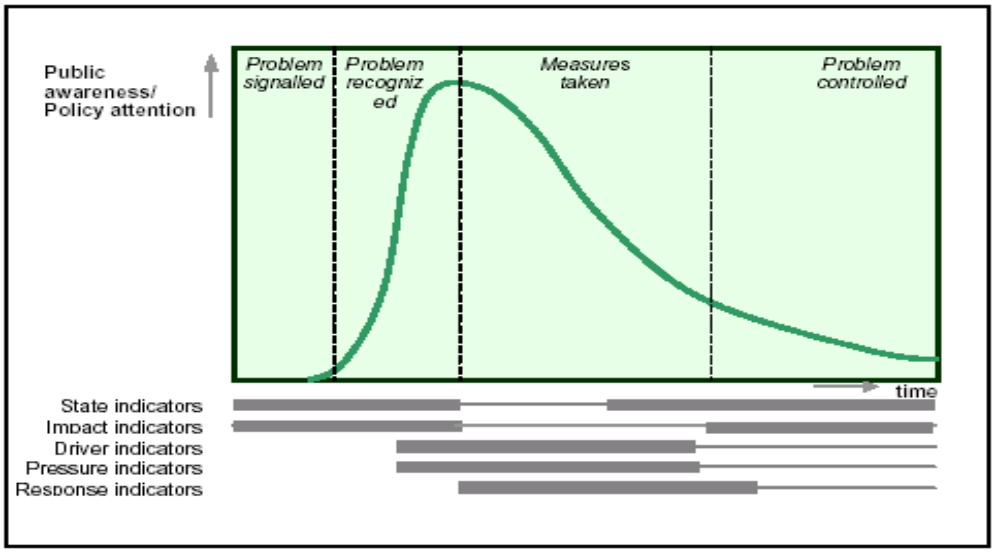
The EEA has developed an extended version of the OECD's pressure-state-response framework, the DPSIR framework (driving forces – pressures – state- impact – responses). These indicators are used in sequence at different stages in the policy life cycle shown in Figure 1, and comprise (Gabrielsen & Bosch, 2003):

- descriptive indicators such as zinc content in shellfish
- performance indicators such as descriptive indicators linked to target values
- efficiency (or decoupling) indicators such as CO_2 emissions per unit of GDP

- policy effectiveness indicators that reflect the actual change in environmental variables related to policy efforts
- Total welfare indicators that attempt to answer the question, 'are we better off?'

Figure 1 DPSIR indicator use in the policy life cycle

(Source: Gabrielsen & Bosch, 2003)



More recently, the OECD also noted that 'The successful integration of environmental policies with sectoral and other economic policies is vital to ensuring that environmental policy goals are reached at least cost and that the effects of other policy measures on the environment are addressed.' (OECD, 2004).

In New Zealand, a similar trend appears to be taking place towards balancing state of the environment indicators with those that monitor of policy and plan effectiveness, as indicated by:

- key findings of the PUCM (planning under co-operative mandates) programme that there is an implementation gap between research ('top down') and consultation phases of developing plans under the Resource Management Act (RMA) and a lack of internal consistency between the logical cascade of steps in plan development (Ericksen et al, 2003)

- adoption of outcome-based investment (OBI) in research programmes by the Foundation for Research, Science and Technology (FRST), which are based on:
    - target outcomes – clearly defined change in one or more significant national measures of wealth or well-being (economic, community and/or environmental) towards the achievement of which researchers and external stakeholders deliver intermediate outcomes
    - Intermediate outcomes – the direct and measurable result of successful implementation or uptake of the research outputs and results by a relevant end user. Intermediate outcomes are measurable, time-bound and significant contributions to achieving a target outcome
- a move by the Ministry for the Environment towards indicators that inform and monitor the effectiveness of national policies to ensure that the indicators are actually used by decision-makers to make decisions and contribute to achieving a better environmental outcome (Julia Porter, MfE, pers. comm. 26 May 2005)

Programme theory: a well-established academic field

Programme theory or programme logic describes how a programme's activities lead to its desired outcomes by conceptualising causal linkages (Patton, 1986). Although in practical terms it is never possible to be certain of causality or anticipate all the variables that intervene between programme delivery and eventual outcomes (Patton, 1987; Owen and Rogers, 1999), programme theory seeks to develop a reasonable estimation of the effects a programme will have or is having on its recipients and hence the subsequent success or failure of its outcomes (Patton, 1987).

Steps in implementing the programme are then defined by a 'chain of objectives' organised so that those at the top depend on the accomplishment of all of those underneath them. This also means that the hierarchy is automatically organised in a time-line of immediate, intermediate and ultimate goals, since each objective must be accomplished in sequence (Woodhill & Robins, 1998; Patton, 1987).

One of the most interesting and useful parts of this process is that analysing the hierarchy also reveals the implicit assumptions made about values, causes and effects

(Woodhill & Robins, 1998). Stakeholders can then test those assumptions by reviewing both their research and evaluation activities (Patton, 1986; Owen & Rogers 1999). Even stakeholders who are exposed to the programme theory for the first time can decide which assumptions they need more information about to make more informed decisions (Patton, 1986).

The need to explore and spell out the assumptions and underpinning philosophies made in developing logical links and indicators is also strongly emphasised in the log frame approach to programme logic and planning, a widely used project management framework.

Developing the programme theory with stakeholders in turn develops a common understanding of the programme, how it works and each person's role in it. This helps them to identify the most important components that need to be better understood (Rogers, Hacsi, Petrosino, Huebner & Tracey, 2000)

- understanding the programme theory helped stakeholders clarify programme goals
- this understanding built co-operation and buy-in from staff members, which helped develop the evaluation
- the process encouraged reflective practice amongst staff, who became more aware of how their actions affected the rest of the programme

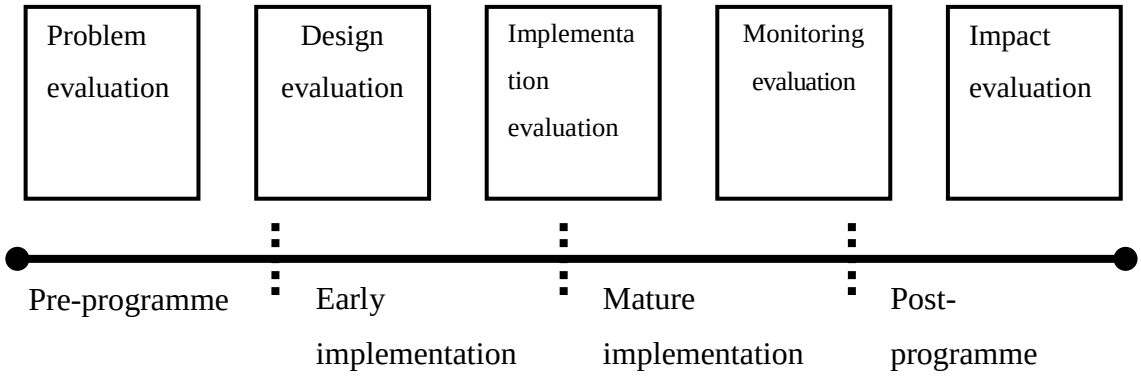
Focus on project evaluation

Owen and Rogers (1999) extended existing programme theory by developing five forms of programme evaluation. Each form has a different purpose and is designed to be used at different times in a programme's life cycle. Figure 2 shows the phases of a programme's life cycle and when to use the different forms of evaluation.

After the pre-programme phase, in which a problem is identified and a decision made to initiate a programme to address it, the life cycle proper begins with evaluating the problem to be addressed. Early implementation is typically a time when problems with programme delivery are found and resolved, with design evaluation then focusing on evaluating and refining the programme's theory, goals, and objectives.

Figure 2 Programme life cycle and evaluation phases

Source:Owen and Rogers (1999)



A programme reaches maturity when its delivery systems are 'settled' and staff are concerned with its daily, routine operations. Implementation evaluation is a responsive evaluation approach similar to action research that aims to maximise the programme's effectiveness. Monitoring evaluation provides indicators and reporting systems that allow programme managers to ensure that a programme is 'on track' to meet its objectives: it is evaluation for management, rather than implementation. After the programme is completed, the post-programme phase of impact evaluation aims to determine the overall effectiveness of the programme in addressing the problem (Owen & Rogers, 1999). It can also be done for mature, well-established programmes when they come up for review for continuation (Patton, 1986). It is notable that this is very similar to the DPSIR indicator use in the policy life cycle proposed by Gabrielsen and Bosch (2003) in Figure 1.

Barriers to application of programme logic

The greatest barrier to the application of programme theory is the perception of staff that they are too busy implementing the programmes to have the time, money, or inclination to properly evaluate them (Vowless, 2002). However, in New Zealand, outcome-based research funding and current trends in evaluating policy effectiveness make it clear that 'programme managers cannot afford not to evaluate' (ibid).

However, to mitigate legitimate concerns about over-emphasis on evaluation, a general rule of thumb appears to be that 5-10% of programme time is appropriate for good evaluation.

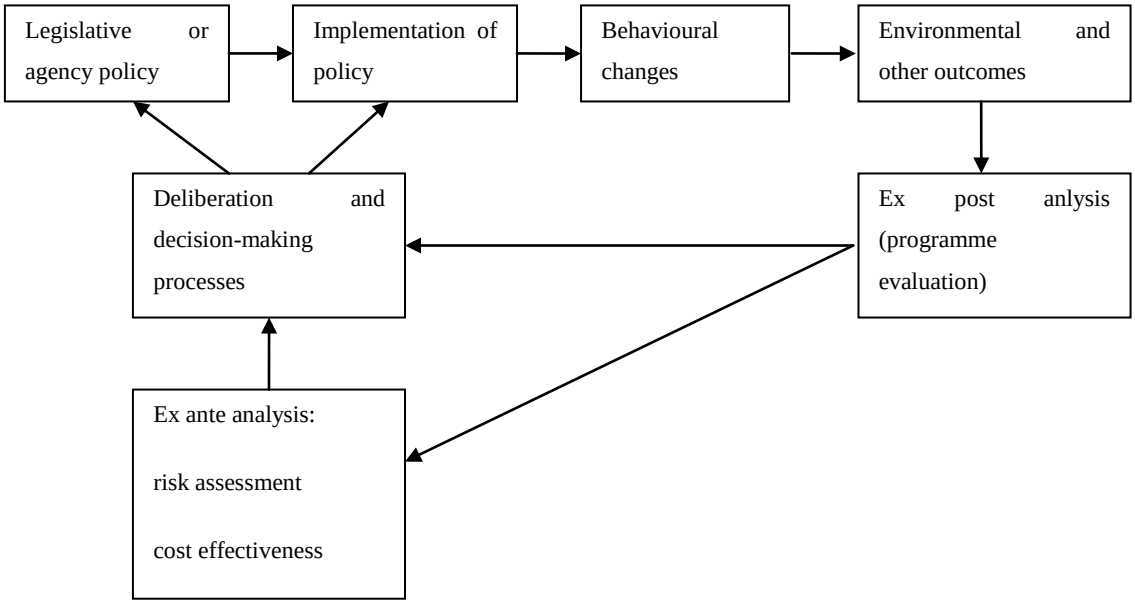
Applying programme theory to evaluating the effectiveness of environmental policy: Some overseas thinking

Although there has been considerable review of policy evaluation from an academic point of view in many fields for over 20 years, (see, for example Snyder, Bennear, & Coglianese, 2005) effort in the area of environmental policy has been comparatively sparse (ibid). To gain a better understanding of whether environmental policies work, it is necessary to look at how research, evaluation and decision-making processes work together. In the diagram in Figure 3, the phase of problem definition is conflated into the legislative policy-making phase.

The paper by Snyder et al (2005) aimed to spell out the processes by which researchers can help decision-makers by using evaluation methods to isolate the effects of specific policy interventions. The authors noted that the focus of data collection was to justify legislation rather than to evaluate its implementation. In calling for more research into programme evaluation, they noted that while 'it is doubtful that program evaluation research will end political conflict … or immunize policy makers from all error… it can help sharpen the focus of policy deliberation as well as inform government's choices about how to allocate scare resources more effectively … and be a necessary step towards an evidence-based approach to environmental decision-making' (page 35).

Figure 3programme evaluation in the policy process

Source: Bennear & Coglianese (2005)



Some New Zealand experience: What the law says

It is easily seen that programme theory and overseas thinking on evaluating the effectiveness of environmental policy reflect the policy and plan-making procedures already enshrined in both the Resource Management and the Local Government Acts.

The PCE's (2004) report, *Missing links: connecting science with environmental policy* noted the complexity of the research and decision-making processes facing researchers, policy-makers and communities. Appendix A to the report used the diagram in Figure 4 to show the various roles that science and research can play in the policy cycle.

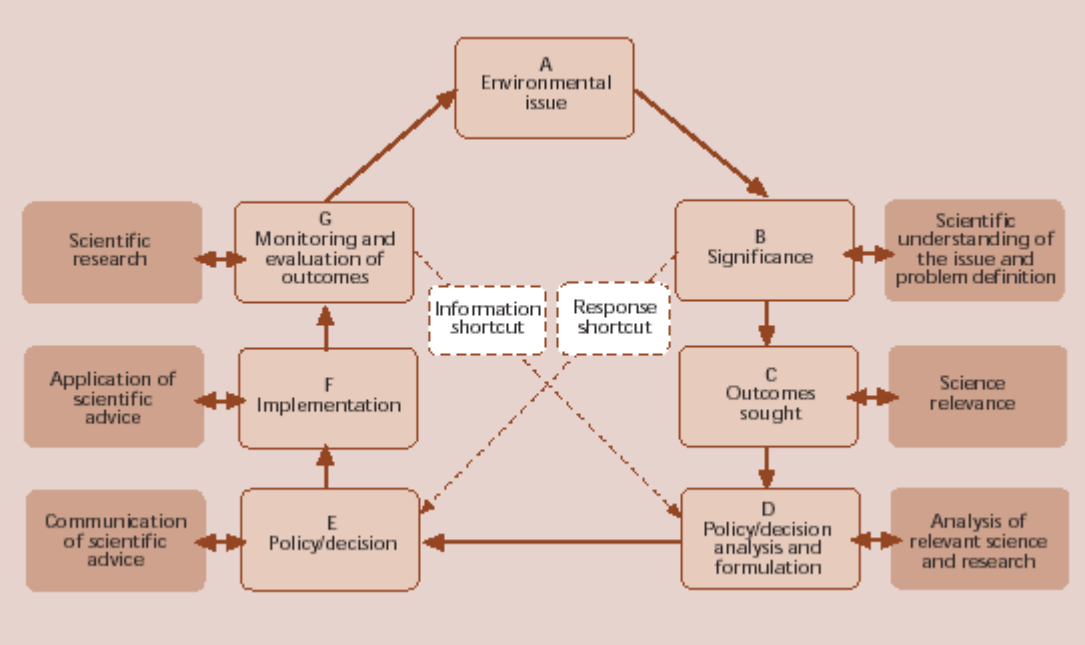
It was noted that science funding, capacity, capability, structure and relationships influence how these roles play out and that uptake of scientific advice depends on correct problem identification and question framing, as well as communication and trust between scientists and policy makers, time pressures and understanding the capabilities and limitations of science.

It was also noted that the cycle can be regarded as a learning process in which use is made of feedback systems [evaluation] to continually strive towards improving environmental policy-making and environmental outcomes.

The Resource Management Act 1991 and the Local Government Act 2002 together define the requirements that many LIUDD stakeholders in New Zealand must meet. Monitoring and evaluation are core components in the statutory processes set out in both Acts, for policies, plans, rules and alternative methods, including the LTCCPs currently being developed around the country.

Figure 4 The policy process

Source: PCE (2004, p. 91)



What we actually do

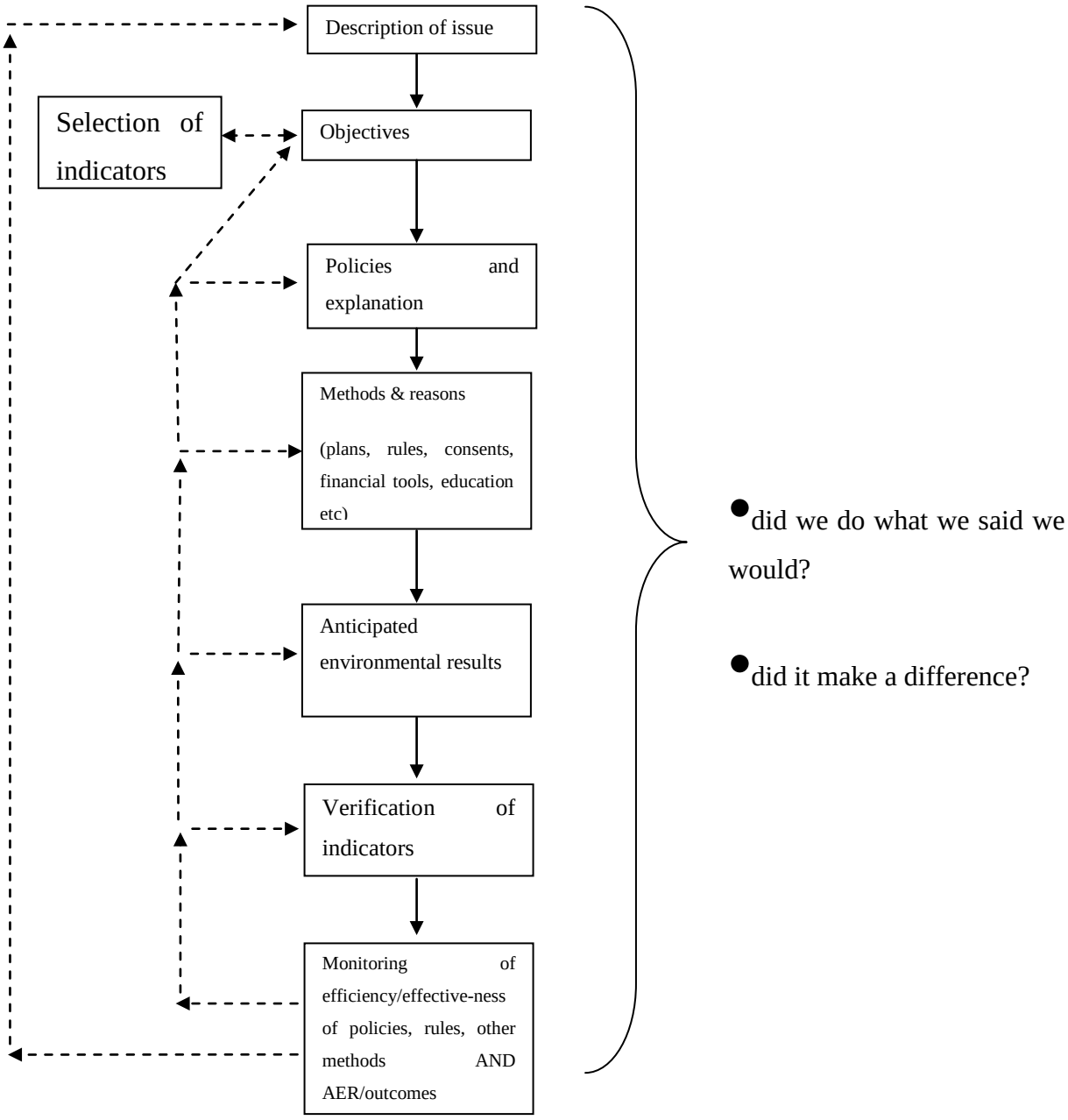
The PUCM research project by the University of Waikato aimed to better understand the links between environmental policy and outcomes by studying the quality of the preparation and implementation of plans produced under the RMA and influencing factors. The research links the assessment of plan quality (PQ) to implementation quality (IQ) and, finally, to environmental quality (EQ) and is being extended to include long-term council community plans under the LGA.

Findings so far clearly indicate that the logical links are weak between high-level outcome statements, policy interventions and environmental and other indicators monitored at national, regional and local level (Ericksen et al, 2003). Further specific research work into the stormwater provisions of district plans by students in Planning Department of the University of Auckland confirmed this.

Figure 5 overleaf shows the logical pathway spelled out in Section 63 of the Resource Management Act, showing the importance of selecting and verifying indicators of the effectiveness of the plan at delivering the anticipated outcomes.

Figure 6 The logical cascade of tools in the resource management act plan process

Source:Ericksen et al (2003)



Can we do better? Implications for the LIUDD researchers and end users

The LIUDD research team is trying to evaluate its own programme, and is also trying to meet the spirit of the FRST outcome-based research funding approach to help end

users evaluate the effectiveness of any new stormwater management programmes they adopt as a result of our research.

Objective 5 of the LIUDD programme aims to change plans and practices, effectively developing new policy and implementation methods for end users to adopt. In order to align itself with New Zealand and overseas best practice and to benefit end users, the programme needs to consider how end users of our research findings can monitor the impacts of a change in policy. The programme researchers are taking a collaborative learning approach, including a website with an online forum to this end.

As researchers, therefore, we want to look at how end users can evaluate new stormwater management strategies that have involved a major change in policy at some level – regional plan, district plan, asset management plan or structure plan.

We started by examining how we could use this approach on our own research, looking at a simple framework that classifies programme monitoring and evaluation data into three categories:

- output – what you do to start off your programme
- uptake – what your target audience does in response to your output
- outcome – how much what you do actually causes the desired change

This raised some interesting questions, including:

- how do we define outcomes in a measurable sense, e.g. to measure progress towards achieving LTCCP outcomes such as those defined for Māori, biodiversity, water quality/quantity and economic performance
- could such an approach be scalable, e.g. for measuring effectiveness of more sustainable stormwater management at the device, building, lot, neighbourhood and catchment scale, noting that community-agreed outcomes are often at neighbourhood or catchment scale in documents such as LTCCPs and structure plans

- how compatible would it be with more detailed technical data bases such as that being compiled in Ecotrack[49], or as a result of discharge quality or receiving environment water quality monitoring?

- how possible would it be to adapt the results into a computer-based format that includes GIS information and aggregate data to higher scales? Could this help us to cross-correlate information in useful ways, for example to produce decoupling indicators

The LIUDD programme researchers are now working with these issues and the terms of the FRST contract, which has an outcome-based focus, to see how we can measure the uptake and outcomes of our research programme. It must be noted, however, that while many of these are beyond our direct influence, we can still nevertheless think about how they could be monitored – the benefit being a higher degree of programme rigour.

Collaborative learning for improved policy effectiveness evaluation

A significant finding of UNEP's GEO 2000 for the LIUDD programme is that 'Monitoring the impacts of current policies should precede and pave the way for the formulation of alternative or additional policies. The key is to consider policy instruments as tools for learning and adaptation, and to treat them with flexibility.'

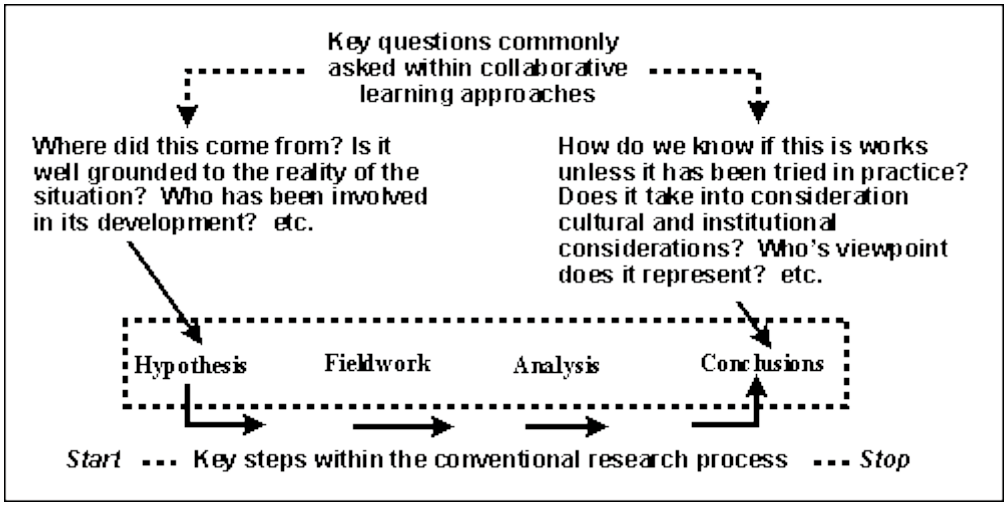
The Landcare Research social science team note that 'Increasingly researchers and practitioners are sharing theories and methods that demystify science and follow collaborative problem solving and dispute-resolution principles such as inclusion, cultural sensitivity, developing shared definitions, and empowering end-users. [But] . . . if the science community wishes to ensure the relevance and rigour of collaborative research initiatives within multi-stakeholder situations, then it needs also to overtly use review or evaluation approaches that ensure that programmes are examined within this broader context' (Allen and Kilvington, 2005).

[49] Ecotrack is a database for ecological monographs and applications developed by the Ecological Society of America. Retrieved from http://esapubs.esapubs.org/cgi-bin/main.plex [Accessed 23 November 2013]

Figure 5 shows the steps within the wider research process showing relationship between collaborative-learning-based and conventional research (adapted from Wadsworth, 1998). Collaborative learning is one approach to changing resource management practice by improving the use of information by different groups with multiple perspectives. In general terms, collaborative learning refers to the capacity of a group to assess the results of their efforts, rethink how they go about their tasks, and use new ideas to change established practices (Allen & Kilvington, 2005).

Figure 5 The relationship between collaborative-learning-based and conventional research

Source: Allen and Kilvington (2005)



Interdisciplinary research such as LIUDD involves many other stakeholders in these circles – including evaluation.

Development of a programme theory and framework will go a long way to maintaining the logical rigour that went into the development of the LIUDD programme, and translating this into outcomes that meet the environmental and legislative needs of end users. An example of this would be by encouraging a focus on defining agreed community outcomes in terms that enable progress towards them to be monitored in ways that are useful for resource, asset and community managers.

Opening a debate on policy effectiveness monitoring of LIUDD

The government has sent clear signals that monitoring of progress towards sustainable development is an integral part of its strategy (DPMC, 2003, pp. 27-28). At present, however, monitoring of the environmental effects of urban development (low impact or otherwise) has fallen into a wide gap between high level policies and on-the-ground environmental baseline monitoring programmes: there is no agreed system for on-going baseline monitoring of the environmental or other effects of low impact – or indeed, conventional urban development – in relation to such policies.

Any framework proposed must be consistent with Resource Management and Local Government Act requirements that issues and outcomes are clearly identified, and aims to help communities and resource / asset managers gather information that helps determine whether or not changes in plans and practices are contributing to progress towards community outcomes agreed in LTCCPs and regional and district plans, as well as other significant planning documents such as asset, catchment management, transport and structure plans.

Indicators are increasingly used as tools for community engagement (source) and the LTCCP process could be an excellent forum for enabling a dialogue amongst researchers, elected representatives, resource managers and communities. There is a body of best practice available to help the programme researchers do this.

Research also shows that this work is weak, both internationally and in New Zealand, so together with the LTCCP process, the LIUDD programme has the potential to make a significant contribution hereby providing a strategic context for deciding which programme and technical monitoring requirements are needed to give the best feedback on effectiveness.

The literature and researcher experience also remind us that data collection is expensive and time-consuming, so parameters selected for on-going measurement must be defensible and cost-effective. This can only add rigour to the process of developing policy and evaluating its effectiveness.

Conclusions

Ultimately, the LIUDD programme researchers, together with end users including councils and developers, as well as other stakeholders, could take part in a discussion about evaluation frameworks that end users and others could use after the end of the LIUDD programme's formal funding period. This could form part of the suite of recommendations for changing plans and practices that objective 5 will produce. This framework would aim to help councils in particular measure the success of their LIUDD interventions.As one of the ways of engaging with end users, all emerging information from the LIUDD programme is being put on the Landcare Research website

http://www.landcareresearch.co.nz/research/urban/ and feedback is invited to promote a wider dialogue with a wide range of stakeholders.

Acknowledgements

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Artifact 4) Beginning the co-production experiment

This final artifact is from the end of the PhD research period. It illustrates a shift in representational practices towards more enactive practices. It is an artifact from a moment when the lexicon for the social science of sustainable development had expanded (note our pluralized references to climates and the way the term responses enabled us to navigate between climate science and climate action). We were becoming more fully resourced for engaging with the co-production of knowledge.

When we began to write the journal paper below, my colleagues and I had intended to provide a longitudinal review of the Marlborough and Waikato climate case studies discussed in chapter 5. However the literature we were reading and our efforts to understand the multiplicity of arrangement's governing New Zealand climates helped us develop a greater sense of the representational work of social science and how climate knowledge was performative.

Title

Russell, S., Greenaway, A., Carswell, F. & Weaver, S. (2013): Moving beyond "mitigation and adaptation": Examining climate change responses in New Zealand, *Local Environment*: *The International Journal of Justice and Sustainability*, doi: 10.1080/13549839.2013.792047.

Abstract

Despite the apparent failure of international negotiations and renewed criticism of the accuracy of climate science, responses to climate change continue in households, cities, fields, and meeting rooms. Notions of "doing something about", or "taking action on" or "mitigating and adapting" to climate change inform practices of carbon trading, restoring native forests, constructing wind turbines, insulating houses, using energy efficient light bulbs, and lobbying politicians for more or less of these actions. These expressions of agency in relation to climate change provide the focus of our enquiry. We found that relationships or social networks linked through local government are building capabilities to respond to climate change. However, the framework of "mitigation – adaptation" will need to be supplemented by a more diverse suite of mental models for making sense of climate change. Use of

appropriate languages, cultural reference points, and metaphors embedded in diverse histories of climates and change will assist actors in their networked climate change responses.

Keywords: climate change; action; governance; New Zealand; social networks

Introduction

In 2009, international negotiations on greenhouse gas emissions stalled and climate science was questioned in the media again (Berkhout, 2010). The promise of global action and binding agreements seemed lost. However, climate governance connects people and practices across global, national, regional, local and personal scales (Kates & Wilbanks, 2003). It is therefore about much more than the high profile negotiations between nation states for emissions targets. It is also more than the setting of strategies for cities, regions, and supply chains in responses to climate change predictions, which is currently the focus of much Intergovernmental Panel on Climate Change (IPCC) supported analysis.

Social networks are a prominent feature of climate governance (Bulkeley and Newell, 2010). Multi-stakeholder networked arrangements are argued to fulfill a leadership role in the protection of global commons (e.g. the ozone layer) (Glasbergen, 2010). Transnational networks for environmental governance have been fostered through the IPCC and United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties processes as institutionalised responses to climate change. Climate-oriented campaigns, such as 350.org or the Greenpeace Sign-on campaign, are often directed towards civil society and community-based organisations based on the argument that social networks are central to mobilising for social and environmental change.

In New Zealand (NZ), problems of climate change and ideas of what to do about it have been contested through both science and policy arenas (Greenaway & Carswell, 2009). Central government (CG) has funded research to reduce emissions in the primary sector (PS) and create business opportunities through new technologies. Local government (LG) dealt with the disestablishment of the Communities for Climate Protection – NZ (CCP-NZ) network and developed regional strategies with

the primary and energy sectors. Meanwhile, non-governmental organisations (NGOs) and community groups planted trees, insulated houses and organised recycling schemes around the country.

Recent contributions from social theorists understand climate change as one among many science-informed political and economic trajectories shaping peoples' individual and collective practices (Wilson, 2006; Aall et al., 2007; Betsill & Bulkeley, 2007; Bulkeley & Newell, 2010; Burch, 2010). Hulme (2008, p. 5) stated "If we can understand from the past something of this complex interweaving of our ideas of climate with their physical and cultural settings we may be better placed to prepare for different configurations of this relationship in the future". We aim to contribute to this goal by providing a few of the empirical details required to show the "complex interweaving" by presenting responses to climate change that seeks to move beyond the heuristic of mitigation, adaptation, impacts, and risks (Jasanoff, 2004; Hulme, 2010; Shove, 2010).

Our investigation of climate change actions considers the questions "What does it mean to take action on climate change?" and "How can we know action is being taken?" We find it useful to characterise climate change actions as capabilities (both individual and collective) that involve making, organising, and representing climates. Our position on "climate action" is informed by various theories of practice (see Giddens, 2009; Shove, 2010) with a specific focus on the idea that actions are achieved through distributed (or networked) relationships and practices. We work with the idea that climates are in the making through everyday routines and tasks, hereafter understood as practices.

Climates materialise and are responded through individual and collective practices and through intermediaries such as temperature gauges, policy documents, or trees (Latour, 2005). Climates are organised through societal institutions. This political and institutional work can be via democratic processes of consultation, election, and liaison with members of parliament or via protest, campaigns garnering public support and influencing public opinion or consumer behaviours. Climates are represented through practices that get to know, characterise, predict and respond to climate change. A range or discourses, and meaning-making processes constitute

climate change action and are constitutive of the other two elements (making and organising climates).

Our reading of literatures about both climate change and agency shows that action might take place through organisations, or communities of interest comprising networks of social relations, for example, in relation to the development of public education campaigns (Slocum, 2004a, 2004b), energy efficiency technologies (Hobson, 2006) or programmes of "climate governance" such as carbon offsetting (Paterson & Stripple, 2010). Bruun and Langlais (2003) argue that networks are a particular form of social relations where knowledge is made to enable action to be taken. Networks, in contrast to hierarchies or markets, have been identified as central steering mechanisms in modern environmental governance (Bulkeley, 2005). Social learning, organisational change, adaptive management, and collective action literatures have suggested that networked governance has been used to mobilise a broad range of environmental governance practices and aspirations that actors deem desirable (Bulkeley & Newell, 2010). Networked governance arrangements have been established across local, regional, national, or global scales through both vertical (policy to community) and horizontal governance arrangements (across communities of interest) (Lindseth, 2004; Slocum 2004a, 2004b; Hobson, 2006). Networked governance arrangements that respond to climate change are characterised by redistribution of responsibility amongst state and non-state actors (Bäckstrand, 2008; Pattberg, 2010).

We have come to understand that knowledge making for climate action is situated in relations and practice, and is bound up in the political and social ordering of institutions (Hulme, 2010; Lahsen, 2010). It is intertwined in the cognitive, behavioural, and affective elements associated with taking action on climate change (Lorenzoni et al., 2007). "Knowledge" is knowing-in-practice whereby "as a regime of competence every practice is in some sense a form of knowledge, and knowing is participating in that practice" (Wenger, 1998, p. 141). We suggest that this understanding implies a strongly relational underpinning of knowledge tied to specific communities of actors and to specific sites. This kind of relational knowledge comes from connecting, and is reciprocal between, actors and communities, with things and located in spaces. If knowledge production is as much action (a practice)

as representation (a body of statements) then how knowledge is situated and framed among the social relationships – socialities – of actors becomes an important issue for action and the very nature of agency (Pink, 2008). This leads us to consider the practices through which responses were enacted and the possibilities for action now and in the future, as well as the discourses of climate change.

Responding to climate change in NZ

NZ's annual gross emissions had risen by c. 20% between 1990 and 2011, yet the country was still expected to be a net seller of units at the completion of the first commitment period (CP1) of the Kyoto Protocol (MfE, 2009, 2011, 2012b). Climate change was regularly featured in public discourse, particularly in relation to CG announcements and international negotiations (Conference of the Parties 15, Copenhagen, December 2009).

CG's intention to "do its fair share" had been enacted by announcing a conditional target for reducing greenhouse gas emissions in August 2009 (Office of the Minister for Climate Change Issues, 2009). The government invested NZ$48.5 million investment in the NZ Agricultural Greenhouse Gas Research Centre, and the establishment of the Global Research Alliance on Agricultural Greenhouse Gas as part of the country's negotiations at Copenhagen in December 2009. The phased introduction of industrial sectors to the Emissions Trading Scheme initially established under the Climate Change Response Act 2002 was continued with the potential inclusion of the agriculture sector in 2015 (Climate Change Response (Moderated Emissions Trading) Amendment Act 2009). While awaiting further developments in international negotiations, the NZ government provided additional funding to allow the land-based sectors to adopt new practices and policies to support community waste minimisation, home insulation, and energy efficiency.

National climate policy has been recast several times, providing challenges for climate governance, undermining public confidence, and weakening support for the country to fulfill its Kyoto obligations. LG in NZ has funded and facilitated various climate change initiatives, primarily in connection with the CCP-NZ. CCP-NZ was the primary vehicle used by CG to support LG activities to reduce emissions from

their own operations and that of their communities. This programme was disestablished in June 2009 after five years of funding from the MfE.

CG continued to support mitigation schemes in regions by involving other agencies such as the Energy Efficiency and Conservation Authority (EECA) or by devolving responsibility for the administration of forestry incentives to LG through the Afforestation Grants Scheme. While public opinion sought action on the part of large emitters, LG had a mandate under the LG Act 2002 to ensure sustainable development for communities through long-term planning and a 2004 amendment to the Resource Management Act made explicit provisions for all persons exercising functions and powers to have particular regard to the effects of climate change (RMA Amendment Act 2004).

NZ's climate policy has been described as characterised by (1) a limited public understanding of scientific issues, (2) active lobbying by climate-sceptics, (3) a lack of consensus on policy directions among stakeholders and policy actors, (4) inadequate cooperation between government and business, (5) inaccurate forecasts of emissions, (6) governmental prevarication, and (7) a series of significant policy reversals (Boston, 2006). Greenaway and Carswell (2009) suggested that the contestation and coalescing of science and policy informed climate change responses in Marlborough and Waikato. They suggested that climate change responses were influenced by the international prioritisation of research for inventories, linkages between sustainable development and climate change discourses, and a general shift towards mitigation and adaptation policies. This article continues the authors' interests in human dimensions of climate change to investigate relationships between governance of, and responses to, climate change in NZ between 2008 and 2011.

Material and methods

Our examination of climate change responses in NZ was informed by a multi-method research approach that was undertaken between 2008 and 2011. Research was conducted by mapping community projects using internet searches and semi-structured interviews; and undertaking desk-based reviews of media coverage and publicly reported opinion polls, and examination of climate action networks (see Table 1). The use of multiple research methods enabled us to triangulate findings and to identify some of the ways climate change is being assembled (Collier & Ong 2005; Larner 2011; McGuirk, 2011).

Table 1. Research methods (2008–2011).

Research methods	Timeframe for data collection	Locality – sample
Mapping community projects using desk-based research	2008 and 2010	LG, NGOs, and community groups involved in 644 projects identified in 2008 and 1065 projects identified in 2010
Semi-structured interviews	May 2008 to May 2009	22 individuals from LG, primary sector (PS) (forestry, pastoral, and dairy farming), and community groups from in Marlborough and Waikato, and policy from CG agencies based in Wellington
Review of media and public opinion polls	February 2009 to February 2011	24 months of articles, blog posts, and YouTube videos collated using Factiva Database and Google Search Engine
Identifying networks	February 2008 to February 2010	16 groups, organisations, or associations established by actors engaged in climate governance with links to CG policy

In 2008 and 2010, we mapped community projects by collating a database of climate action projects around NZ. These projects were either CG initiatives, linked to LG, NGOs or community groups. Our approach was adjusted between 2008 and 2010. In 2008, projects were identified by (i) consulting a database of climate change programmes developed by CG, 1 (ii) internet searches on central and LG websites using key words (e.g. “climate change”, “sustainability”, “waste”, “education”, and “projects”), and (iii) follow-up conversations with individuals from community organisations and LG agencies to seek information on climate projects in each locality that may not have been identified through the web search. In 2010, we repeated the steps above to identify any changes from 2008 and a fourth step was

added to identify particular practices used in climate action projects to deliver their desired visions and goals.

Projects were analysed using open coding that led to the development of an emergent typology of categories to describe each project (see Table 2). We also counted the number of projects per category of project and identified the types and numbers of actors involved (e.g. LG, NGOs, and community groups). There were cases where one actor could be involved with a number of different types of projects or one project may involve a number of different actors. In 2010, practices used in projects were identified (see Table 3). Differences between 2008 and 2010 in project numbers within a category were assessed using a chi-squared test within R, and where significant were adjusted for multiple comparisons (R Core Development Team 2010).

Table 2. Typology of climate action.

Action	Description
Adaptation	Address climate change adaptation through building resilience to anticipated future changes in climate variability and change
Agriculture	Address climate change issues in agriculture, including urban agriculture
General	General category where organisation or project covers mitigation, adaptation, education, and/or advocacy dimensions of climate change
Design	Addresses design for a building or build environment
Restoration	Involves the protection or enhancement of a natural area, commonly involving the enhancement of natural regeneration within a defined area
Energy	Improve energy efficiency, involve a shift from fossil to renewable energy sources, or lower rates of energy consumption. The climate change effect of such projects is to contribute to climate change mitigation through lowering the demand for carbon intensive energy types
Mitigation	Designed to reduce greenhouse gas emissions
Policy	Designed to analyse or influence climate change public policy (mitigation and/or adaptation) at the local or national government level
PRE	Projects with the explicit aim of reducing emissions
Sustainability	Aim to reduce the ecological footprint of the actor(s) involved in the project, and in turn reduce the carbon footprint of the participating agency
Transport	Aim to reduce demand for fossil fuel-based transportation energy through fuel switching, transportation mode switching, and/or behaviour change
Urban	Focus on reducing the ecological footprint of a specified community or set of participants with a particular emphasis on an urban setting. Such projects will often address sustainability issues in an integrated fashion cutting across energy, waste, transport, food security, and/or ecological restoration themes
Waste	Focus recycling and waste stream management, including composting, liquid, and solid waste minimisation

Table 3. Practices for climate action identified in community mapping approach (2008, 2010).

Practice	Description
Advocacy	An action (usually a form of communication) that comprises a request for someone other than the advocate to undertake behaviour change or policy change
Education	Methods and innovations used by educators in their effort to be effective at either raising awareness, increasing understanding, or conveying information. Educational projects are those that offer an information service in the form of a formal educational programme, an advisory service, or public awareness programme
Facilitation	Actions designed to help someone else (other than the project proponent) undertake behaviour change. Facilitation tools are those methods used by facilitators to bring about behaviour change in their target group
Funding	Self-explanatory
Management	Actions undertaken by the project proponent within their own organisational or project boundary (e.g. inside a household, business or organisation, or inside a defined boundary where the project proponent has a management role – e.g. a parcel of land)
Networking	Participant–participant communication to facilitate behaviour change (e.g. web-based car pooling) between participants
Planning	Self-explanatory
Research	The production of information, rather than producing management outcomes
Standards	Quality assurance infrastructures designed to improve the quality of behaviour, goods, services, management, or any activity deemed relevant to the standard setting entity

We conducted semi-structured interviews with key informants involved in climate action projects3 and climate governance between May 2008 and May 2009. First, we interviewed individuals based in Marlborough and Waikato who were involved in particular climate action projects or climate governance. These localities were chosen because we had undertaken interviews there a few years earlier (Carswell et al., 2007). They also provide insights from two distinctly different regions. Waikato is largely a dairy farming region in the North Island and Marlborough is a wine growing region in the South Island. Second, we interviewed policy-makers from local and CG agencies based in Wellington.4 The interviews lasted up to 90 minutes and were audio recorded. Each interview covered particular climate action projects as well as climate governance in NZ. We asked interviewees to explain the origins, development and implementation of projects with reference information sources, relationships with other actors (domestically or internationally), and challenges or lessons learnt from these projects. Interviewees were asked to draw a map of their networks to gain insight into particular projects and the associated relationships with other actors.

Interview transcripts were coded using NVivo (2008) software into topics of activities, organisations, and networks to consider what activities were taking place, who was doing these, and where and how these activities were being undertaken. Each quotation used is accompanied by a pseudonym that indicates the sector each interviewee is connected to,5 the category of action with which they are associated (as per typology developed in the survey), and whether the quotation relates particular to projects in Marlborough, Waikato or NZ.6 These pseudonyms are also used if interviewees referred to other sectors.

Further desk-based research was conducted: first, we reviewed public opinion polls and media coverage (broadcast and social media to provide a context in which to understand interviews and survey results. A portfolio of coverage comprising articles, blog posts, YouTube videos, and publicly reported opinion polls concerning climate change over a month period was created.7 This was reviewed to (1) identify key events, organisations, and people mentioned; (2) examine how climate change had been represented, and (3) key messages being communicated over this period. The portfolio also enabled us to identify other networks, groups, and organisations

engaged in climate governance in NZ. We conducted further desk-based research to understand their respective origins, membership, and activities. This provided a map of a range of actors involved in climate governance.

Results

In this section, we examine climate change responses, hereafter described as "actions" that are involved in making, organising, and representing climates. Also, we present some practices responding to climate change in NZ and show how these were networked and contested in relation to climate actions. These actions need to be considered beyond the mitigation – adaptation framework that is common in climate change discourse.

Making climates

In 2008, we identified over 644 climate-related projects profiled on the Internet. In 2010, we identified 1065. Examining the changes between 2008 and 2010, we found an apparent 70% increase in the number of projects that could be identified as climate change oriented since 2008. This increase may partially reflect the use of an improved search methodology in 2010. Projects involving ecological restoration (50% increase; $P < 05$) and sustainability (230% increase; $P < 05$) experienced the most growth between 2008 and 2010. Waste, energy, transport, and policy initiatives also showed significant increases ($P < 05$) since 2008. The number of mitigation projects significantly decreased between the two dates ($P < 05$) (see Figure 1).

In addition to those projects identified from the surveys, we identified other projects during interviews. CG agencies were developing policies and research strategies with the PS in connection with established networks, such as the Research Innovation and Technology Transfer Technical Working Group (see Table 4). CG agencies were also working with the insurance sector to assess property-related climate risks, e.g. flooding, which were linked to global initiatives to address climate change by the insurance sector. Meanwhile LG agencies were developing energy and transport strategies involving stakeholders in a series of events and networking meetings.

Findings from the mapping of climate projects and our interviews indicated that some projects were presented as both mitigation and adaptation efforts. For example,

restoration projects that involved planting native flora adjacent to waterways are part of efforts to protect or enhance a carbon sink (mitigation) and contribute to adaptation activities through the resilience of a catchment to future climate variability. The climate change focus here is on mitigation through the protection and/or enhancement of a carbon sink or reservoir. Ecological restoration projects also make a contribution to climate change adaptation through the enhancement of the resilience of a catchment to likely future climate change impacts such as increased flood frequency or drought.

Media attention in 2009 focused on NZ's commitments through the UNFCCC, the Kyoto Protocol, and the Copenhagen Accord, but climate actions underway around the country were rarely reported. Our research identified things such as waste, trees, buildings, and roads as well as practices making legislation, project proposals and regional energy strategies were all intertwined in climate actions. Also, landfills, living rooms, conference rooms, windy ridges, and riverbanks were important yet largely unreported sites for climate action in NZ. We found that networks in NZ did create a collective knowledge of climates and that the possibilities for acting were bound up with actors' relationships to the objects and environments.

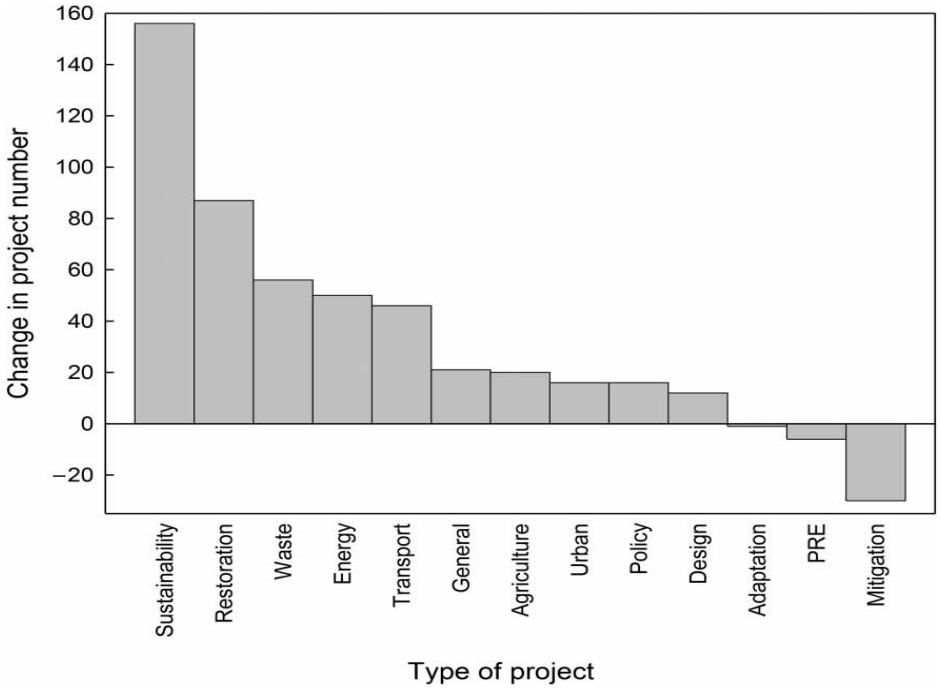

Figure 1. Change in climate actions being taken between 2008 (N ¼ 644) and 2010 (N ¼ 1065), grouped by project type (see Table 3 for descriptions of types of projects). Note: PRE, projects to reduce emissions.

Legislative changes in 2004 positioned CG to address mitigation, while LG addresses adaptation concerns. This separation of responsibilities between central and LG was far from clear in practice.

> *...the big thing in mitigation has been the ETS [Emissions Trading Scheme], or central government doing research through AgResearch8 to come up with new technologies. It does look like mitigation is central and adaptation is local. But I think it's not as clear cut – you actually have to look at the policy instrument. And whether it's more appropriate for the policy instrument you happen to be using, to be centrally or locally driven. (CG – Policy – NZ)*

We identified people taking action on climate change from across most sectors in society but those most heavily involved were NGOs, and local environmental community groups, e.g. Te Pahu Landcare group. LG organisations had the second highest number of climate change initiatives, e.g. community funding schemes and adaptation resources. LG, alongside local NGOs (LNGO) (usually community groups), were responsible for many more projects than any other groups of actors (Figure 2). Increased activity between 2008 and 2010 was observed for both local and national NGOs, LG, and CRIs (Crown Research Institutes) ($P < 05$). There was no change in the activity of the other actors. Numerous initiatives through the EECA led to CG actors also featuring quite highly in our surveys.

Table 4. Climate action networks identified through desk-based research.

Networks	Actors involved	Examples of climate action
(1) Greenhouse Policy Coalition	Major emitters from industrial sectors and mining industries	Engage with policy-makers to ensure a policy framework for a sustainable business sector Works to ensure benefits are commensurate with cross and distributed across all sectors of society
(2) NZ Farm Forestry Owners Association	Owners of forestry plantations	Share knowledge amongst members Develop innovative voluntary responses to climate policies (forestry practices) Develop codes and standards for industry players in forestry management Engage with development of policy and legislation
(3) CCP-NZ	LG authorities	Develop vehicle fleet initiatives Reduce energy consumption in corporate buildings through lighting, printing, and other operational efficiencies Review transport and stormwater design as activities to mitigate and adapt through settlement planning
(4) Climate leadership Forum	Government advisors	Revise and advise government on implementation of policies
(5) Business Opportunities Working Group (6) Adaptation Working Group (7) Research Innovation and Technology Transfer Technical Working Group	Representatives of PS and associated professional services	Provide a "sounding board" for development and implementation of strategies Provide advice to other technical groups developing policies for sectors
(8) LEARN	International scientific community	Collaborate for research to measure and mitigate effects of emissions
(9) CarbonNet (10) Pastoral Greenhouse Gases Research Consortium	Representatives from research organisations	Provide expert knowledge to parties interested in climate change mitigation Promote engagement and partnerships between researchers and industry Make investments in research activities
(11) NzOnet (12) EcoClimate Group	Scientific peers Representatives for research organisations	Convene network to facilitate and integrate research on evaluation of market-based instruments for climate change mitigation
(13) Climate Defence Network (14) 350.org (15) Sign-on and Greenpeace (16) Tck, Tck, Tck, Oxfam	Local, National, and International NGOs	Make submissions to policy documents Support international campaign events and community action around NZ Create visions for the future

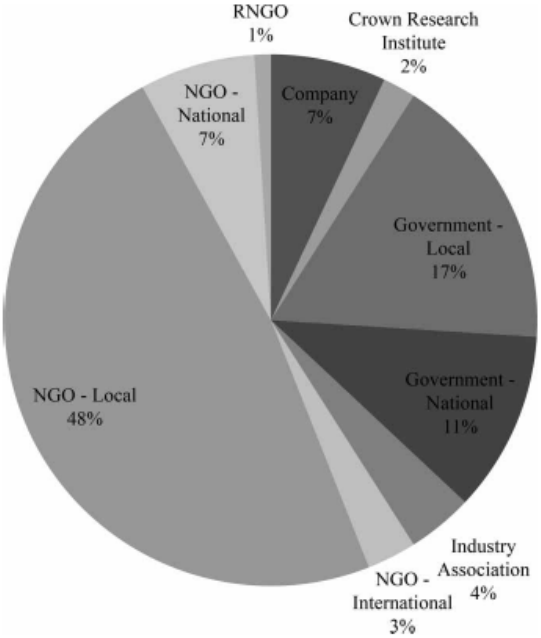

Figure 2. Types of organisations taking climate action in 2010 ($N = 1065$).

Public opinion polls relevant to climate change, published between 2006 and 2010 reveal support for the NZ government, major emitters and all New Zealanders to take action on climate change. This public discourse of "climate change requires urgent action" was at times strong, at others, more equivocal. Public opinion on the whole suggested that major emitters should take direct responsibility to reduce emissions. CG climate actions have focused on regulatory programmes, such as the Emissions Trading Scheme where major emitters, except the agriculture sector, have responsibilities under legislation; and on investment in research and innovation in the agriculture and forestry industries. Thus, the public discourse contrasts markedly with the CG's prioritising of investments in research for the development of new agrarian technologies.

In contrast to public discourse, interviewees implicitly connected climate change to other sustainability projects, for example, one person stated

> *It really doesn't matter whether it's branded climate change, and it really doesn't matter who delivers it. What you're wanting is that behaviour change (CG – Policy – NZ).*

Our research supports Bulkeley and Moser's (2007) assertion that climate change is being used as a vehicle to realise complementary policy objectives of government. We found this to be the case with regard to waste reduction, behaviour change programmes, and restoring biodiversity through tree-planting schemes. The quote above and that below illustrates two perspectives on climate change demonstrating that while behaviour change is the priority from a policy perspective, but that such behaviour is situated in a context (see Shove, 2010) where actions (including recycling waste) enable individuals and communities to engage with global issues at home, at work or in paddocks.

> *So we've given people an alternative and we've given them the opportunity to actually participate in dealing with climate change and some of those global issues in their home (LNGO – Waste – W).*

Organising climates

Opportunities for individuals, as consumers, householders, and citizens, to respond to climate change have generally been facilitated through what can be called global citizen networks previously researched by Glasbergen (2010) and Slocum (2004a, 2004b). International NGOs are catalysing this movement through international campaigns, primarily targeted at decision-making in international policy forums such as Copenhagen and Bonn. This global focus for action and leveraging of global climate change statistics (2 degrees and 350 degrees) gives attention to the global aspects. Citizen campaigns convey ideas of societal change and a strong sense of urgency to reduce emissions. However, these campaigns have not yet influenced broader domestic policy, have little foot- hold in the agri-forestry policy debates in domestic climate policy, and have weak links with the formal policy development networks in NZ.

While the CCP-NZ network was formally disestablished in 2010, LG continued to engage climate governance alongside other actors, such as NGOs and local community groups. One interviewee warned that capacity building – an important feature in the CCP network – needed to continue despite the disestablishment of the CCP-NZ.

> *... people don't recognise that capacity building is an on-going process and, you know ... you can't just sort of pull the plug or you need to be more targeted earlier on. There has to be some other different delivery mechanism (LG – CG – Policy – NZ).*

In Waikato, LG investigated opportunities to establish a regional network of climate change actors to create a regional strategy. Other actors are using social networking activities, such as the "green drinks network", or social media technologies to share information and develop connections on the topic of climate change and sustainability issues (see, for example, Celsias 2012). However, the ability of NGOs and community groups to undertaken climate action was hampered by changes to funding and associated support from government agencies.

Citizen campaigns have led to the forging links with others around the world. In Waikato, a zero-waste initiative has developed connections with other domestic and international recycling groups. These connections enable the sharing of information and development of skills concerning waste reduction. For example, the zero-waste initiative used international connections to examine what happened to waste after exportation to China.

> *As a result the network result decided to stop exporting waste on the basis that the environmental impact of our waste left in China on the villages was too great for us, so ... all we were doing was transporting our waste issues to another country which had less environ- mental controls (LNGO – Waste – W).*

The decision to deal with waste locally, rather than export it elsewhere indicated the network's development of informal rules and standards outside the national or intergovernmental arena (Glasbergen, 2010). There was a common idea that the network of relations becomes a site for governing and for action. Networks enable individual and collective actors to assemble in response to a common concern. The taking of action is part of the development of norms and practices that were characteristic of the network (such as the decision to stop exporting waste to China as a result of the environment impact discussed above).

The investigation of climate change networks led to the identification of 16 groups, organisations, or coalitions that engaged with aspects of domestic climate governance in NZ. Some networks involved actors from the PS, policy agencies, and the science community; while others involved LG and NGOs (see Table 3). In contrast to those networks linked to international campaigns, some networks that were established in direct connection with a government policy or strategy often had a limited lifespan, whereas those with less specific purposes are likely to have been in existence for longer. The Forestry Stakeholder Reference Group, for example, existed between 2007 and 2008 to provide advice on the implementation of the Emissions Trading Scheme. In contrast, the Greenhouse Policy Coalition was formed in 1996 to ensure a climate change policy framework that "secures a growing competitive, profitable and sustainable business sector", and continued to take political action through making submissions to CG and parliament and participating in research work.

Some networks are collectives that had formed in relation to policy developments, while others had a formal status established under statute as an association or a non-profitable charitable trust. Yet others emerged as part of a broader response to sustainability concerns or as part of the relationship between the Crown and Maori under the Treaty of Waitangi.10 These networks often involved traditional representatives of the agricultural economy and were fostering views within the network and with other communities on "business as usual" and the use of technology to provide solutions.

We found evidence of networks being used by policy agencies to seek consensus or facilitate relationships in the hope that these agencies would take action, seeking to integrate, or break institutional and organisational silos:

> *One of the key ways we're looking at doing that [enabling and supporting] is through the Adaptation Forum and places like that where there's actually a space for people to talk about adaptation, making sure that the direction of things that we're doing actually meeting the needs and requirements and priorities of sectors. And it's key for us that actually rather than central government going directly to land managers per se that actually we're*

engaging with local government and the sectors themselves because they're the ones primarily dealing with the land managers (CG – Policy – NZ).

I think the nice thing about it was ... when we started with the group they obviously had an interest in climate change ... but they spent the first couple of meetings just discussing what adaptation was, and why it was important. ... So that actually we found that our members were then using opportunities when there were conferences, seminars, grower meetings, board meetings, ... [and] .. . using that as an opportunity to put climate change adaptation on the table and discuss it. And by the time we'd finished the process ... I probably see them as, they've become like "adaptation champions". They're willing to put it on the table (CG – Policy – NZ).

We have been informed by Pink's (2008) description of networks as assemblages of actors, embedded in social relationships, creating and sharing knowledge, and making climate governance. One LG agency, for example, supported a waste reduction project led by a community group by awarding a contract to provide waste management services, or a community group promoting environmental education received funding and information from a CG agency. The connections and relationships between actors involved in climate actions can be linked to practices that are particular to the programme of climate governance. For example, policy initiatives concerning sustainable land management used the practice of award schemes to enable individuals, including landowners and LG, to share experiences and build a network.

Comments about "circles of concern", "circles of influence", champions, and leaders indicate that actors are realising and strengthening their networking capabilities informally to build capacity within the communities, for example, people involved with soil conservation and resilience to drought in Marlborough. Similarly, networking practices were used in Waikato to mobilise action among local communities to changing contractual arrangements around waste. Networking was one of the social practices (i.e. routines and everyday activities) identified in our surveys through which interactions occur, and where the governance of climate change was ordered and orchestrated (Shove & Walker 2010). Other practices

identified included education-type tools (used to raise awareness and provide information), and the facilitation of actions (where actors assist other individuals and organisations to undertake behaviour change (see Table 4).

Representing climates

Various actors were adapting their information resources to their particular needs and using a variety of communication channels such as newspapers, radio shows, specialised news- letters, and information pamphlets.

If you want individuals to change the way they're doing things, you then need to actually get the right information through the right channels, in the right way, to actually enable them to understand, make decisions, to change their businesses (CG – Policy – NZ).

This quote indicates the strength of belief in the power of information in enabling action. For those seeking to share information, raising awareness means weekly and monthly communication with other local and national actors and more frequent engagement with international actors at events and conferences. Such practices can be used for "targeted and tailored information provision" (Lorenzoni, Nicholson-Cole & Whitmarsh, 2007, p. 456). For those seeking to raise funds, regularity of contact with potential funders is also important (Andonova, Betsill, & Bulkeley, 2009, as observed above in connection with the CCP-NZ).

Climate change discourse in relation to many projects was infused with the language of project management. Terms such as visions, goals, outputs, and impacts created a common language shaping how community groups, LG, and businesses plan and communicate the impact of their actions. In addition, actors are developing ways to indicators and using social media technologies to support climate action projects. Indicators and reporting mechanisms are technologies used by actors to share knowledge in the network and render the impacts of such action visible to others, including policy-makers. In response to a perceived lack of information by individuals involved in the development of clean technologies, alternative web spaces have been established to enable the creation and sharing of information among parties interested in climate change (e.g. Celsias Blog, Celsias, 2012). Virtual spaces enable

networks of actors to interact, which leads to action for climate change similar to the cyber-communities identified by Bond (2010).

Instead of waiting for regulatory action by central or LG, others are engaging in conversations with friends and colleagues to encourage individual or collective action. Actors are then sharing and engaging with others about their journey of taking action by reducing emissions, mitigating remaining emissions, and educating others as the quote from a representative of a leading company illustrates:

> *We're trying to achieve basically to reduce our carbon emissions first and foremost and then mitigate the remaining carbon emissions so, you know, our efforts are much better spent in educating other industries, other people along those kinds of lines and we see that as part of our reduction projects well by opening our intellectual property up but also making reductions ourselves, keeping relevance in what we're doing and letting the people who are experts do the lobbying (Co – Sustainability – M).*

> *But it's more using a collective and participative approach that is reflective in terms of you don't own the process. You enable a process, you participate in that process, but you don't pull "I'm from CG agency, you've got to listen to me, this is how it fits in". Yeah, it's allowing a dynamic to grow, if you like, and become its own entity and using that not just for CG agency but also for the sectors as well. So, yeah, there is reciprocity (CG – Policy – NZ).*

Between 2008 and 2010, the practice of using a "climate change" label decreased from 50% to 26% of all ecological restoration and sustainability projects. Ecological restoration or sustainability projects that indirectly address climate change appear to have increased at the expense of "explicit" climate change projects (including "mitigation" projects). Interviewees who avoided labelling their projects as "climate change" cited concerns that the label might negatively impact on the uptake of the project among participants.

One interviewee observed that it might be better to encourage behaviour change through best practice land stewardship rather than linking the actions to climate change. For some, climate change is currently a topical driver, but is entwined in best

practice land stewardship. For others, climate change has been represented as a threat and has negative implications for the country, as it is no longer seen as an opportunity but rather as a cost:

> *Climate change or the whole sustainability, it can be a huge cost to us or it can be a huge opportunity, depending on how we play it out. When we first got engaged we were playing it out as an opportunity, now I think it's being played out as a cost and that's disastrous to New Zealand (Co – Sustainability – M).*

> *In terms of climate change it's raised a lot of issues with people in the community – some of the people in the community wanted it because they wanted to save the planet, some of the people wanted to do it because they wanted to be wise with resources (LNGO – Waste – W).*

As such, framing of climate change is identified as a possible factor that may constrain or enhance capacity and capability to respond to climate change (Moser, 2010b). We found that such terms, while associated with pragmatic action and focused on current action, enabled the creation and sharing of knowledge of what it means to act in the world opening up of exchange of ideas with the broader spectrum of climate action.

Discussion: moving beyond a mitigation – adaptation lens

Climate governance in NZ spanning CG policies, research projects to reduce emissions, and community actions and campaigns perpetuates a dominant market-based ideology and ecological modernisation approach in which individual actors are passive and uninvolved consumers rather than active and engaged citizens (Lindseth, 2004; Slocum, 2004a, 2004b; Hobson, 2006; Paterson & Stripple, 2010). This reflects the "severe problem" articulated by Wynne in 2010 where "the dominant prevailing scientific knowledge already carries tacit imaginations of human and social actors and capacities, and also (usually by default, without deliberate intent) imposes 'the' public meaning on the situation and its actors" (Wynne, 2010, p. 300).

Climate change action projects often connected mitigation and adaptation with activities of ecological restoration and sustainability (Bulkeley & Moser, 2007;

Lorenzoni et al., 2007; Bulkeley & Newell, 2010; Moser, 2010a & 2010b). This relationship between climate change and other concerns indicates the continuation of the sustainability journey during uncertain times for individuals and communities, which may connect with policy objectives and yet is not limited to that scope, as observed by the quote below.

> *[Climate initiatives] are not cohesive enough and it's not, it doesn't have a high strategic contextual vision because all these things are just bits of sustainability (LG – Policy – M).*

In the context of international negotiations and consternation about the climate science, climate actions were underway a diverse range of places and times, ranging from local rivers to parliamentary committee rooms. By expanding our view of climate action as broader than mitigation and adaptation, we identified many situated examples where people take action in accordance with the sociality of that particular network and where action is represented, enacted, and articulated across the land, water, air, in buildings, and in text.

Science has identified that the problems of climate will be a barrier to identifying what actions are indeed being taken to respond to this knowledge. Climate science is often central to the "we need urgent action" discourse. If knowledge and action are distributed through networks, where might a climate scientist's look for indicators of action? Until they can recognise that actions will not be framed through the dominant (over determined) climate change discourse they will not be able to see that actions are taking place and will continue to say that more must be done.

While the NZ government continued efforts under the auspices of "doing our fair share"[50], our research identified various practices, communities, and LG actors continued to take action, potentially beyond their "fair share". LG and community groups were navigating the ebb and flow of climate change policies to continue on their sustainability journeys. Our consideration of social processes that constitute

[50] "Doing our fair share" is the term used to describe the NZ government's establishment of the Emissions Trading Scheme to reduce emissions relative to developments internationally and in science. See Ministry for the Environment (2012a).

climate action led us to consider how actors have navigated paths through the contested flux of NZ's political, economic, scientific, and climatic governance trajectories.

We found climate action was shaped by present political and economic agendas as well as by people's aspirations for the future they want for NZ. We identified conceptions of climate action linking across everyday decision-making, political, and strategic activities as well as articulations of theories of social and global change that influence how actors understood themselves in the world. Our framing of action as a continuum expands the notion of "climate action" often framed as a heuristic of mitigation, adaptation, impacts, and risks. As illustrated in Table 5, actions were making climates by changing conduct in spaces and enrolling things, individuals, and communities into everyday practices such as riparian planting of flax on riverbanks; actions were also organising climates by establishing planning processes or standards to change institutional arrangements or advocacy activities to change policies; and practices of education and facilitation which were representing climates, prompted actors to consider what climate change means and raised questions of agency.

Cullen (2007, p. 228) observed that it is "only when we understand what climate change means to us and NZ society will we all be ready to embrace effective new policies to deal with it". As actions for climate change were undertaken, understanding and knowledge of climate change and sustainability was also being created. Thus "knowing things and doing things were not separable". Further, knowledge about climate change can understood as constituted through networks of people in places, at specific times, in connection with material things. Actions making, organising, and representing climates are entwined with the socialities of networks, which are situated in time and space, often in connection with material objects (Pink, 2008).

Table 5. Examples of climate action identified in interviews.

	Examples of climate action	Examples of actors involved	Site of action and space where networks are (re)created	Type of network	Practices
Making	Individual household insulation	Individual homeowners Energy conservation authority	Households Local town halls	Friendships, personal connections Communities of interest	Sharing information and experience
Organising	Development of policy	Citizen groups	Parliamentary committee rooms	Formalised networks constituted as groups, fora, coalitions organised campaign groups	Rule setting
	Social movements Lobbying government Liaison with representatives of political institutions Opinion surveys	Lobby groups	Farming field days		Capacity building Campaigning
Representing	Reframing climate change as an opportunity rather than a risk	Individuals, collectives	Conference rooms	Informal and formal networks of researchers and colleagues	Conference presentations
	Rethinking land use and interaction with the land		Meeting rooms Fields	Relationships between landowners and scientists	Conversations

Conclusions

Climate actions identified in this research indicate a broader engagement with discourses of sustainability negotiating steps towards a lower carbon economy over a longer timescale, rather than solely aligned with a mitigation – adaptation framework. This reflects the fluctuation and periodic alignment of climate governance with discourses of sustainability, the knowledge economy, and economic growth. While successive governments adopt policy positions favouring voluntary rather than mandatory action, communities in NZ continue the sustainability journey by trading carbon credits, restoring native forests, and lobbying politicians. Community actions have moved beyond the domestic governance to develop networked relationships with others around the globe.

Networks of actors remain central to renegotiation of the climate policies, the scaling back of CG support and the fluctuating engagement with climate change. Networks enable actors to respond to climate change through creation and sharing of knowledge, enrolment of material objects, and engagement in philosophical questions of what it means to act in the world. LG-facilitated networks can play a critical role in strengthening of relationships across CG and community groups in order to build capabilities within NZ to respond to climate change. Within such an exploration, opportunities may arise to engage in the creation and sharing of knowledge for climate action by actors within science and research, with policy and business communities, and with wider communities.

We conclude that this study, while highly specific to NZ, reveals the importance of paying attention to everyday responses to climate change and the new images of citizenship and climatic relationships opening up through actions. Further critical and reflexive consideration of how people make sense of and respond to climate change may create opportunities, however momentary, to transform economic and political responses to climate change. Finally, we suggest that the framework of mitigation – adaptation will need to be supplemented by a more diverse suite of mental models to make sense of climate change. Use of appropriate languages, cultural reference points, and metaphors embedded in diverse histories of climates and change will assist actors in their climate actions as well as open up dominant framings, such as

mitigation and adaptation or citizen-consumer (Barr, Gilg & Shaw, 2011) to hint at possibilities for continued action.

Notes (for Artifact 4)

- MfE's Sustainable Management Fund; the Ministry of Agriculture and Forestry's Sustainable Farming Fund; and the Communities for Climate Protection run by International Council for Local Environment Initiatives (ICLEI) (CCP-NZ).

- Version 2.11.1, R Development Core, R Project.

- Some interviewees were invited to participate on the basis that they had been involved in previous research. Others were identified using the snowballing technique.

- Wellington is the capital of NZ and the base for most CG agencies.

- For example, interviewees from LG are indicated with, those liaising between LG and CG policy agencies are; members of the PS, companies (Co) LNGO, community groups, and CG policy agencies.

- Marlborough – M, Waikato – W, New Zealand – NZ.

- Each month we collected all articles featured in the first five pages of the Factiva database; the first 50 results from the Google search engine for blogs and the first 20 YouTube videos originated in NZ or about NZ concerning climate change.

- AgResearch is a Crown Research Institute owned by the NZ government and focused on supporting the pastoral sector through scientific research and development (AgResearch, 2012).

- Green Drinks is a self-organising network of people that meet regularly in cities around the world. These social meetings often involve a presentation on environmental issues relevant to members (see www.greendrinks.org).

- The Treaty of Waitangi (Te Tiriti o Waitangi) is the treaty signed on 6 February 1840 by representatives of the British Crown and Maori chiefs.

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