ADAPTATION ECOLOGIES: CIRCUITS OF CLIMATE CHANGE FINANCE, POLICY, AND SCIENCE IN THE PACIFIC ISLANDS

by

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Abstract

In order to address the expected impacts of climate change, international development institutions have instigated adaptation projects and policies. These efforts promise to mitigate anticipated harms in vulnerable-to-climate-change social and ecological systems. This dissertation examines the operation and dissemination of adaptation projects and policies in the context of small island states in the Pacific region. It also explores the important role that the pre-eminent development institution, the World Bank, plays in programming adaptation. The research questions explored here are: i) How do finance, policy and science circulate in the name of adaptation? ii) What do the circulation of finance, policy and science achieve for adaptation in Kiribati and Solomon Islands? and iii) Why is the World Bank invested in adaptation, or what does adaptation do for the World Bank and other developmental actors? In answering these questions, I draw from multi-sited primary fieldwork, participant observation, and documentary analysis: at the World Bank in Washington, DC and Sydney, within the public bureaucracies of Australia, Kiribati, and Solomon Islands, and with regional organizations and development partners in the Pacific region.

This dissertation posits the emergence of a Pacific Adaptation Complex. The analytical concept of the Pacific Adaptation Concept recognizes the vast institutional arrangements, configurations of expertise, and project technologies that come together to make adaptation happen. Within the Complex, experimental nodes are key, as are multi-directional flows. Yet, I find that, overwhelmingly, flows and investments for adaptation are dogged by persistent stickiness, and a rhetorical attention to mobility and success that is indifferent to practical outcomes. However, the promise of adaptation finance, policy, and science works through failing development institutions and imaginaries, allowing reinvention in an era of development crisis.

Preface

The identification and design of this research program, performance of this research, and analysis of this data were undertaken by the author, Sophie Webber. The resulting dissertation is an original intellectual product. UBC Research Ethics Board certificate number H13-01518 'Climate change adaptation finance and policy in Pacific Island Countries' and H11-00709 'Climate and Pacific Society' approved the fieldwork reported in these pages. The research reported here contributed to the following publication:

Chapter 4 draws substantially on work previously published in Webber, S. (2015) Mobile Adaptation and Sticky Experiments: Circulating Best Practices and Lessons Learned in Climate Change Adaptation. *Geographical Research* 53(1): 26-38.

Chapter 3 is based on collaborative data analysis conducted by Dr. Simon Donner, Dr. Milind Kandlikar, and Sophie Webber. The author contributed to the development of the methodology, analyzed the data presented in the chapter (based on categorizations implemented by Donner and Kandlikar), and drafted the chapter independently.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

ADB	Asian Development Bank
BOM	Bureau of Meteorology
BR	Biennial Review
CCKP	Climate Change Knowledge Portal
CIF	Climate Investment Fund
COP	Conference of Parties
COSPPac	Climate and Oceans Support Program in the Pacific
CRISP	Community Resilience to Climate Change and Disaster Risk in the Solomon Islands Project
CROP	Council of Regional Organizations in the Pacific
CSIRO	Commonwealth Science and Industrial Organization
DAC	Development Assistance Committee
DFAT	Department of Foreign Affairs and Trade
ENSO	El Niño Southern Oscillation
FSF	Fast Start Finance
FSM	Federated States of Micronesia
GEF	Global Environmental Facility
GFDRR	Global Facility of Disaster Reduction and Recovery
ICCAI	International Climate Change Adaptation Initiative
ICU	Island Climate Update
IDA	International Development Association

IPCC	Intergovernmental Panel on Climate Change
KAP	Kiribati Adaptation Project
LDCF	Least Developed Countries Fund
LiDAR	Light Detection and Ranging
MDB	Multilateral Development Banks
N Marianas	Northern Mariana Islands
NAPA	National Adaptation Programmes of Action
NIWA	National Institute for Water and Atmospheric Research
NOAA	National Oceanic and Atmospheric Administration
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PACCSAP	Pacific-Australia Climate Change Science and Adaptation Planning
PCCSP	Pacific Climate Change Science Program
PIFS	Pacific Islands Forum Secretariat
PNG	Papua New Guinea
POAMA	Predictive Ocean Atmosphere Model for Australia
PPCR	Pilot Program for Climate Resilience
SCCF	Special Climate Change Fund
SCOPIC	Seasonal Climate Outlooks in Pacific Island Countries
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environmental Programme
SST	Sea Surface Temperature

TTL	Task Team Leader
UNFCCC	United Nations Framework Convention on Climate Change
WMO	World Meteorological Organization

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First and foremost, I must acknowledge the efforts of those struggling to implement some kind of adaptation in Kiribati and in Solomon Islands. Not only do I appreciate their assistance, which was invaluable for this project – in generously answering my questions and emails, sharing with me their efforts, and pointing me in fruitful directions – but I am also in awe of their hard work within the confines of the adaptation industry. To these public servants, development workers, contractors, volunteers: thank you. In particular: in Kiribati, my heartfelt thanks to a tireless engineer, for endless open and honest assistance; in Solomon Islands thanks to an Australian volunteer who was far friendlier than required and showed me Honiara; and in Melbourne, a science manager who helped me understand how their world was shifting underfoot.

In each and every research site I was assisted by those who took extraordinarily generous risks and time. In Washington, DC, Ellen, Mark, Rafi and Simon provided a home; and I cannot thank Ellen enough for her assistance downtown. During my first visit to Honiara, I had an unfortunate encounter with a sewer, and Tim, Serin, and Hugh rescued me from Number Nine hospital, and in many other respects. In Tarawa, with Anni, Claire and others, we did a lot of work, and sometimes we had fun. In Canberra, my sister and smallest brother helped. In Suva, those from the University of the South Pacific greatly assisted. And in Melbourne, many thanks to folks at the University of Melbourne School of Geography, CSIRO and BOM who helped right my course on several occasions. Elizabeth Cox provided last-minute, much needed, research assistance, and the Preston-Cox's is a fine second (third?) home.

I hope everyone gets the opportunity to work in an inspiring environment like our department, surrounded by a community of outstandingly strong women. Carolyn, Elanna, Emilia, Emily, Jessi (occasionally), May, Rosemary, Paige, Sage, and Sarah have been such

great colleagues and mentors. Of course supported by allies: Adam, Andrew, Craig, Dan, Max and Wes. There are many others too (including the CCEL and EGRG), some older, some newer. Back in Melbourne, Elissa, Gigi, Svenja and other adaptation scholars, reminded me how to do coffee. And beyond the confines of my departmental affiliations, there are too numerous dear friends to name in the collegial and wildly fun world of geography. Pancake mornings with Sarah, Adam, Elanna, Gab, Craig, and Andrew sustained me in my last, frantic year of writing. Katrina, and a few other fine friends in Melbourne often brought me back to earth in the most endearing ways – there is always footy and a swim after all.

My supervisors are always engaged, always pushing, and always supportive. I have asked a lot of them, and they consistently delivered above and beyond. Simon Donner has taken scholarly risks to support my research. He has also always asked me to question for whom we research and for whom we write. Jamie Peck has magnificent phrasing. But, his exasperated excitement and reliability is inspiring. Leila Harris asks the toughest questions although I will of course be better for it. And Jim Glassman is always open for conversation. Jon Barnett says: just get on with it; but he did also graciously support my visiting scholar status at the University of Melbourne.

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Finally, to Mum, Dad and Andrew.

Prologue

It is almost impossible to capture the multiple ecologies, societies, and histories of Pacific Islands within the pages of a dissertation. It is even more difficult to do so without reverting to some kind of essentialised romanticism, or small island exceptionalism. Capturing island socio-environments and the omnipresence of climate change is a challenge – especially beyond refrains that small island life is a panoply of tropical papaya and sunsets, that indigenous knowledge, properly respected, is sufficient to overcome expected risks, or that such sites are singular and unable to be grasped beyond first-hand experience. Yet, there is something unique about these places and conducting fieldwork there; the daily rhythm or experience of life as a researcher in Kiribati or in Solomon Islands is profoundly different from that of sitting in an office in Vancouver. One cannot escape climate variability and climate changes: the heat, the rain, the ocean are pervasive.

This dissertation has travelled to climate and adaptation hotspots: to small islands at extreme risks of climate change impacts and subject to extensive experimentation in climate change adaptation. This has allowed an unrivalled exposure of the limits of adaptation, as these small islands understandably stress such a transformational program of change. It also allowed insights into how one lives on the edge of climate change – balancing endless dancing, shared sweet tea, and loud pop music in palm-thatched communal structures, and a constant stream of consultants, volunteers, technicians, and researchers, all hoping to help alleviate anticipated impacts. Those working against climate change in small islands must learn how to manipulate the aid project-State, and to connect to the strange collection of adaptation experts. But, there is also an everyday negotiation of limited access to freshwater, the constant risk of rain- or ocean-induced flooding, and changing food availability and health-outcome regimes. In the face of

nearing climate risks, island communities live in contradiction: with access to the freshest tuna but a preference for tinned mackerel, with the most inviting aquamarine lagoons that cannot be used for swimming due to pollution, being at home on the ocean but also threatened by rising sea levels, and with learning to live with imminent impacts through easy (or perhaps uneasy) laughter.

Small island sites in the Pacific are essential to understanding the edges of international assistance and World Bank power in relation to climate change and what it means to live in a climate change hotspot. The necessity of understanding Kiribati and its mediation of anticipated climate impacts was revealed during my Master's research. In 2010 I spent an extended period of time in Tarawa speaking to different consultants and development partners about how they were responding to projected climate changes. With a desire to examine these questions from beyond the 'metropole' of the capital I also travelled to several of the outer islands. When in North Tarawa, Butaritari and Abemama I spoke with residents about their lives and their livelihoods, sharing a mug of milo and in their celebration of a recently acquired television powered by new, project-supplied, solar panels. We also discussed issues such as access to freshwater and coastal erosion and how (or whether) the local project-State has intervened productively in such socio-environmental relations. While community members recognized and articulated environmental shifts, they often reflected on climate change as a foreign construct; both caused and epistemologically produced elsewhere. Although these visits certainly inform the research I have undertaken subsequently and were important in stepping off and away from the well-worn foreign expert itinerary, this dissertation is principally concerned with how climate impacts in Kiribati have become a global question, and problem for international intervention and institutions.

Therefore, this dissertation principally grapples with the emergence of climate change adaptation within the World Bank and the operation of the Pacific Adaptation Complex. The Pacific Adaptation Complex is the highly connected institutional configuration that consists of experimental sites, aid bureaucracies, and flows of science, policy and finance between them. The Complex connects the World Bank and the Pacific Islands, development and adaptation, and projects and their programmers. Such connections and institutions make adaptation familiar and sensible, facilitating projects and investments. Rather than an extended ethnographic study of the impacts of climate change in these places, or how localized communities are coping, this is an institutional investigation of how actors are responding to the 'imminent threats' of climate change. Kiribati in particular and the Pacific region in general, with all its adaptation challenges, has become a kind of extra-local experiment. Understanding how to respond to climate change in these places necessarily involves the making of global, relational connections too.

The objects and subjects of this research are therefore situated firmly within the Pacific Adaptation Complex and its networked, multi-directional circulations. To clarify, I am, as the researcher, an active member of this Complex. As Goldman (2005) writes of the World Bank: the institution needs its researchers – and even critics – to project outwards its vision and version of the world and even to account for its presence. And this is a role I admittedly play for the Pacific Adaptation Complex too: moving in and out of key nodes and experimental sites, hoping to remain in connection with each. The purpose of this research project, then, is to understand why and how development institutions have connected themselves to the transformative program of adaptation, and to the experimental sites of adaptation investments in the Pacific region. I describe why and how that the Pacific Adaptation Complex mediates and facilitates these relationships.

The dissertation also reads recent interest in climate change at the World Bank through the cases of Kiribati and its Kiribati Adaptation Project and Solomon Islands and its Community Resilience to Climate Change and Disaster Risk in the Solomon Islands Project. The emergence of adaptation and the growing prominence of small island states is a matter of quite recent history for the development lender. As such, contemporary Pacific cases are examined in order to understand the real-time machinations of the development-adaptation conjuncture, as the World Bank transmutes from its focus on 'Knowledge' to 'Solutions.'

There are certain things that this research project is not, as a result. First, there is only a very limited engagement with the histories of Kiribati and Solomon Islands. Understanding the circulatory capacity of the idea of climate change adaptation required multi-sited research. Because of the need to situate myself in multiple institutions, multiple islands, and multiple bureaucracies the research project was bounded in other ways. This is not to say that histories of colonialism, nuclear testing, post-colonial development aid, and natural resource extraction are irrelevant to fully understanding adaptation as a program of intervention. But, it is to recognize that fully accounting for these histories is beyond the scope of this research project; instead this research is concerned with the projection of a new kind of imperial force, the growth of adaptation interventions (see also Barnett & Campbell, 2010). For Solomon Islands, histories of intervention have been written, particularly related to 'the tensions' in the late 1990s and afterwards (see for instance Bennett, 2002). While much less has been written about Kiribati and its colonial histories and presents, my Master's research (Webber, 2011) delved into these continuities in more detail. Similarly, this research goes into little detail of the role of the nation-state and of formal national politics within Pacific countries, and instead accounts for the power and work of multi-lateral and bi-lateral development – and increasingly adaptation – institutions.

Finally, I am conscious that, despite intentions, this research replicates many of the neo-colonial tendencies that are subject to critique here. A decolonial, action-activist centered research project focused on the World Bank and on adaptation was not possible in these contexts, where the role of civil society organizations is limited, or dominated by religious groups (Kuruppu & Liverman, 2011). Resistance groups in the region are quite recent, and focus principally on raising awareness about climate change in small island states and urging rich countries to take drastic action; this stance is one I wholeheartedly support and which informs my research. Despite these restrictions, where possible I have attempted dialogical research, and it is with great hope for further engagement on this topic that I continue to research for Pacific Islands and for adaptation.

Chapter 1: Introduction

1.1 The promise of adaptation

Climate change adaptation is a promise. In definitional terms, it promises to pursue and facilitate processes of adjusting "to actual or expected climate and its effects" in order to mitigate harms (IPCC, 2014b, p. 5). Principally, this is a promise made to vulnerable-to-climate-change social and ecological systems: those peoples, places, and things designated – problematized (Li, 2007) – as lacking in inherent resilient potential (see Chapter 2). The promise for these vulnerable peoples, places, and things comes largely from those who have caused climate change: large greenhouse gas emitting countries. Indeed, through their very emissions – which is to say, through fossil-fuel dependent economic development and growth – large emitting countries have tacitly enabled their own designation as not-vulnerable to climate change. Adaptation, therefore, is an idea for differentiating the vulnerable from the not vulnerable, and the promise of a transfer from the latter to the former, not as reparations, but as a coercive and benevolent salve for the anticipated impacts of climate change. Moreover, this promise (see also Rajan, 2006) sustains a vast collective, consisting of scientific and technical, developmental and financial, and policy and project endeavours and objects.

This introductory chapter outlines my approach for studying the promise of adaptation in Pacific islands and at the behest of the World Bank. For the remainder of this section, I discuss the socio-ecological and climate-changed context in which adaptation emerges as a concern in Kiribati and Solomon Islands. Following this, I introduce my research questions and the contributions towards theorizing adaptation interventions that I make in the remainder of the dissertation. Next, in the third section of this chapter, I outline the methodological approach of the Pacific Adaptation Complex within which I examine key nodes of experimental adaptation

programming, and the circulation of finance, policy and science between these sites. The fourth section presents the methods through which I collected the 'data' that animates the subsequent chapters. And finally, section five summarizes the arguments of the remaining chapters. As such, the purpose of this introductory chapter is to foreground the contributions made in the dissertation, and presents the methodologies and strategies through which these claims were enabled.

In the central Pacific nation of Kiribati, the adaptation promise is significant, perhaps existential. Recent scientific reports (Australian Bureau of Meteorology and CSIRO, 2014) find existing climate changes include: warming trends in air temperature in Tarawa (the capital) since 1950, sea-level rises of 1-4mm per year since 1993 (Australian Bureau of Meteorology and CSIRO, 2011) and evidence of changing location or intensity of the Inter-Tropical Convergence Zone, affecting rainfall in eastern Kiribati. This recent report projects that for the period to 2100: El Niño and La Niña events will continue to occur (although it remains unclear whether these will change in intensity of frequency); annual mean temperatures will continue to increase and so will 'extreme' high daily temperatures; annual rainfall will increase, with more extreme rainfall events but declines in the frequency of drought events; ocean acidification caused by warming oceans will continue along with heightened risks of coral bleaching; sea-levels will continue to rise; and there will be changes in wave directions and heights.

Adaptation projects hope to promote social and environmental changes that will alleviate these impacts in Kiribati. Such adaptations must also be understood in the context of socio-economic and environmental conditions. As vulnerability and natural hazards scholars have long argued, vulnerability is mediated – if not caused by – exposure and sensitivity to the hazard and adaptive capacities in the form of economic, social, and political factors (Adger, 2006). In

Kiribati, therefore, grounding adaptation promises requires contending with social and economic factors including rapid urbanization and population growth in Tarawa, and an economy dependent on public sector employment, Official Development Assistance (ODA), and imported foods (Barnett & Adger, 2003; Barnett & Campbell, 2010; Government of Kiribati, 2014). Adaptation efforts in the 32 atolls, reef, and limestone islands of Kiribati faces unique bio-physical challenges: little land area, low elevation, shoreline instability resulting in exposure to coastal hazards including erosion, flooding, and salinization of soil and the freshwater lens (Duvat, Magnan, & Pouget, 2013; Storey & Hunter, 2010). Adaptation projects and programs promise to alleviate the effects of these changes, and have to date principally focused on governance of the freshwater lens (the layer of freshwater that sits below the soil of the atolls) and freshwater supply and coastal protection measures. There is an increasing interest in adaptation in relation to food security and population health (Government of Kiribati, 2014).

Further west and slightly to the south of Kiribati, the promise of adaptation and the management of climate extremes are found in a different socio-ecological context. In Solomon Islands, in comparison to the 1950s and 1960s, the current climate shows evidence of: increasing temperatures, especially in minimum and night-time temperatures; some suggestions of decreasing frequency and increased intensity of rainfall events; and an average of 29 cyclones per decade with increased frequency of cyclone events in El Niño years (Australian Bureau of Meteorology and CSIRO, 2014). For the period to 2100, climate projections for Solomon Islands are similar to Kiribati. These projections suggest that: El Niño and La Niña events will continue, but with no consensus as to changes in intensity or frequency; there will be increases in annual mean temperatures and extremely high daily temperatures; extreme rainfall events will increase, so might annual rainfall, even as the frequency of drought events may decrease; again, ocean

acidification will continue alongside increases in coral bleaching events; and sea-levels will continue to rise.

Solomon Islands consists of almost a thousand islands, with 80% of the population spread throughout rural settings in 90 of these islands. People in these rural communities depend principally on the production and marketing (principally for sale in Solomon Islands) of food crops, and other commodities including timber, fish and marine crops, and oil palm (Schwarz et al., 2011). The economy has grown, in a formal sense, since the 'tensions' ended in 2003, principally on the back of exploiting natural resources through logging and mining.[1] There remains, however, limited formal income-based employment, especially in the rural areas. People, communities, and governments in Solomon Islands – like many other places – face socio-economic challenges associated with decreasing natural resources including land, and increasing populations (Schwarz et al., 2011). Physically, Solomon Islands are prone to geological, hydrological and climatic hazards. Solomon Islands experiences extreme climatic events including tropical cyclones and associated landslides, flooding, and drought, and, although unrelated to climate, the country also experiences volcanic eruptions, earthquakes and tsunamis (World Bank, 2014b). Flooding and salt-water inundation are affecting human settlements and food gardens, as are deforestation-induced landslides and erosion. Food shortages are projected to increase, and so too is it anticipated that the principal economic sectors of the country – logging, tourism, fisheries, and agriculture – will be negatively affected by climate change (World Bank, 2014b).

[1] The 'tensions' refers to the period starting in 1998 and continuing for at least four years when there were (sometimes violent) conflicts in and around Honiara between peoples from different islands.

1.2 Research questions

This dissertation wrestles with the promises of adaptation in the context of climate risks in the Pacific region. It also examines how and why the World Bank – the prominent development programmer – has become invested in climate change adaptation. I conceptualize this as a study of the Pacific Adaptation Complex: a non-circular, or uni-directional circuit (following Roy, 2010) in which the expertise, and experts of, finance, policy, and science travel. Key to the sustenance of this Complex are highly celebrated experiments with financing, policy-making, and science. In this case, an experimental policy is distinguished by its openness in activity and outcome and by its hope to be replicated in other sites. Experiments for adaptation are kept in relation to each other, and to new replication sites, through the circulation of finance, policy and science (Roberts, 2014; Roy, 2010). This dissertation problematizes the production of best-practice experiments and the connections they make, for the World Bank and in pursuit of adaptation in Kiribati and in Solomon Islands. Problematizing mobility requires taking seriously the promise and purpose of flows, but to also be attentive to how claims of mobility mask stubborn stickiness (Peck & Theodore, 2015). Throughout the chapters here, I examine the work that mobility – the idea of movement – does, while largely finding that promissory adaptive circulations are stuck in places and are historically and geographically contingent.

The following empirical and theoretical chapters also unpack how adaptation and development are entangled, or appended to each other, in key vulnerable-to-climate change sites and by developmental and scientific experts and expertise. Climate change adaptation and development are linked in numerous ways: unsustainable socio-economic development and growth has led to increasing concentrations of greenhouse gases that necessitate the need for adaptation; development may contribute to adaptation; and climate change may impede

development (Ayers & Dodman, 2010; Boyd, Grist, Juhola, & Nelson, 2009; Klein et al., 2007; Schipper & Pelling, 2006; Tanner & Mitchell, 2008). Of primary concern here, however, is that these linkages have led to the incorporation of adaptation into development agendas (Tanner & Allouche, 2011). This is nowhere more evident than the way that adaptation has been taken up by one of the principal development propagators, the World Bank, which has become committed to "ensuring all our work, all our thinking, is designed with the threat of a 4°C world in mind" (World Bank, 2012c, p. x).

The resulting adaptation at the heart of development institutions, expertise, financing, and policy-making is what I call Adaptation with a 'big A'. Here, I draw from the distinction between Development with a 'big D' and development with a 'little d' that Hart (2001) uses to differentiate between the post-second world war 'project of intervention' and development *qua* capitalism (see also Wainwright, 2008). In turn, Adaptation refers to the intentional, interventionist, and internationally programmed practice of climate change adaptation.[2] While Adaptation may appear singular in this framing, the intent is not to suggest a coordinated conspiracy but to identify some overarching characteristics and trends. Much research has focused on adaptation with a 'little a' – the immanent process of coping with climate change in specific contexts. While societies have long adapted in unplanned, spontaneous, and inherent ways – some more successfully than others (Orlove, 2005) – it remains unclear, at best, that the megaproject of Adaptation can be effective. As I demonstrate, Adaptation occurs at the heart of the development apparatus, I turn to critical development geographies, and cognate fields, to understand how it operates and what its effects are.

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[2] Where I write adaptation projects, policies, programs, or interventions (adaptation as adjective), I make reference to 'big A' Adaptation, without marking it with the capitalized nomenclature.

The research questions explored in this dissertation are:

i. How do finance, policy and science circulate in the name of adaptation?
ii. What do the circulation of Adaptation finance, policy and science achieve for Kiribati and Solomon Islands?
iii. Why is the World Bank invested in Adaptation, and what does Adaptation do for the World Bank and other developmental actors?

In seeking to elucidate how circuits of finance, policy, and science are maintained within the Pacific Adaptation Complex, I draw from geographical research about policy mobilities (Larner & Laurie, 2010; McCann, 2008; Peck, 2011; Peck & Theodore, 2015). This field of research is concerned with how policy models (people, knowledge practices, and policy products) move from place to place and are reworked in the process. Emphasizing the role of specialized expertise and powerful truth claims within global circuits of knowledge (M Goldman, 2007; McCann, 2008), policy mobilities research also demonstrates that policies travel in fits and starts, mutating and morphing in the process. In addition, mobile policies do not land in flattened spaces, but rework those landscapes in which they arrive (Peck & Theodore, 2015). This is a concern with how policies work, and how success is produced (Mosse, 2005). But it is also a concern with how climate change adaptation projects morph and mutate as they travel between experimental sites – Kiribati and Solomon Islands – and between sites of knowledge production and implementation – for example, Washington D.C. to Kiribati and back again.

Additionally, this research is concerned with the institutional affect of climate change Adaptation: what does this promise do, as work for the World Bank? As Ferguson (1994) explains, although development interventions might 'fail' in their stated objectives, they have other profound institutional impacts in terms of building and maintaining state function and

apparatuses. Also, although interventions frequently fail on their own terms from these failures are born new conceptualizations of problems and their solutions, by way of new intervention, while relying on familiar techniques (Li, 2007). Echoing the words of Goldman (2005), this dissertation asks how does climate change Adaptation work, and for whom?

1.3 Methodology: the Pacific Adaptation Complex

In following how adaptation and development are folded together, and how finance, policy and science are mobilized, I conceptualize Adaptation methodologically as a complex, with key nodes. The idea of a complex is similar to Roy's (2010) circuit. Roy's analysis of circuits of finance and truth in the making of development capital through microfinance technologies is concerned with how poverty alleviation and development are made to work by those who manage and finance anti-poverty policies and projects (see also M Goldman, 2005). Roy employs the conceptual tool of connected, yet contested, microfinance circuits through which different consensuses on microfinance success travel – circuits of truth and capital. The circuit differs from the network in suggesting that clear routes are repeatedly traversed by knowledge, experts, and finance: the same people, claims, and things pop up repeatedly in key nodes and move along similar paths. This is the case for a complex too, and particularly of the Pacific Adaptation Complex. However, a complex differs from a circuit in that it is not circular or unidirectional: instead, within the complex similar people, things, and truth claims pause in key nodes, travel in fits and starts, are stuck in some places more than others, and sometimes make surprising stop offs.

Like Roy, I follow different circuits – at institutional sites, conferences, and knowledge making, and financial innovation, centers. Also like Roy, I follow the climate change complex to a key centrality: to the World Bank offices in Washington DC. But, I also follow this complex to

its margins: to small World Bank offices in Sydney and to the small and vulnerable-to-climate change Pacific island countries of Kiribati and Solomon Islands. This research posits climate change Adaptation as a global and networked, circuitous complex through which finance and financiers, policies and policy-makers/economists, and science and scientists, as well as ideas, travel.

Roy (2012) also argues for, and I endeavour to pursue, a methodology of ethnographic circulations rather than locations as per traditional ethnography. Such global ethnographies of connection and disconnection that Ferguson (1994), Li (2007), Mitchell (2002), and Tsing (2004) produce, challenge ethnographies of ontological presence and immersion. Such presence and immersion, Roy (2012, p. 34) concedes, "can rarely be maintained in the study of circulations;" however, I hope to be attuned to the ethnographic practice of problematizing and 'denaturalizing' the 'circulatory capacity' of adaptation technologies, finance and ideas (Peck & Theodore, 2012). The 'how' questions, that Goldman (2005) and Mosse (2005) advocate, lend themselves to ethnographic styles of research in which the authors become indelibly linked to the world of development that it describes. As Goldman articulates, spending time inside the body of institutions such as the World Bank is key to taking seriously what they say and do in day-to-day activities and practices and enables the researcher to see multiple perspectives and opportunities within 'sites of encounter'. In order to answer the more complicated 'how' questions one must to delve inside the "particular sites where these ideas, concepts, policies, and loans get debated, crafted and challenged" (2005, p. 33). This study, therefore, aims for the "up-close, granulated analyses" (Peck & Theodore, 2012, p. 21) that are foundational tools of ethnography, but is also sensitive to movement and "multisited policy networks or fields" (2012, p. 24).

1.4 Research design and methods

My research questions are answered by fieldwork in a number of sites, and using a variety of methods. The critical policy and development studies that I draw from here advocates a particularly grounded approach, following policy actors and projects as they move from place to place and embed themselves in locally specific practices. A multi-sited ethnography approach, Burawoy (2000) describes, "follow[s] the things that flow". I attempt that here: mapping finance between Pacific locations, following policies and science through key nodes in the promissory Adaptation Complex. In addition to following what flows, per Burawoy, I also am attuned to blockages and detours (Ferguson, 2006). Thus, key focuses of this thesis are climate change adaptation projects in situ, but also as they circulate, recognizing and interrogating the globalizing, transnational and transformative nature of policies and projects.

1.4.1 Research sites

There are four principal institutional actors – sites, or nodes – in this study: the adaptation industry in Kiribati, in Solomon Islands, at the World Bank, and within various arms of the Government of Australia. Below, Appendix A names the interviews conducted. Let me consider each research site in turn. There are several reasons to visit Kiribati and study the Kiribati Adaptation Project (KAP). Kiribati is a site of experimentation in climate change Adaptation, and the KAP is one of the first such projects implemented by the World Bank, beginning implementation in 2002. Therefore, the KAP is a pilot project from which others draw key lessons of 'success,' and from which the World Bank draws Adaptation expertise. For many social, political, and physical reasons, Kiribati is (or, is perceived at least, especially by the World Bank) as an extreme vulnerable-to-climate change place. As such, it poses endless challenges to the KAP and to the promise of attempts to adapt. Kiribati and the KAP are thus

central to the Adaptation Complex, as a key site of experimentation in, and dissemination of, policy and project technologies. Yet, Kiribati is also a divergent site that 'stresses' and extends World Bank and developmental power – as a small country with few assets and limited experience with global financial institutions. For these reasons Kiribati and the KAP are key for exploring the circulation of adaptation finance, policy, and science.

In comparison to Kiribati, climate change in Solomon Islands has only more recently become a subject of concern for governmental policy-makers, and international development assistance. While Kiribati and Solomon Islands are Pacific neighbours, they are expected to experience climate change quite differently, both in terms of impacts and interventions. Climate change in Solomon Islands does not yet attract the same attention as it does in Kiribati: for instance, although there are numerous projects that promise to deliver adaptation, these are very recent. Indeed, the World Bank has only just begun a project that hopes to explicitly draw from the KAP – the Community Resilience to Climate Change and Disaster Risk in Solomon Islands Project (the CRISP). While the KAP and the CRISP have diverse aims, they have similar institutional affiliationsm and technical assistants and project managers. In Kiribati and Solomon Islands, therefore, I conduct a relational analysis of best-practice Adaptation, examining how notions of truth, as well as capital, move from one site to the next. In addition, both Kiribati and Solomon Islands participated in regional programs funded by the Australian aid program, which promised to encourage evidence-based adaptation policy making through the provision of climate change science. In both sites, I examined how this promise was negotiated in governmental offices.

Understanding the promise of Adaptation for Kiribati and Solomon Islands also required attending to regional organizations, mostly centered in Suva, Fiji. I do not think of Fiji as a

research site on its own terms, however. In Suva, I investigated how regional organizations based in Fiji – numerous members of the Council of Regional Organizations in the Pacific (CROP) – are involved in the Pacific Adaptation Complex, and how they assist in programming adaptation for Kiribati and Solomon Islands. Several regional projects are headquartered in Suva. Regional conferences related to climate change are also frequently held in Suva, and while there I attended several such events.

Third, I investigated climate change Adaptation – in various forms – at the World Bank in Washington DC, as well as from its regional Pacific headquarters in Sydney. Since its climate change commitments were cemented in the Strategic Framework for Development and Climate Change (World Bank, 2008), the World Bank has become a foundational programmer of adaptation in terms of finance and truth claims. With relation to the former, the World Bank spends several billion dollars of its own funds in climate change Adaptation, and manages and implements projects funded by numerous climate-related trusts (Haites, 2014; World Bank, 2014a), including its role as the interim trustee for the Green Climate Fund (Donner, Kandlikar, & Zerriffi, 2011). The projects implemented with these funds have focused on knowledge-based approaches, learning by doing, and testing innovative market methodologies. In addition to knowledge and truth in project-form, the World Bank has also invested significantly in knowledge-tools, and even scientific reports, to encourage the further integration of climate change into development (this is considered in much more detail in Chapter 2 and Chapter 4). With this in mind, several key 'global public knowledge products' have been created, including the World Development Report 2010 (World Bank, 2010a), the Economics of Adaptation Report (World Bank, 2010b), and several interactive tools such as the Climate Change Knowledge Portal (CCKP; see World Bank, 2012a). In 2014, the World Bank organized their first Massive

Open Online Course – in which I enrolled – that focused on climate change and adaptation options, building on the 'Turning Down the Heat Reports' (World Bank, 2012c).

There is something of a climate change moment at the World Bank. This moment is particularly concentrated in the areas of innovative climate finance, and knowledge driven policies/projects and sharing knowledge tools and expertise. While in Sydney and Washington DC, I sought to historicize this – to understand how it came to be that the World Bank was interested in climate change and Adaptation, how this interest was implemented in sites such as Kiribati and Solomon Islands, and what this interested does institutionally. That is, as outlined in Chapter 4, how does a concern for, and focus on, climate change related programming help stabilize the World Bank at a time of internal and external volatility. I focused on financial mechanisms, truth-generating tools (methodologies which produced certainties about anticipated climate change and how to react to these changes) and how these are put into action in experimental sites.

Finally, I conducted interviews at several Government of Australia ministries. It was not my intention to study the Australian government, but it became increasingly apparent that in order to understand the circulations of finance, science, and policy through a focus on the Pacific, one needed to pay attention to what was frequently described to me as the 'regional hegemon.' It is, after all, principally Australian finance, Australian science, and Australian sponsored policy ideas that circulate in the name of adaptation in the Pacific (often with World Bank or other global support, and relying on regional expertise and nodes of knowledge production). As a result, I focused attention on the Australian aid program and the science-

adaptation programs it supported.[3] This was difficult research; much more so than in others sites. On the one hand, AusAID – as it was then, although it has now been folded into the Department of Foreign Affairs and Trade (DFAT) – are ambivalent about researchers, and require stringent legal transactions. On the other hand, I was conducting this research during a tumultuous political period for those working in the international development assistance and climate change science and policy arena. As an example, I tried to interview representatives from the federal ministry responsible for climate change twice: on one of these instances I had planned interviews on the day that the Australian aid program (their funder) was restructured, and on the other occasion there was a leadership 'spill' (an internal Party challenge for leadership), the Labor Prime Minister was replaced, and the Ministerial portfolio was in flux. Suffice to say, in part at least to these coincidental and unfortunately timed events, I did not have much success in Canberra. I did, however, conduct some of the most fruitful and collaborative interviews with Australian federal scientists working at the Commonwealth Science and Industrial Organization (CSIRO) and the Bureau of Meteorology (BOM) in Melbourne, which allowed generative insights into climate change and development politics, and the growing importance of commercial business models in their work.

In summary, the key nodes in the Adaptation circuit investigated here are the World Bank, in Sydney and in Washington DC, the regional organizations in Suva, Fiji, the Australian

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[3] In this thesis I refer to the Australian aid program when speaking of official development assistance from the Government of Australia. I use this nomenclature as during the duration of my study – as will be explored – what was called AusAID (the Australian Agency for International Development) was dissolved and assimilated into the Australian Department of Foreign Affairs and Trade. This term, therefore, encompasses what was known as AusAID and the subcomponent of DFAT which is concerned with distributing and programming Australian ODA.

federal science and aid program, and the sites of adaptation interventions in Kiribati and Solomon Islands.[4] Appendix A outlines the interviews I conducted in each of these places. These key nodes offer vital points of comparison, as explored above. They also delve into both centralities and peripheries of the global adaptation assemblage. On the one hand, the Pacific islands are places of extreme vulnerability-to-climate change, while they are also sites of preliminary experimentation in climate change. On the other hand, large investments from development institutions are novel in most Pacific Islands, and are small in geographical scope and financial investment compared to, for instance, development programming in neighbouring South-East Asia. The Adaptation circuit explored here thus offers insights into both centers of calculation, which have circulatory capacity, but also counterforces of adaptation and development (Roy, 2012).

1.4.2 Research methods

In order to find interviewees in Kiribati, Solomon Islands, and Fiji, I consistently used a 'snow-ball' methodology. This involved asking those I interviewed to recommend others they thought would be able to help answer questions related to adaptation programs in the country, and the 'scaling up' of adaptation technologies. I then got in contact with new informants through email, or by visiting their offices and proposing a time to talk in the future. I also knew that I wanted to talk with the major development partners working in each country, and so would email, or visit their offices to set up appointments. Mostly, I spent a lot of time waiting in hallways, at front

[4] This is by no means an exhaustive list of the Pacific Adaptation Complex. Much further research could have been conducted in Suva with regional organizations, and in Samoa where the Secretariat of the Pacific Regional Environment Programme – a major climate change adaptation actor – is based. There are also experimental adaptation projects in other sites in the Pacific; but the KAP is foundational to the World Bank and the Pacific experience of adaptation.

desks, hoping to be eventually passed onto the right person – often I had to return on two or three occasions to finally speak to the person with whom I had an appointment. During these visits I interviewed project managers, consultants, technical experts, aid workers, non-governmental organization staff, and federal bureaucrats who labour in pursuit of Adaptation. I interviewed as many people as possible working in the broadly defined 'adaptation space' and attended several related functions, conferences, and presentations. In these sites, my focus was to access narratives and understandings that would allow for analysis that grounded globalizing imaginaries, best-practice policies. And I also sought to understand how global circulations are locally embedded through interviews, observations and reading reports. My approach to interviews in the Australian government was similar – taking advantage of whatever leads I had and asking people to recommend other potential informants.

The World Bank was somewhat different; although I did rely on snowballing strategies, this was not sufficient. I started with those working on the Pacific Island projects of interest – emailing project managers, desk officers, and technical experts who had worked or were working on the KAP and the CRISP. But, I also wanted to talk to those involved in global World Bank programming related to climate change finance and knowledge-products: in those cases I contacted authors of analytical reports, relevant blog posts, and noted experts. I was able to schedule interviews with, as an estimate, slightly less than half of those I contacted. It was also the case that the people I wanted to meet with were in the offices next to those I had just interviewed – often I would be introduced, or could just knock on the door. It was essential to mention who I had already spoken to – and the first person I interview was a recently retired, very experienced climate change programming expert: this operated as a sanction for new interviews. Having a valid visitor pass (which a generous interlocutor had provided for me) also

operated in this manner – that is, I was sanctioned to schedule new interviews, as I was already inside the offices.

Each of the in-depth, key-informant interviews I conducted involved unique questions. When conducting these expert interviews, my primary aim was to let informants speak for themselves. This meant asking informants to speak about their current roles and what had led them there. It also meant using only a semi-structured research technique, and following the informant's conversational direction. Before each interview I conducted extensive web-based research on the informant, including watching YouTube videos, finding blog posts, and reading their project summaries – and used this information to relate my interview questions to specific examples, or to modify them slightly. I also found it crucial to develop my interview questions in the language of the institution: using specific jargon such as achieving Adaptation 'at-scale', comparative advantages, and opportunity costs for the World Bank. In general, each interview lasted between 45 and 90 minutes. Appendix B outlines a list of the questions I asked, and topics explored in the interviews.

Alongside these in-depth interviews, and often as a key source for asking questions in interviews, were analytical and technical reports, policies, and planning documents. I read as many of these reports possible. And I did discover that referring to reports, asking questions as to how they were formulated, the policies/politics behind them, and their knowledge claims, and grounding them in observations in countries was fruitful as a research strategy: it opened up specific lines of questioning and demonstrated my familiarity with the field. However, having triangulated claims within reports with their authors and with my observations of a project (for example), it now seems irresponsible to take reports at face value. Instead, I think of them as

coded messages – the authors, other observers or critics, and one's own observations can provide the key for unlocking such a code.

Finally, where possible and as much as possible, I relied on participant observation. On occasion, I was invited into project and strategic meetings. Although this was relatively rare, it was insightful for situating informants' claims and comments, and for assessing the progress of projects. I attended seminar series – numerous at the World Bank, and one in Fiji – and project launches. And I went to several 'industry' conferences and workshops related to climate change, mostly while I was conducting fieldwork in Kiribati, Solomon Islands, and Fiji. These events and meetings were insightful for triangulating the comments of interviewees, for learning about the landscape of adaptation policy-making, for identifying new key sources and informants, and for fine-tuning lines of questioning. While I do not frequently refer to specific conference or meeting happenings – and certainly never quote what was said – these events often serve as entry- (or reference-) points for further conversation.

1.5 Dissertation outline

This dissertation traces how the adaptation promise is sustained, contested, and recast through the circulation of finance, best-practice policy, and science. In each of the empirical chapters that follow, I demonstrate that such circulations proceed in fits and starts rather than travelling from sites of expertise to sites of experimentation smoothly and swiftly. And yet, despite the breakdown in these circulations, the promise is maintained: that is, while circulations may not succeed in their stated ambitions, they have other, no-less politically imperative, effects. The dissertation proceeds in the following manner.

1.5.1 Chapter 2

After long being relegated to secondary importance compared to mitigation concerns, climate change adaptation has emerged over the last 15 years as a vital policy and financial issue and topic of academic research. This chapter examines how, in the process of growing in importance, adaptation has been folded into the post-World War Two development apparatus. This conceptual folding of adaptation into development has occurred in three related ways: first, through vulnerability assessments and research, adaptation has become a policy-necessity for the poor and underdeveloped; second, adaptation has become the domain of development institutions, including the World Bank; and third, it is proposed that adaptation be best achieved by mainstreaming climate change into existing development institutions and programming.

As a consequence of this assimilation, I argue it is necessary to produce critical adaptation scholarship that draws from the insights of critical development studies. That is, I argue for a differentiation between Adaptation (with a 'big A'), which is the intentional, interventionist project of climate change adaptation, and adaptation (with a 'little a'), which is the immanent process of coping with climate change (drawing from Hart, 2001). Much more attention is needed on the former. I demonstrate in this chapter the conceptual gains in theorizing Adaptation and its limits when considering it as a mode of intervention in the context of churning developmental buzzwords and policy formations (Kothari, 2005; Mosse, 2005) and the pervasive history of greening development (M Goldman, 2005). Closely related to this, Adaptation must be unpacked as a 'future positive' orientation – a promise for the future (Rajan, 2006) – seeking new frameworks and methodologies for intervention. Finally, and as an entry into the chapters that follow, I argue that more sustained attention is needed to unpack the circuits of finance and truth that work for Adaptation. Although there is only a fledgling field of research concerned

with critically unpacking adaptation interventions, such research is necessary, for uncovering the limits to, and political work of, such programming.

1.5.2 Chapter 3

Drawing from diverse methodologies for accounting for climate change finance, this chapter examines trends in public financial flows associated with subsidizing Adaptation. I first review the state of global adaptation finance, finding that these investments have increased over the last few years while remaining well short of estimated adaptation finance needs. Scholars of climate finance are critical of the methodologies used to account for these flows, and argue for the need for greater investments in measurement and tracking in order to assess whether this funding is new and additional, and to hold rich emitting countries to account for their pledges. After reviewing global adaptation finance, I use a more detailed, and longer-standing database of all official development assistance in the Pacific region to outline the contours of the Pacific Adaptation Complex. In particular, I show that adaptation finance has grown in the Pacific, but explicit adaptation investments remain very few. Adaptation finance is invested unevenly throughout the region. I also demonstrate that the principal funders of Adaptation in the region are the major bilateral development partners. In addition, I show that Adaptation circulates along the same routes and through the same institutions as more traditional development investments. In sum, the enlarged adaptation finance rhetoric is not yet matched by material transformations of intervention and investments in the Pacific region.

1.5.3 Chapter 4

After mapping flows of adaptation finance in the Pacific region, I examine attempts to mobilize best-practice climate change adaptation projects. In this chapter, I explicitly draw from recent research within the field of policy mobilities, which examines how policy models are created,

how they are mobilized from experimental sites to replication sites, and how they transform and are transformative in their movement. The chapter examines how the World Bank produces the Kiribati Adaptation Project as a model for best-practice climate change adaptation policy, despite the overwhelming failure of the project to achieve its own objectives. Through the production and citation of analytical reports, best-practices are extracted from their geographical and historical specificities in order to be deployed in newer sites. Best-practices must be sufficiently prescriptive, yet vague, and create relational connections between experimental and replications sites. Then, I look to how these best-practices are incorporated into the planning and processes of the Community Resilience to Climate Change and Disaster Risk in Solomon Islands Project, finding there is limited uptake of KAP lessons. But, this example demonstrates both the work required to produce mobile projects, and the work that these models do – building internal and external legitimacy and momentum. Moreover, I demonstrate that this legitimating work is particularly necessary as the World Bank faces internal and external institutional challenges, and potential irrelevance.

1.5.4 Chapter 5

Having considered finance, and policy, in this final empirical chapter I examine the circulation – the production and consumption – of useful, actionable climate change science. Such packages of information called climate services are intended for use in adaptation policies and projects. This chapter explores how such products are made, including what kinds of transformations are required to turn climate change science into a service product: one that is useful, and that is used. Then, drawing from observations and interviews conducted in Kiribati and Solomon Islands I examine how these products are put into use in adaptation planning and policy-making. Although such products circulate from sites of production to sites of consumption in Pacific Islands, they

are rarely put to use for adaptation planning. Due to internal factors (i.e. tensions related to dynamic and uncertain climate science) and external factors [i.e. the political-economic circumstances in which climate services are produced; following Muellerleile (2013)], there are (at least) three contradictions inherent to the climate service business model which prevent further uptake. These contradictions are: (i) that climate services are facilitated through fostering relations between producers and consumers, yet the business model tries to break down such relationships; (ii) that the island decision- maker seeks accuracy and precision while these are plagued with uncertainties within climate science; and (iii) climate services seek to cultivate entrepreneurial service providers while scientists seek to maintain their objectivity. Despite these contradictions, service providers, scientists, official development assistance bureaucrats, and multilateral organizations remain future oriented, arguing that such limitations are to be overcome through further circulation of climate service products.

1.6 Conclusions

As I was putting final editing touches on this dissertation, I was involved in conversations with eminent scholars of adaptation – those who were involved in its initial conceptualizations in the 1990s. One such eminent scholar reflected with great sadness that the very best of intentions to help those vulnerable and marginalized with the ideas of adaptation and vulnerability have become an industry for the machinations of development. Indeed, as noted in the opening of this chapter, the politics and purposes of adaptation are centered on globally uneven responsibilities, deeply rooted injustices, and profound asymmetries. But the world of Adaptation unveiled in these pages has drifted far from this orientation. Instead, this dissertation shows that adaptation projects have come to serve the interests of a failing developmental imaginary, a global institution in crisis, and a cadre of development, climate, and scientific experts. By digging into

key experimental nodes, and examining the connections made between sites of intervention, I demonstrate the profound limitations of Adaptation in its existing configurations.

Observing this brings me great sadness too: some weeks ago a cyclone event brought an extreme flooding event to Tarawa reeking havoc on health and sanitation, and limiting needed access to freshwater. The same cyclone event splashed across the news for the impact it had in Vanuatu, a close neighbour of Solomon Islands. With an eye to these concerns, and with an interest in what is to be done differently and better, the following chapters argue that experimentation in Adaptation, and circulations within the Pacific Adaptation Complex are insufficient. But, it also traces how this particular configuration of adaptation came to be, suggesting it need not be so.

Chapter 2: Folding adaptation into development

2.1 Introduction

Over the last 15 years, the issue of climate change adaptation has significantly grown in importance in the international policy arena and in research communities. After long being secondary to climate change mitigation policies and agreements, the 2001 Marrakesh Accords of the United Nations Framework Convention on Climate Change (UNFCCC) introduced adaptation as an issue for negotiation, and provided preliminary financial resources for Annex II (developing) countries. Since this time, adaptation programs, policies, and research projects have proliferated. Considerable financial and technical assistance has been provided or promised – through the UNFCCC, global development and multilateral institutions, and bilateral official development assistance. Alongside financial and policy investments, adaptation as a topic of scholarly research has also gone 'viral' (Ribot, 2011); Basset and Fogelman (2013) find that the number of research articles emphasizing adaptation more than doubled between 2008 and 2011, and a Web of Science search shows 150% growth between 2011 an 2014.[5]

This chapter sustains a central claim related to the evolution of adaptation and its growing importance in the climate change arena. It demonstrates that over this period of growing adaptation importance, adaptation research and projects have been folded into the existing development policy, expertise, and financial architecture. There have been three central ways through which adaptation has been conceptually assimilated into development. Through vulnerability assessments and research, adaptation has become a policy necessity for the poor and underdeveloped, rendering them in need of development. Adaptation is also assigned to the

[5] A simple search on Web of Science which included "climate change" and "adaptation" as topics, and counted responses per year.

poor through the international climate change policy regime, which leaves the implementation of adaptation to development institutions like the World Bank. Additionally, much adaptation research argues that adaptation should be fully integrated through the practice of 'mainstreaming.' I outline these three mechanisms for integrating adaptation into development in Section 3 of this chapter.

Building upon these observations, I argue that the folding of adaptation into development necessitates an analysis that draws key insights from critical development studies. Where Section 2 outlines the critical development studies with which I engage; Section 4 presents a preliminary step towards critical adaptation studies. As I show, there are potential shortfalls in understanding, theorizing, and pursuing adaptation if these insights are ignored. A necessary first step for considering the assumptions, logics, and operation of adaptation interventions – and one that frames this chapter – is to borrow a key conceptual distinction from critical development studies. A common definition of development draws from Hart's (2001) distinction between 'little d' development and 'big D' Development (there are many other distinctions and definitions). The former – development – refers to "the development of capitalism as a geographically uneven, profoundly contradictory set of historical processes", while the latter – Development – is "defined as a post-second world war project of intervention in the 'third world' that emerged in the context of decolonization and the cold war" (Hart, 2001, p. 650; see also Cowen & Shenton, 1996). Accordingly, we must differentiate between Adaptation (with a 'big A') and adaptation (with a 'little a'); where Adaptation refers to the intentional, interventionist project of climate

change adaptation, and adaptation refers to an immanent process of coping with climate change.[6] This distinction, and a focus on the practices of Adaptation, is timely given the growth in projects towards this goal; those temporally and spatially bounded policy solutions delivered to vulnerable locales and purported to achieve adaptive communities, governments, and places.

There has been a necessary lag-time between the financing of adaptation programs throughout the 2000s, and research about these programs. Instead, research about climate change adaptation has focused on anticipated adaptation strategies or conceptual frameworks for categorizing adaptation (Biagini, Bierbaum, Stults, Dobardzic, & McNeeley, 2014), and on placed-based assessments of adaptive and potential actions (O'Brien, 2012; for one example of an examination of actually existing adaptation policies and projects, see Tompkins et al., 2010). These assessments of adaptation strategies involve hypothetical adaptation practices and climate impacts to estimate the extent to which adaptation may alleviate the effects of climate change (Smit & Wandel, 2006). As a result of this focus on future, categorized adaptation options at the expense of empirical examinations of actually-existing interventions, there are few conversations between "theory and practice" (Biagini et al., 2014, p. 98).

This chapter, therefore, is written 'for' Adaptation research and policies; which is to say it recognizes the absolute necessity for such programming while arguing that the existing developmental-style interventions are radically insufficient for meeting this need, and require sustained but constructive critique. I do not suggest that vulnerable communities and places are unaffected by climate change, nor that they do not need to adapt. Rather, I argue that greater critical attention must be paid to the ways in which adaptation is built into development

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[6] I have tried, very hard, to maintain this distinction through the dissertation. As noted, I refer to adaptation projects/policies/programs, and Adaptation, in similar ways.

apparatuses, and to the limits and contradictions that inhere to a developmentalist Adaptation. These limits and contradictions are particularly revealing when examining what interventionist Adaptation is, and is not, able to achieve in practice.

I term the concomitant research agenda, and questions that follow from this recognition, 'critical adaptation studies', which draws heavily from critical development studies. Several scholars have already begun this critical movement. Key is Hulme's (2009) proposition that scholars examine the discursive work and material manifestations of the 'idea of climate change' in changing social, economic, and political (as well as biophysical) life within co-productive 'adaptation assemblages' (Head, 2010). Following Hulme, adaptation is not just a reaction to biophysical stimuli, but an idea with political currency and mobilizing power, particularly in the world and business of development (Weisser, Bollig, Doevenspeck, & Muller-Mahn, 2014). As Weisser and colleagues argue (2014, p. 112), adaptation has 'mobilising power' as a travelling idea, and should be viewed in the "context of political debates, interests, and cultural conditions." Accordingly, societies do not only feel the impacts of climate change through changing precipitation and temperature distributions, but also through the growing imposition of climate change projects and policies (Cameron, 2012; Marino & Ribot, 2012) primarily deployed through developmental infrastructures (Gasper, Portocarrero, & St Clair, 2013; Ireland & MacKinnon, 2013; Weisser et al., 2014). The rarity of theoretically informed scholarship about Adaptation speaks to its designation as a necessary and urgent policy ambition, perhaps immune from critique, although requiring improvement (Cameron, 2012), as well as the necessary lag between Adaptation and its thorough study. Recognizing the mechanisms through which adaptation is built into development, and drawing from critical development studies is essential for constituting and conceptualizing Adaptation, and how it is rendered necessary.

2.2 Situating critical development studies

Two influential interventions (M Goldman, 2005; Mosse, 2005) in critical development studies demonstrate a tension within the field. Goldman's classification defines two major streams of development studies – post-development and pro-development. Post-development studies, exemplified by Escobar (1992, 1995) and Ferguson (1994), scrutinize the ways in which Development – the post World War Two discourse – has emerged as a dominant, singular, technical, top-down phenomenon that is driven by Northern capital, expertise and politics. This approach not only highlights the inherent contradictions of d/Development programs, but also, according to Escobar, underlines the ways in which new conditions of possibility are recreated through the resistance and rejection of d/Development. Mosse (2005) describes these studies as 'radical', in that they dismiss, outright, the institutions, potentials, and work of Development. Yet, post-development studies have been subject to critique from political economic and postcolonial perspectives. This speaks to the overly deterministic nature of post-development research which posits Development as a "a steam-roller running roughshod over the Third World with no one in the driver's seat and nothing to stop it" (M Goldman, 2005, p. 23). Despite these critiques, the field has been influential and effective, destabilizing the assumed philanthropic and technological foundations of Development, and continuing to reject the promise of any 'real' or 'pure' development through improvement (Wainwright, 2008).

In contrast to post-development, the pro-development, or instrumental, view is focused on why development fails, and seeks solutions and socio-behavioural modifications in order to improve development outcomes. As Mosse (2005) notes, the instrumental view is constantly searching for new theories, paradigms, frameworks; the orientation is 'future positive'. Thus, the concern for future pro-development research revolves around 'problem definition' and 'program

realization' where policy becomes a rational tool for problem solving. This position legitimates and expands 'big D' Development, constituting it as necessary, although subject to improvement.

This characterization is necessary for understanding Adaptation. There is no equivalent to post-development studies within our conceptual frameworks for interrogating Adaptation (although see Farbotko, 2010; Webber, 2013; Yamane, 2009 on discourses of vulnerability, and; Cameron, 2012; Ireland & MacKinnon, 2013 on the "local" in adaptation). But, as we will see below, the majority of the literature examining development and adaptation is instrumental, seeking to assimilate adaptation into existing development circuits, and make place based recommendations for improving planning objectives (O'Brien, 2012). Each of the three research contributions and policy assumptions outlined below seek to reform adaptation and development.

After outlining and critiquing pro- and post-development positions, Mosse (2005) and Goldman (2005) both chart an alternate route. The lack of engagement between the radical and instrumental directions, Mosse argues, has prevented insights into the relationships between interventions and outcomes, policy and practice provided through ethnographic work. Mosse's (2005, p. 6) approach wants to "move on from the image of duped perpetrators and victims… as well as to revise the false notion of all-powerful Western development institutions" and to examine the complexity of policy as practice. In short, this approach is not about whether development works, but how it works. Goldman's comparable path through pro- and post-development studies seeks to understand how hegemonic development is produced in sites of encounter. Like Mosse, Goldman (2005, p. 33) uses ethnography to see the sites where "ideas, concepts, policies, and loans get debated, crafted and challenged." The potentials of this third route for understanding Adaptation are explored in the subsequent sections of this chapter. Specifically, I outline how adaptation and development have become entangled over time,

through specific assimilations of the adaptation and development problem and solution. Building on the insights of critical development studies, and the analysis of adaptation and development entanglements, the final section of the paper outlines a critical adaptation studies, which historicizes waves of intervention and governance and situates the co-production of capital and truth in pursuit of Adaptation.

2.3 Evolution of adaptation and development

In this section, I outline how Adaptation, in research and practice, has been folded into development. By 'folding', I imply that adaptation – as intervention and process – has been enveloped and subsumed within the institutions, policies, and practices of Development. In many ways, Adaptation represents a new iteration or era of development practice, a reworking of those that have gone before (M Goldman, 2005). Here, I seek to highlight the mechanisms – the conceptual manoeuvres, the assimilating assumptions – through which this folding (of objective and outcome) takes place, in order to indicate that it is not inevitable, and indeed creates numerous contradictions.

In practice and in research, the relationship between adaptation and development has evolved over the last 15 years. In the 2000s, adaptation as a policy necessity and research object rose to increasing prominence after long playing second fiddle to mitigation policies, technologies, and international governance institutions. It is often argued that the increasing importance of adaptation was due to the recognition that mitigation actions had been, and will be, insufficient (Khan & Roberts, 2013; O'Brien, 2012), and that the impacts of climate change were already being felt. Some climate change some impacts will be inevitable, due to the commitment in the ocean-atmospheric system. In this section I explore the mechanisms and assumptions through which climate change adaptation is subsumed within development. I

demonstrate that there are three central – albeit overlapping and co-produced – ways through which adaptation and development are assimilated: through the long-standing vulnerability and adaptation research tradition, through the international climate change policy architecture, and through an emphasis on mainstreaming climate change into development. Respectively, these are conceptual, financial, and policy justifications for enveloping adaptation within development; each of which will be considered in turn here.

2.3.1 Vulnerability and the underdeveloped

In their earliest manifestations, studies of adaptation centered on defining and categorizing differentially distributed vulnerability (Adger, 2006) and potential ways to reduce vulnerability through adaptation policies and projects. The vulnerability tradition has an extensive history in geography, beginning with studies of environmental hazards, famine, and other shocks which aimed to denaturalize natural disasters and emphasize the social, political, and economic vectors of vulnerability (for instance, Hewitt, 1983; Watts & Bohle, 1993; Wisner, Blaikie, Cannon, & Davis, 2004; for a review, see Bassett & Fogelman, 2013). Key definitions of vulnerability, such as Adger's,[7] build on the vulnerability to hazards tradition, formulating vulnerability as a

[7] Other slightly different ones are found in Fussel (2007), O'Brien et al (2007); see also Webber (2013) for a summary and critique of this and associated approaches. However, such conceptualizations of vulnerability are not always stable formulations. Over time, studies of adaptation and vulnerability have been subject to critique due to their emphasis on accommodating and reinforcing existing political-economic conditions (Bassett & Fogelman, 2013; O'Brien, 2012). Adaptation, it is argued, fails to address the 'root causes' of vulnerability to climate change (Schipper, 2007). In order to overcome the reactive nature of adaptation, and potential maladaptive infrastructural and institutional 'lock-in', some researchers point instead to climate resilience and risk management – strategies which purport to be win-win or no regrets, independent of the climate change impacts a place or person might experience (Cannon & Muller-Mahn, 2010; Mertz, Halsnaes, Olesen, & Rasmussen, 2009). Accordingly, resilience studies emphasize fluidity and change, drawing together techniques and strategies of adaptive management, reflexive governance, and collaborative activities focused on learning, trust and

function of "the stress to which a system is exposed, its sensitivity, and its adaptive capacity" (2006, p. 269) and commonly seek to combine social, political-economic and biophysical components of a vulnerable system.

While all places and things will need to adapt in the face of climate change, some sectors and people will have to adapt more or more quickly (Adger, Huq, Brown, Conway, & Hulme, 2003; Lemos, Boyd, Tompkins, Osbahr, & Liverman, 2007). Many adaptation experts note that climate change is distinctly asymmetrical in its causes and effects. Those who will be most affected by climate change are the poor and underdeveloped, due to both the location and concentration of climate events and changes, but also to their limited ability to adapt to these changes (Burton, 2009; Fankhauser & Burton, 2011). Burton (2009) calls this the 'adaptation deficit' – the insufficient adaptation that is linked to underdevelopment. "Development, or lack thereof, is thus a critical aspect of vulnerability to climate change," suggesting the need for ameliorative investments in "basic development indicators such as income per capita, literacy, the quality of institutions, trade openness and the depth of financial markets" (Fankhauser & Burton, 2011, p. 1040).

Moreover, these vulnerable subjects are the least responsible for causing climate change. Conversely, "those who have profited from high levels of greenhouse gas emissions are the least threatened by the consequences" (Ayers & Dodman, 2010, p. 162). For instance: poor, atoll countries in the Pacific are highly vulnerable to climate change because they are very exposed

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confidence (Bahadur, Ibrahim, & Tanner, 2013; Grove, 2014). Other critics propose transformation as a strategy for coping with climate change impacts and effects. For Pelling (Pelling, 2011), our 'adaptation age' represents an opportunity to transform. Transformative adaptation, Pelling insists, is a social and political act that can address questions of sustainability and justice.

and sensitive to sea-level rise and extreme events, and they – and particularly poor people and communities within them – have limited capacity to absorb these shocks both institutionally and individually (Barnett & Campbell, 2010). According to models of vulnerability, this high vulnerability is an outcome of both the biophysical characteristics of atolls – their low-lying nature, their isolation, and their limited soils (IPCC, 2014a) – as well as political-economic factors, such as their dependence on natural resources for economic sustenance and livelihoods.

As vulnerability is largely concentrated among the poor, the poor are the recipients of Adaptation: those processes, policies, and practices that will ameliorate their exposure and sensitivity and increase their adaptive capacity. A large body of research within geography and cognate disciplines "analyses and assesses how households, communities, sectors and society in general can respond to changing conditions and new risks" (O'Brien, 2012, p. 667; for instance Adger, Lorenzoni, & O'Brien, 2009). Primarily, this research reiterates the Intergovernmental Panel on Climate Change (IPCC) definitions of adaptation as "the process of adjustment to actual or expected climate and its effects… [that] seeks to moderate or avoid harm or exploit beneficial opportunities" (IPCC, 2014b, p. 5; older definitions are similar). Thus, Bassett and Fogelman (2013) find that 70% of articles discussing climate change adaptation in core journals repeat IPCC definitions of vulnerability and methodologies of alleviation. This, and cognate, methodologies follow a linear "sequence of analyses beginning with projection of future emissions trends, moving on to the development of climate scenarios, thence to biophysical impact studies and the identification of adaptive options" (Kelly & Adger, 2000, pp. 326–7).

In addition, adaptive options are principally located in 'development planning' organizations and logics. As such, Adaptation "is firmly embedded within the dominant development paradigm and effectively treats climate change as an externality" (K. Brown, 2011,

p. 28). Scholars continuously note that Adaptation actions will be "akin to development activities" (Schipper & Pelling, 2006, p. 27). It is hypothesized that "increased economic output . . . should eventually lead to poverty eradication and… to a reduction in vulnerability to climatic extreme events" (Suarez and Ribot, in Schipper & Pelling, 2006, p. 27). Similarly, Klein et al (2007, 25) argue that "vulnerability to climate change can therefore be reduced… by development aimed at improving the living conditions and access to resources for those experiencing the impacts, as this will enhance adaptive capacity." Thus, Watson and Ackerman (2000, p. 24) forcefully argue that climate change Adaptation does note precipitate "a different or new strategy."

Recently, for instance, Fankhauser and McDermott (2014; see also Burton, 2009) argued that inclusive economic growth policies are essential for boosting 'adaptation demand' and reducing the 'adaptation deficit.' Accordingly, "low-income countries are less able to deal with climate events because they lack the institutional, financial or technological capacity to adapt effectively" (Fankhauser & McDermott, 2014, p. 9). Specifically, Fankhauser and McDermott argue that adaptation has a demand effect and an efficiency effect, whereby rich countries will demand more adaptation (due to its positive income elasticity) and whereby rich countries have more assets – "good public services, sound institutions and the ability to process knowledge" – which have spillover effects for adaptation (2014, p. 10). As a result, adaptation is enhanced in rich countries, and lacking in poor countries.

It is a 'recurring theme' in the climate change adaptation literature, that "development is the best form of adaptation" (Mearns & Norton, 2010, p. 30) as "development actions can address multiple sources of vulnerability" and achieve 'win-win' development and adaptation objectives (Bassett & Fogelman, 2013, p. 51). Scholars and development practitioners hope to

contain contradictions between adaptation and development, instead suggesting that the two concerns are positively related, if not unified. Climate change reaffirms the need for economic development as key to enabling adaptive capacity and reducing vulnerabilities. To this end, new developmental programs continue to be funded under the label of climate change adaptation and existing development projects are rebranded. These projects may contribute to enhancing adaptive capacity, but may also be a simple catch-phrase for categorizing diverse, and at times growth driven, development agendas (Bowen, Cochrane, & Fankhauser, 2012; Ireland & MacKinnon, 2013). This is both a policy and conceptual challenge, as "to date, much of the literature on climate change adaptation and development aid has reflected developmentalist paradigms… often framed within a logic that situates the idea of development aid (and often of the development sector) as legitimate, natural, and necessary" (Ireland & MacKinnon, 2013, p. 159). As will be explored further below, one of the principal ways Adaptation comes to the fore in development programming is through the technology of climate change mainstreaming, which concentrates on improving and adjusting the development sector (M Goldman, 2005; Mosse, 2004).

2.3.2 The international adaptation policy and financial architecture

The section above demonstrated that discourses of vulnerability inextricably link Adaptation, as a program of change, to the poor. While this argument recognizes that poor people and poor countries will be affected by climate change, and that these impacts and abilities to cope with them are unevenly distributed; I suggest that it is foundational to our understanding of adaptation that the poor are constructed as the principal the recipients of such programming. Adaptation hopes to transform poor subjects into flexible, resilient, and resourceful ones. In addition to

ontological problematizations of vulnerability inhering to poor subjects, Adaptation is tied to development through the international policy and financial architecture within the UNFCCC.

As an object of policy and financial investment, adaptation was cemented at the 2001 Conference of Parties in Marrakesh, Morocco, where international delegates recognized the importance of Adaptation and formalized new funding mechanisms through the Marrakesh Accords (Adger et al., 2003). Until COP7 in 2001, the UNFCCC had primarily focused on mitigation, and many involved in climate change negotiations rejected any attempts to consider adaptation (Schipper, 2007). It was thought that adaptation would perilously detract attention from mitigation attempts, was defeatist, or was an implicit acceptance of responsibility from large-emitters for causing climate change (Ayers & Dodman, 2010; Khan & Roberts, 2013; Schipper, 2006). Over time, the dichotomy between adaptation and mitigation as a policy choice has eroded, and adaptation has emerged, although as a narrowly construed technical response to anticipated biophysical impacts (rather than process of political, economic, and social change; Khan & Roberts, 2013). This shift was in no small part due to lobbying by small-island developing states (Mace, 2005). Indeed, echoing assumptions explored above, through the UNFCCC adaptation is considered a 'developing country' question (Schipper, 2006).

The central problematic of adaptation negotiations is financing: who will pay for Adaptation, will it be additional to development funding, and how will this funding be administered and governed? Establishing funding mechanisms and operationalizing them builds the machineries of Adaptation. The Marrakesh Accords of 2001 created several financial mechanisms for Adaptation: the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF) and the Adaptation Fund. The Adaptation Fund operates somewhat differently to the vast majority of adaptation focused financial modalities. The Fund secures its

contributions through a two per-cent levy on all projects funded through the Clean Development Mechanisms and, therefore, is not beholden to claims of financial crises induced fiscal austerity (Khan & Roberts, 2013). The Adaptation Fund is governed independently of existing development structures with an independent board. And the Adaptation Fund is a 'direct access' modality, where countries can make direct applications for program funding which they can use to implement projects and policies independent of developmental intermediaries. In contrast, the LDCF and the SCCF are both replenished by voluntary pledges from bilateral contributors; the former supports developing countries in preparing and implementing their compulsory National Adaptation Programmes of Action (NAPA), and the latter finances climate change activities including mitigation, technology transfer, and adaptation. Both of these mechanisms are deployed through the Global Environment Facility, which also manages the Strategic Priority for Adaptation that finances pilot adaptation projects.

During the 2000s, following the establishment of these financial mechanisms in 2001, Adaptation grew in prominence and importance, culminating in numerous monetary pledges of support through the UNFCCC process. Just as COP15 in 2009 in Copenhagen failed comprehensively in its mitigation efforts, that meeting did secure, or secure promises of, considerable financial and political support for Adaptation. This was cemented in 2010 with the Cancun Accords announcing pledges of thirty billion dollars in 'Fast-Start Finance' between 2010 and 2012, to be scaled up to one hundred billion dollars annually for climate finance (see Chapter 3 for summaries of disbursements; Donner et al., 2011; Tanner & Allouche, 2011). The Green Climate Fund (GCF) – established to manage an unstated portion of this hundred billion dollars – will balance mitigation and adaptation in its funding priorities and both this and Fast-Start Finance will flow through various channels, including bilateral and multilateral Official

Development Assistance, the Global Environment Facility (GEF), and other UNFCCC mechanisms. At the Lima COP20 in December 2014, the GCF met its initial capitalization target of USD10 billion.

In practice, these adaptation financial mechanisms are intimately related to complications and flows in development finance. Much of the money which is devoted to climate change adaptation has been directly withdrawn from Official Development Assistance. For instance, an Oxfam study found that of the funds earmarked as fast-start finance, only 33% was new, and only 24% additional to existing development contributions (Oxfam, 2012), although methodologies for categorizing adaptation finance generate divergent results. It is hard to see how development and climate change financing will remain separate, given that contributions for climate finance to the developing world – if met – would dwarf existing official development assistance budgets from major donors (Donner et al., 2011).

Adaptation funds are deployed through existing multi-lateral development banks – principally the GEF in partnership with the World Bank. As adaptation is coded as a development issue in both vulnerability studies and in the UNFCCC, most adaptation finance is managed by the GEF through its SCCF and LDCF, and therefore placed at the heart of Developmental machinery (Khan & Roberts, 2013; see Biagini et al., 2014 for a discussion of GEF projects). The GEF and the World Bank have an intimate relationship: the World Bank established the GEF in 1991 in consultation with the UNEP and UNDP as a trust fund to finance its global environmental projects, and indeed is still hosted by the World Bank compound in Washington, D.C. Commentators deplore the World Bank's and the GEF's brand of global managerialist Adaptation (Adger et al., 2003; Ayers & Huq, 2009; Haigh, 2011; Ireland & MacKinnon, 2013; Seballos & Kreft, 2011; Tanner & Allouche, 2011).

Entangling adaptation finance within existing development institutions has led recipients to report difficulties in accessing funding. Those who attempt to access these financial mechanisms report complications related to bureaucratic procedure in application, the high transaction costs of working with the Global Environment Facility and their implementation partners, and hefty reporting requirements (Ayers & Huq, 2009). Difficulties in access and implementation are augmented in the cases of the LDCF and SCCF, where the GEF will only provide funding for the additional costs of a program due to climate change. Consider this illustrative example from Tuvalu (Ayers & Huq, 2009). Through the NAPA process, Tuvalu aimed to invest in coastal infrastructure to stem shoreline erosion – a 'development' issue compounded by climate change. As UNFCCC mechanisms will meet only the costs accrued due to climate change, the project team must complete complicated calculations of the percentage of project costs associated with development or with adaptation, even though the costs of financing the development 'slice' of the infrastructure is prohibitive relative to Tuvaluan resources.

As an object of international policy and programming, adaptation and development are intertwined, with adaptation projects often subsumed within – and also actively remaking – existing development institutions. In practice, this relation is messy and duplicitous. For instance, one of the projects examined in this dissertation, the Kiribati Adaptation Project (KAP), obtained funding from the Government of Australia through its 'Fast-Start Finance' climate change commitments (which is supposed to be new and additional to existing development funding; but in this case it was obviously not), dispersed via the former AusAID, and also from the Government of Australia through its Global Environment Facility pledges. Both of these sources of finance for adaptation are deployed through the World Bank, which also provides grant

finance for the KAP. Additionally, the KAP draws from scientific and technical contributions from regional projects, World Bank investments, and other bilateral initiatives.

2.3.3 Mainstreaming

Adaptation is folded into development institutions and projects through the uneven distribution of vulnerability which is concentrated on the underdeveloped, and through the international financial mechanisms that plug program implementation into existing development apparatuses. These two mechanisms for assimilating adaptation and development culminate in the idea and practice of 'mainstreaming.' In recognizing the impact that climate change will have on development efforts, researchers, non-governmental organizations (NGOs), international development banks and agencies and other development actors have increasingly begun to incorporate anticipations about climate change into their work (Ayers & Dodman, 2010; Boyd et al., 2009; Tanner & Allouche, 2011). As a result, development actors have become climate actors, "believing they have the skills, experience, local knowledge and networks to undertake locally appropriate vulnerability reduction activities that increase resilience to a range of factors including climate change" (Ayers & Huq, 2009, p. 164). Mainstreaming has principally been used to refer to development projects and policies, but the term can also apply to national, local, and sectoral planning (Huq & Reid, 2004), or can be used to describe climate change and development finance, where existing official development assistance can be redirected to climate change adaptation-related interventions.

The 'mainstreaming' concept is borrowed from previous development regimes, where gender or participation concerns were mainstreamed into development practice (Klein et al., 2007). It is a practice that requires information about future climate change impacts be incorporated into future and current development plans to promote adaption to climate change

(Ayers, Huq, Faisal, & Hussain, 2014; Huq, Reid, Konate, Sokona, & Crick, 2004; Klein, 2010; Schipper & Pelling, 2006) and secure current investments (Klein et al., 2007). There are different approaches to mainstreaming climate change into development assistance. There can be stand alone, or impacts-based, mainstreaming, which responds directly to projected climate change impacts (Tanner & Mitchell, 2008) in a particular location or for a planned investment (Klein, 2010). This might include technical adaptation interventions such as irrigation schemes or disaster early-warning systems. Similarly, development interventions can be adjusted slightly to incorporate climate change projections, such that development investments are climate-proofed (Ayers & Dodman, 2010). This is exemplified in the Poverty Reduction Strategies of the World Bank that now also emphasize reducing vulnerability, and measure success against vulnerability indicators (Kok, Metz, Verhagen, & van Rooijen, 2008), even though such measurements remain a research challenge (Lemos et al., 2007). Climate proofing the Poverty Reduction Strategies involves "systematically evaluating development strategies, policies and projects on their climate dimension… checking whether climate vulnerability is reduced, GHG [greenhouse gas] emissions are minimized, parallel climate change decision-making structures are avoided" (Kok et al., 2008, p. 106). Climate proofing might also involve screening development portfolios or policies to assess their exposure to climate risks. However, these stand-alone, or 'mainstreaming minimum' approaches have been criticized for failing to address the underlying vulnerability of poor or underdeveloped populations (Ayers et al., 2014).

In contrast, 'mainstreaming plus' is a more holistic approach, where development interventions explicitly aim to reduce vulnerability, and climate change is considered to require more than technical actions (Fankhauser & Schmidt-Traub, 2011; Klein et al., 2007; Schipper & Pelling, 2006). In this case, practitioners act on the assumption that development interventions

and climate change interventions are similar, with the difference lying in their goals, problem definition, and strategies, and not in their tools (Ayers & Dodman, 2010; Boyd et al., 2009). Such development interventions have in the past been implemented to address "wars, famines, plagues, epidemics, global economic recessions, restructurings, natural hazards and other stressors" (Lemos et al., 2007, p. 27; see also Mercer, 2010 for the close relationship between adaptation and disaster risk reduction). Many development practitioners implement traditionally defined development projects in the name of climate change adaptation, only sometimes with minor alterations. For example, conditional cash transfer programs – a fairly novel development practice – are thought to contribute to climate change adaptation by: "a) meeting existing basic needs, ... b) helping the poor respond to climate-related shocks, c) reducing the pressure to engage in coping strategies which weaken long-term adaptive capacity, d) helping vulnerable households to better manage risk, ... e) transferring money for investment in long-term livelihood and adaptive capacity improvement, and f) facilitating mobility and livelihood transitions" (Wood, 2011, p. 1).

Similarly, a popular climate change Adaptation tool is the Community Based Adaptation project, the practices of which are closely derived from community based development interventions (Ayers & Dodman, 2010). Such 'bottom-up' strategies hope to move on from 'top-down' adaptation assessment, which provide only very basic indicators of climate change variables, and fail to account for adaptation actions (van Aalst, Cannon, & Burton, 2008). In contrast to top-down approaches, van Aalst and colleagues (2008) suggest that involving local stakeholders, their current experiences of climate and socio-economic conditions, and empirical observations, is necessary to develop programs that address climate impacts. Such a community-based adaptation approach emphasizes that adaptation decisions are "local and place-based…

and contextually specified" (Ayers & Forsyth, 2009, p. 26). Ayers and Forsyth (2009, p. 26) provide the example from Bangladesh where a project is "working with local communities in this district to develop ways that farmers can grow food on flooded land, using a process of community-led identification and prioritization of natural resource management options and technologies." As a result, farmers have adopted innovative floating gardens to grow vegetables and provide sustenance even during floods. Engaging communities to this end requires establishing trust, communication, and adaptation options. But, "once set up, a [community based] adaptation project looks much like any standard development project (e.g. for water harvesting in drought conditions)… the adaptation element introduces the community to the notion of climate risk and then factors that into their activities" (Huq & Reid, 2004, p. 2).

An assumption underlying the mainstreaming approach is that with the addition of climate projections and planning, development interventions will become successful Adaptation interventions. These assumptions are evident even among 'mainstreaming plus' approaches. For example, in a recent update of their long-standing mainstreaming framework (Ayers & Huq, 2009; Huq et al., 2004), Huq, Ayers and colleagues (2014) argue for four necessary and sufficient steps to achieving mainstreaming which include: (i) raising awareness of the importance and relevance of climate change to development; (ii) providing this information to development practitioners and policy makers; (iii) piloting potential adaptation projects; and (iv) fully integrating adaptation into development planning and policy. While, the authors recognize – drawing from their experience of national and sectoral adaptation programing in Bangladesh – that their assumption of the linearity of this mainstreaming process was overly simplistic, they maintain that these four steps constitute meaningful mainstreaming in a "patchwork of processes, stakeholders, and approaches that converge or coexist" (2014, p. 48). They remain confident in

their step-wise mainstreaming approach, despite evidence of lack of ministerial and governmental coordination, sudden loss of institutional memory due to brain-drain, and continued funding of ad-hoc adaptation or development programs.

In addition to potential benefits to addressing climate change, proponents hope mainstreaming might also offer an opportunity to reform, remake and revitalize development. Thus, climate change is presented both as a potential saboteur of development or as a stimulant for "dominant modes of capitalist development" by means of the rushing inflow of climate finance through development institutions (Tanner & Allouche, 2011), and the political attention devoted to climate change (Mercer, 2010). For Pelling (2011, p. 3), climate change adaptation presents a profound "opportunity for social reform, for the questioning of values that drive inequalities in development and our unsustainable relationship with the environment." Thus, Pelling (2011, p. 167) wants to reposition adaptation as offering prospects for transforming the social and power relations of our time, and for "reconfigur[ing] the meaning and trajectory of development." Here, adaptation "is seen to take the development agenda further" where this requires 'reshuffling' development to a climate adjusted future (Schipper, 2007, p. 3 see also section 2.2.1). To the question of whether adaptation is a "new opening to revisit some long-standing problems of environment and development in an innovative way" as Soussan and Burton ask (in Schipper, 2007, p. 3), the response form mainstreaming proponents is an assertive yes.

In summary, this section of the chapter has demonstrated the ways that adaptation (and Adaptation – the idea and the practice) has been worked into the existing apparatuses of development. Jointly these assumptions find a target population, provide policy and financial imperative, suggest project technologies for administering adaptation, and operate together to

reinforce interventionist Adaptation. It is important to recognize that it is neither automatic nor natural that adaptation is folded into development. Indeed, highlighting the intellectual and practical mechanisms through which this folding has happened, and demonstrating the historical contexts in which this relationship has evolved, suggests that there are alternate paths not taken. This convergence of adaptation and development requires that we think historically and conceptually about development in order to understand and situate adaptation. In other words, the following section of the chapter proposes an intellectual and conceptual 'mainstreaming' of critical adaptation and development studies.

2.4 For critical adaptation studies

In this section of the chapter, I lay out key insights from critical development studies that help us better conceptualize adaptation given its entanglement with development. I choose to highlight these insights as they stem directly from my empirical research and subsequently speak to themes taken up throughout this dissertation. This is a modified version of 'mainstreaming' that suggests there are significant intellectual and policy gains to be made by bringing critical development studies to bear on the Adaptation enterprise. Given that the previous section of this chapter demonstrated that adaptation has been folded into development, I link adaptation as a policy and project ambition to the greening of development. Given this, an examination of the regimes of expertise and circulations of finance is necessary for conceptualizing how Adaptation works.

Upon failure and critique, hegemonic development regimes are continually reformulated, articulating new allegiances and new objectives (M Goldman, 2005, 2007). As an example, contemporary development within multilateral institutions has shifted to increasingly incorporate environmental and social concerns, following civil society critique of 'green neoliberalism.'

Thus, a legitimacy crisis at the World Bank, spurred by extensive and public criticism of its financial support for environmentally and socially damaging large infrastructure projects, was met with a greener, softer bank. In another case, participation – a broad suite of alternative development practices that include a focus on communities, local knowledge, and diverse participation – rose swiftly to address claims of dispossession of marginalised populations. In parallel to environmentalist concerns, participation was once a radical program for critiquing large development interventions, but it became a methodology for cementing class power and gender hierarchies through processes of project design and modeling (Bebbington, Guggenheim, Olson, & Woolcock, 2004; Kothari, 2005; Mosse, 2005; Sylvester, 1999). These two cases echo a larger institutional trend, where once celebrated, then critiqued policy paradigms are continually replaced: "the 'new' turns attention away form the 'old' (recurring problems, challenges), mobilizes new energy and resources, and inaugurates a 'fresh' start" (Kapoor, 2008, p. 68).

So how might climate change Adaptation operate in this churning machine of development regimes? And can we trace greening trends through to the contemporary adaptation conjuncture? We know from above that the broad suite of programs and policies to cope with the impacts of climate change have undergone continued redefinition and refinement. In conceptual terms, planned or reactive adaptation appears rigid and may cause maladaptive infrastructural lock-in, leading to the offer of win-win or no-regrets policies (Barnett, 2001; Smit & Pilifosova, 2003). Then arrived resilience, which was also critiqued for vagueness and for its synergies with entrepreneurial neoliberalization (Head, 2010; Walker & Cooper, 2011). Resilience has been followed by calls for transformative adaptation that addresses the root causes of vulnerability,

and sees climate change as an opportunity to fundamentally change socio-economic systems (O'Brien, 2012; Pelling, 2011).

Similarly, as a development objective, policy circles continually redefine adaptation interventions. The World Bank has shifted from Green Growth (World Bank, 2012b) strategies, which perhaps focused too much on growth, development that is climate resilient (Gitay et al., 2013), which depended too heavily on climate change models, to robust decision-making under deep uncertainty (Hallegatte, Shah, Lempert, Brown, & Gill, 2012; Kalra et al., 2014). This latest model is a RAND Corporation decisions making tool for testing investment decisions against climate risks using Monte Carlo simulations for optimal outcomes. For instance a

> Ghanian hydraulic engineer would be wise to ask climate modelers to predict precipitation rates for the next 100 years, instead of relying on historical data. But using a climate model might be dangerously misleading: projections of future precipitation changes in the region are very uncertain (Hallegatte et al., 2012, p. 4).

According to robust decision-making, the engineer should determine a variety of scenarios over which the water infrastructure investment will perform well. Being built into development, climate change adaptation programs also rise and fall swiftly, with the new being carved out of the remainders of the old. Mosse (2005) reminds us to be skeptical of how influential such policy reformulations are, finding – in relation to participatory frameworks – that policy orientations have little influence on project practices. Although individual project problematizations may not alter practices, the cumulative waves of Adaptation emphases are successfully transformative within the developmental imaginary.

Like development, the idea of adaptation requires constant "conceptual work to remain politically and morally viable" (Mosse, 2005, p. 1). Scholars and international policy actors

constantly refine, revise, and reframe adaptation in order to account for past failures: from vulnerability analyses, to resilience, and transformation. Within this instrumental view, the question becomes how to frame the problem of adaptation – identifying problems and deficiencies to be rectified – and finding appropriate policies and projects. Here, adaptation scholars concentrate on the failures and successes of Adaptation, leading to attempts to improve framings, and find the right management solutions and technical modifications (M Goldman, 2005). This 'will to improve' (Li, 2007) – improve Development itself, as well as underdeveloped and climate-effected populations – is precisely defined by its proponents' desire to help: to improve conditions in vulnerable-to-climate-change places. Yet, there is a gap here, "between what is attempted and what is accomplished" despite the persistence and stubbornness of this will to improve which feeds off its "failures and shortcomings" (Li, 2007, p. 1).

Adaptation is 'future positive', seeking new frameworks – from adaptation to resilience to transformation – for adaptation policy and planning to contribute to the climate change impasse. But, argue Goldman and Mosse, we must examine the complexity of Development, and Adaptation, in practice. Such an approach is necessary to conceptualize: how policies and practices are produced and interact, the relationships between interventions and outcomes, and how hegemonic regimes are settled.

Like the sustainable development agenda before it, the pursuit of climate change related policies within the World Bank seeks to satisfy and internalize critique. As is discussed in Chapter 4 of this dissertation, Adaptation offers new sources of, and sites for, financing, and new threats and objectives. Additionally, if the World Bank does not confront the anticipated impacts of climate change on its lending project work – as it had to with sustainability too – its purpose would be questioned and undermined. That is, the World Bank's pursuit of climate change and

associated ‘climate proofing’ of its development investments must be read in the context of both a relevancy and legitimacy crisis: where the Bank must continue to confront its demand side problem (where its biggest client countries no longer require its financial and technical assistance) and criticisms of its bureaucratic, conservative, outdated, and even ineffective, approach to development.

The churning of buzzwords and policy formulations is evident within understandings and practices of Adaptation itself, but climate change also reworks and transforms developmental interventions. Given that climate change threatens past gains and future interventions, global development managers have adaptation and mainstreaming climate change on their radars (see for example World Bank, 2012c). As such, at the World Bank climate change builds directly on environmental, disaster management, and sustainable development programming: recently the climate change ‘anchor’ has shifted out of the environment department to constitute an organization wide, and far reaching ‘beam’ and the Sustainable Development Vice Presidency and office has been rebadged the Special Envoy for Climate Change. Indeed, now climate change is accommodated across the lending portfolio, with the 2014, USD52bn replenishment of the International Development Association (IDA-17) – the Bank’s fund for their poorest client countries – now requiring all partnerships to screen for short and long term climate and disaster considerations and pursue climate resilience (Ebinger, 2014; International Development Association, 2014; World Bank, 2014d). In programming Adaptation, the World Bank shifts its target sites from the Ministries of Environment to the Ministries of Finance, with the aid of increased financial assistance directed through multilateral development institutions.

Here, we witness the consolidation of transformative climate change adaptation circuits of capital and truth, which establish and strengthen a new adaptation-development regime (Roy,

2010). In the world of poverty management, those experts who produce knowledge about the existence of poverty and program alleviation measures, are integral to setting agendas, and delivering the latest policy solutions (Roy, 2010), thus steadying an otherwise "complex and unstable network" (Roberts, 2014, p. 1031). Mobilizing and sustaining 'development capital', or 'poverty capital' – by definition in motion – requires work, and development actors must constantly seek new sites to fix demand, and maintain development legitimacy. One of the effects of the instrumental literature – which seeks to refine and improve Adaptation as a project – is to maintain and reproduce such circuits of capital and truth towards this end. Each of the three mechanisms outlined above – vulnerability discourses, the international policy and financial arena, and technologies of mainstreaming – work in tandem to prompt the incorporation of adaptation into circuits and machineries of development, that Twentieth Century idea of improvement (Li, 2007), and intervention. Through each of these positions, it is assumed that Adaptation is best delivered through developmental apparatuses, without recognizing the histories, failures, and organizing logics of such interventions.

2.5 Conclusions

This chapter argues for critical adaptation studies that examine existing adaptation projects, and their relationships to the circulation of adaptation truth and capital. Given that sufficient time has passed since preliminary adaptation investments, it is now necessary to analyze these interventions, and to do so using the conceptual insights of critical development studies. In this chapter, I first documented the mechanisms through which the adaptation financial and policy architecture, and existing literature examining adaptation and development, reinforces developmental paradigms. Following from this, I demonstrate the ways this literature is instrumental and, in contrast, demonstrate the potential insights from critical adaptation studies.

This is not to say that preliminary adaptation research is unnecessary, or fails to succinctly diagnose the uneven and imminent adaptation condition; rather, I argue that, alongside instrumental scholarly endeavour, a critical examination of the limits and contradictions of adaptation is needed.

In a critical review of adaptation and vulnerability studies about the Canadian Arctic and Indigenous populations therein, Cameron (2012) demonstrates the continuing colonial logics of this research that assimilates the Indigenous and the local, and elides non-traditional livelihood strategies. Cameron recognizes that some may reject taking time to "work out the complexities of (neo)colonial formations [as] folly" (2012, p. 112), given the urgency of climate change demands immediate adaptation policies and programs. After all, surely those implementing and practicing Adaptation, and proposing improvements for such policies and projects, are only doing so with the best of intentions. Of this, there is little doubt; for many locales, adaptation to climate change is an urgent necessity. Perhaps, then, taking the time to understand the institutional and historical context into which climate change adaptation proposals insert themselves may be construed as unnecessary and obfuscatory dallying. Yet interventionist histories are littered with such urgencies, suggesting the importance of carefully considering the demands of vulnerable peoples, and the "risks of well-meaning, benevolent intervention" (Cameron, 2012, p. 112). It is precisely in the name of good intentions and urgency that such adaptation projects and policies go understudied, and decisive and detailed critiqued is dismissed. Moreover, they deploy a false theory and practice binary in this moment of urgency in order to sideline critical approaches as too time-consuming. My critique of recent proposals for Adaptation does not aim to delay necessary and important action on climate change, but to give pause for thought about where such actions should be directed, how, and for whom. Taking time

to critique existing adaptation research does not amount to the outright rejection of development or adaptation (Wainwright, 2008). Instead, it seeks to recognize the radical insufficiency of specifically interventionist programming (Development and Adaptation) to meet the challenges that climate change poses to vulnerable places.

Chapter 3: Circulating adaptation finance and the Pacific Adaptation Complex

3.1 Introduction

A key dimension of the work of adaptation projects, and adaptation *as a* project, is the circulation of financial promises and (potential) investments. International climate change agreements increasingly recognize the financial burden of adapting to climate change and continue to assert that a significant portion of these costs lie with rich, emitting countries. While there is no consensus on definitions of climate finance (Haites, 2014), this chapter borrows from the official United Nations Framework Convention on Climate Change (UNFCCC) definition, where climate finance refers to "local, national or transnational financing, which may be drawn from public, private and alternative sources of financing" (UNFCCC, 2014). The principal concern of this chapter is a subsection of climate finance: the financial flows associated with subsidizing climate change adaptation (henceforth adaptation finance) that travel from Annex I (developed) countries to Annex II (developing) countries. If this dissertation 'follows the thing' (Cook, 2004) – where the thing is Adaptation, as investment, policy, and science – then, this chapter follows the money behind these elements.

However, this chapter 'follows the money' (Christophers, 2011) in only some respects. Christophers (2011) argues that following money must expose the 'fingerprints of exploitation' (following Harvey, 1990) and unveil the constitutive social and spatial backgrounds of money. His is a specifically Marxist project for 'unmasking the fetishism' of the commodity, money, without which political and regulatory governance of finance would "fail to address the structural and social contexts in which capitalist monies are made and moved and which,

therefore, shape key outcomes such as who makes money from money" (Christophers, 2011, p. 1082). Yet, Christophers also recognizes the numerous difficulties this entails, particularly for unraveling where money begins and ends, and because of money's in-distinguishability and unique temporal rhythms. There are two key differences between Christophers' defetishization argument and what unfolds in these pages. First, my object of concern is Adaptation, and the assumption – if not fetish – of smooth, fast financial flows in its name. Second, this argument is not programmatic, but begins the empirical work of tracing flows of finance for adaptation as they 'go global.' The chapter outlines difficulties with this endeavour, principally related to limited and incomplete data collection. While later chapters reflect on the "extended cohabitation and in situ engagement" that Peck and Theodore argue is crucial for following 'things' (2012, p. 25; see also Mosse, 2005) within the Pacific Adaptation Complex, the data presented here begin to denaturalize the promises of globalizing adaptation finance. The chapter begins by introducing global flows of adaptation finance, before concentrating in the Pacific region for a more detailed analysis of the characteristics of such investments.

In presenting an analysis of the state of adaptation moneys in the Pacific region, the goals of this chapter are twofold. First, it examines how financial investments intended to facilitate climate change adaptation, flow into and around the Pacific region. Drawing from different data sets which track and report on development finance, this chapter outlines answers to major questions in adaptation finance, including: how much investment is there in Adaptation; has this changed over time; who are the major financiers and recipients of Adaptation; are Adaptation and development finance related; and how does adaptation finance move from one place to another? These answers illustrate the shape and contours of flows, and the major nodes, of an adaptation finance circuit within the Pacific Adaptation Complex. The regional analysis

highlights that adaptation finance is unevenly distributed. Some countries receive close to their estimated adaptation finance needs, while others receive none. Although adaptation finance in the Pacific has grown over time, adaptation investments remain a small portion of development budgets, and are often driven by singular projects. The analysis also shows that many of the long-standing development partners in the region are large adaptation funders, even as there is a growing role for Multilateral Development Banks (MDBs). It is not clear, however, whether adaptation funding represents a structural shift in the circulation of development finance.

Second, this chapter outlines the state of existing debate centered on adaptation finance, and the need for greater investment in measuring and tracking climate finance flows. At the heart of these debates are both technical and political concerns: questions related to improving the accuracy of measuring and tracking climate finance flows, and related to what would be a politically just transfer for costs associated with Adaptation. However, using both global climate finance data, and the case study of the Pacific region, I argue that this debate fails to see the forest through the trees. Although it may be the case that it is difficult to assess existing flows of climate finance with precision, and especially adaptation finance, I suggest that an overriding focus on improving measurement and tracking overlooks the fact that very little money flows in the name of adaptation. It remains unclear whether improving measurement and tracking techniques will change this fact. Moreover, this preoccupation with increasing and measuring international financial flows presumes that such investments can achieve their stated objectives; that is, that greater adaptation finance is equivalent to greater adaptation.

The following section outlines existing global adaptation finance. It focuses on existing estimates of the costs of Adaptation, the current debates surrounding adaptation funding and how it should be better coordinated and tracked, and then observes existing flows of global adaptation

finance. Having situated this chapter within the contemporary literature related to funding Adaptation, this chapter follows the money within the Pacific Adaptation Complex. It discusses different methodologies for tracing money within the Complex, then it examines the geographical distribution of the location and destination of adaptation finance.

3.2 Global adaptation finance

3.2.1 Accounting for adaptation

How much adaptation money might we be following? In 2007, the UNFCCC estimated that the additional investments required to return greenhouse gas emissions to current levels by 2030 would be between USD200-210bn[8] annually (UNFCCC, 2007). They also found that adaptation costs would be in the magnitude of tens of billions of dollars per year, based on suitable scenarios. However, estimates of the investments required to overcome the costs of adaptation vary widely. For mitigation investments (those financial flows required to return carbon dioxide equivalents emission to current levels), estimates of costs range from USD50-625bn annually by 2030, and for adaptation (the costs of adapting to the impacts of climate change under certain scenarios) they range from USD30-100bn annually, with the claim that the costs of adaptation are far more difficult to predict than mitigation due to heterogeneity and complexity (Haites, 2011; Smith et al., 2011). These adaptation estimates are also confounded by the fact that there is no operational definition of adaptation, by associated difficulties in differentiating adaptation from development, and disputes related to the assignment of capital and operating costs. Methodologies for costing adaptation include: estimating the percentage of an investment that is sensitive to climate change; estimating the costs of all necessary actions outlined in a country's

[8] Unless otherwise stated, financial figures in this chapter report on current/nominal prices.

National Adaptation Programme of Action (NAPA); or, more recently, considering sector-based vulnerabilities and costs to ensure a particular level of service or welfare (World Bank, 2010b; see also Smith et al., 2011; Fankhauser, 2010). Using this latter approach, the World Bank (2010b) considers the costs of adaptation to two degrees of warming will cost between USD70-100bn per year between 2010-2050.

In the Pacific, according to recent estimates (Asian Development Bank, 2013; World Bank, 2010c), the greatest costs associated with climate changes emerge from cyclones and other extreme events. The total value of infrastructure and agricultural production at risk from climate impacts in the region is estimated to be over USD122bn (World Bank, 2013a). An Asian Development Bank (ADB; 2013) study estimates the costs of adapting to a 'worst-case' climate change scenario at USD447m or 1.5% of GDP (within a range of 214.6m-775.4m) per year until 2050; although were carbon dioxide emissions held below 450ppm, adaptation costs could remain as low as USD158m over the same period. While there is no World Bank Pacific wide estimate, they conducted a case study of Samoa that predicted the costs of adaptation ranging from USD3.5m-10.9m per year until 2040 [about 0.8-2.4% GDP; World Bank (2010b)].[9] Again, there is no equivalent estimate for Kiribati, but the country's first Joint Implementation Plan for Climate Change and Disaster Risk Management (Government of Kiribati, 2014) costs its activities at AUD103m over its implementation period, 2014-2023 (if these costs are distributed

[9] The costs were calculated by estimating sectoral costs and NAPA project costs under different climate scenarios with no change in frequency and severity of cyclone events. For some context and for a quick per capita estimate, Samoa is a country of 190,000 people, amidst a Pacific region population of some 10 million, including more than 7 million people in Papua New Guinea.

evenly over ten years, this represents approximately 6.5% of GDP each year, in 2011 constant prices).

At best, these estimates probably relate to lower bounds, and provide only an insight into the order of magnitude of the costs of adaptation. But, it is hoped that estimates of financial costs can serve to mobilize political commitments (Fankhauser, 2010). For instance, the preliminary UNFCCC 2007 estimates precipitated agreements to facilitate climate finance flows. Beginning with the Bali Action Plan in 2007, and reiterated with the Copenhagen Accord in 2009 and the Cancun Agreements in 2010, Annex I countries committed to provide 'new and additional' financial resources to Annex II countries to address climate change, reaching USD30bn in Fast Start Finance between 2010 and 2012, with a goal of mobilizing USD100bn per year by 2020. In short, estimates of the costs of adaptation vary widely. But, the highest current estimates are that adaptation investments may reach USD100bn per year globally by 2030, and estimates for costs in the Pacific range from 1-6% of GDP annually.

3.2.2 Debating global climate finance

How much adaptation finance is currently flowing? One way to follow adaptation finance is to trace different tracking and measurement devices. But tracking these global adaptation investments is plagued with difficulties: countries report their own climate finance contributions, leading to over- and mis-reporting; and there are many different, but overlapping organizations involved, making completeness difficult to achieve. These issues have been examined by a collection of critics whose purpose is to demonstrate the need to increase quantities of climate finance, to hold donors and financiers accountable to their pledges, and to argue for better governance mechanisms and innovation for further climate finance contributions (Ayers & Huq, 2009; Ciplet, Roberts, & Khan, 2013).

There remains a gap between the needs of, and current commitments for, adaptation finance (as will be demonstrated further in the following section). As a result of this gap, many critics of existing climate finance flows and providers argue for a greater role for private finance (Bowen, 2011; Stadelmann, Michaelowa, & Roberts, 2013). Some suggest that innovative forms of climate finance will be required; one example is debt relief for climate finance swaps, which could easily reach USD100bn (Fenton, Wright, Afionis, Paavola, & Huq, 2014). Other examples include harnessing completely new financial flows to address climate change, such as financial transactions taxes, or taxes on international travel (Ciplet et al., 2013).

Relatedly, a significant component of this literature remains concerned with the means to ensure that climate change related funding remains additional to development finance. On the one hand, climate change is caused largely by historical emissions from developed countries and, as recognition of this responsibility, throughout negotiations developing countries insist that climate finance should not result in a diversion of existing development assistance. While many developed countries agree with this in principle, in practice determining whether, and ensuring that, funding is new or additional depends heavily on pre-defined baselines; Smith et al (2011) find that varying the baseline results in almost all, or almost none, of the pledged Fast Start Finance can be adjudged new and additional. Moreover, many countries disagree as to the best definitions of 'new and additional', especially since almost all OECD (Organisation for Economic Co-operation and Development) countries have failed to reach their pledges of spending 0.7% of GNI on Official Development Assistance (J. Brown, Bird, & Schalatek, 2010; Stadelmann et al., 2013). That is, since many OECD countries have not yet met their development finance obligations, despite being repeatedly affirmed as a target by OECD member countries, how could adaptation finance be new or additional to this?

On the other hand, insisting on newness and additionality poses challenges for integrating and coordinating development and climate change related programming. Indeed, an 'adaptation deficit' [where poor countries are more effected by climate change impacts and events; (Fankhauser & Burton, 2011)] is linked to underdevelopment, at least in the minds of many climate change and development assistance practitioners and experts (see Chapter 2). As a result, adaptation, or adaptability, often increases when basic, but climate sensitive, development – for instance health, education, and economic growth – is pursued (Agrawal & Lemos, 2015; Fankhauser & Burton, 2011). Also, in practice ensuring additionality may cause a duplication of administrative and governance efforts (Smith et al., 2011; Zadek, 2011). Following adaptation finance demonstrates that this money is bundled together with development capital in untraceable ways.

Despite some disagreements about the sources of increased adaptation finance, there is a consensus that development and climate change would be better coordinated, and that some measure of additionality could be ensured, were there better information about past, present, and future climate related financial flows. For Brown et al (2010, p. 6), "the tracking of ODA flows is important to ensure that we know how much money is going to climate change and what may be considered additional." As noted, however, there are difficulties with measuring climate finance, with limited ability to compare different figures (Clapp, Ellis, Benn, & Corfee-Morlot, 2012; Haites, 2014; Stadelmann et al., 2013). Also, existing figures are collected principally by national governments, using diverse methodologies and interpretations of relationship to climate change, and voluntary coding. This can lead to over-reporting for political purposes; for instance Michaelowa and Michaelowa (2011) find that the general ecological preferences of a donor country and political ideologies of donor governments can lead to over-coding of the

contributions to climate change mitigation of a project. In response commentators demand the introduction of a systematic, audited and verified methodology for accounting for diverse flows of climate finance.

3.2.3 Accounting for global adaptation finance

In order to begin to explore the challenges of following adaptation money, this section reviews global adaptation finance, drawing from numerous sources and methodologies. Globally, there are several institutions and reporting mechanisms for following climate finance. The *Landscape of Climate Finance* (Buchner et al., 2014) annually reports its measurement of climate finance investments. In 2013, they found global flows of USD331bn, a decrease since 2012 principally due to the falling costs of renewable investments. Of this: USD137bn was public finance and USD193bn was private; USD164bn was concentrated in OECD countries and USD165bn in non-OECD countries; and USD34 billion flowed from OECD to non-OECD countries, a fall from 2012 of USD8bn. Most climate finance in 2013 stayed in its country of origin, and this trend is strongest among private financiers. Of this climate finance, USD191bn was invested in private entities, USD46bn went to public entities, and USD32bn flowed to a mix of public and private sources (with the remainder being too difficult to track). Mitigation comprised an overwhelming majority – 91% – of the climate finance that the *Landscape* report captured, and most of this was invested in renewable energy. In turn, only USD25bn was invested in Adaptation, an increase of USD3bn from 2012, and all of this money was public climate finance – principally in cheap debt and grants. Most of the funding for Adaptation was invested in water supply and management (58%), and the remainder in infrastructure and coastal protection (14%), disaster risk management (9%) and agriculture and forestry related activities (8%).

In addition to the *Landscape* reports, the UNFCCC hopes to improve climate finance reporting by requiring Annex I countries report their bilateral investments in their biennial update reports. However, methodologies and guidelines are varied, and countries report their own investments (Haites, 2014). The OECD development finance system provides another tracking database: the Rio Markers, which measure development assistance and its contributions to 'environmental' factors. Here, OECD countries report their official development assistance, and 'flag' if their investments are 'principally' or 'significantly' related to climate change mitigation or adaptation (see OECD, 2011).[10] Figure 3.1 shows the total reported climate change adaptation finance since the OECD began collecting adaptation data in 2010, revealing moderate increases over this period. In addition, 'principal' commitments remain lower than 'significant' commitments, and much lower than investments that are only screened for their climate change exposure, or not screened at all. Again, however, methodologies for flagging investments are diverse, and the investment's relevance to climate change can be overstated (Michaelowa & Michaelowa, 2011). Interestingly, both the OECD and UNFCCC mechanisms intend to track the same climate finance, but receive different data, as shown in Figure 3.2 (Haites, 2014; Smith et al., 2011).

[10] A project is scored as 'principal' or 'significant' in its contribution to adaptation if it "intends to reduce the vulnerability of human or natural systems to the impacts of climate change and climate-related risks" and if these are explicitly indicated in documents and specific measures (OECD, 2011). If the project activity would not have been undertaken without this adaptation objective it is 'principal'. That is, adaptation is fundamental in the project's/activity's design.

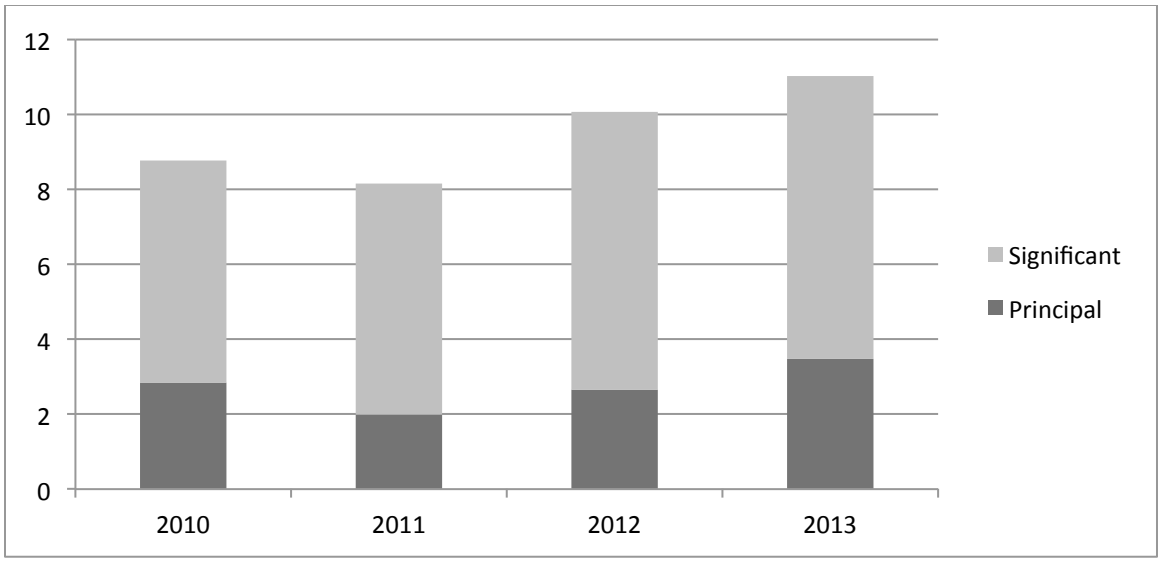

Figure 3.1: Total climate change adaptation finance reported to the OECD DAC Rio Markers (USDbn)
Source: OECD-DAC Rio Markers (2015)
Note: 2010 constant prices

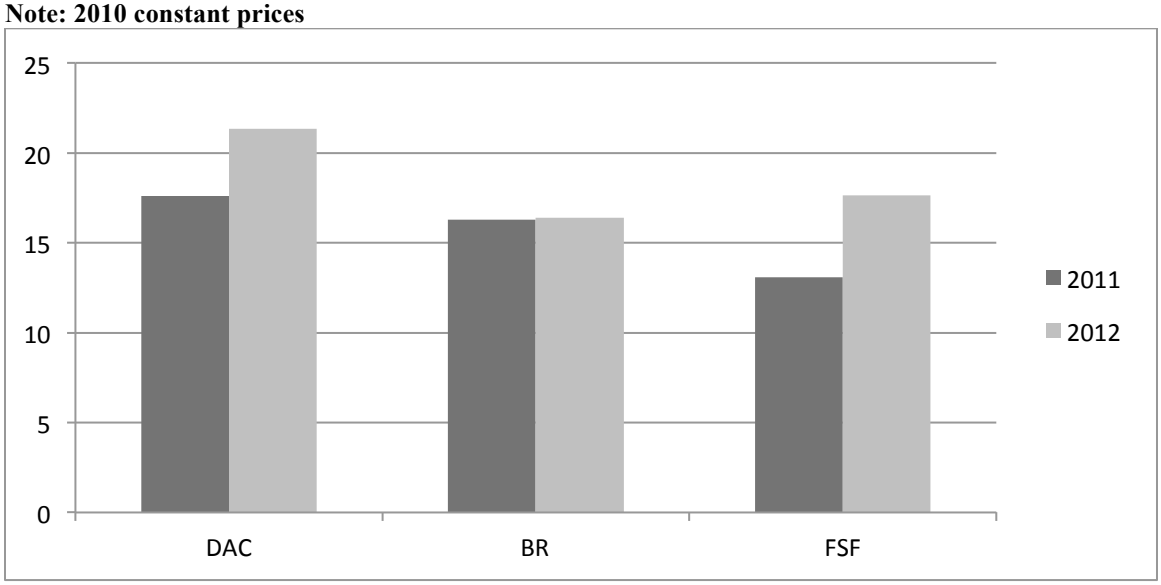

Figure 3.2: Climate change adaptation finance in 2011 and 2012 as reported to different sources (USDbn).
Source: data from Haites (2014)
Note: DAC shows the data collected by the OECD Development Assistance Committee, BR is the data reported to the UNFCCC in country's Biennial Review reports, and FSF is the data reported in the Fast Start Finance reports submitted to the UNFCCC.

Multilateral Development Banks and institutions also finance climate change related programs. The 7 MDBs that report their climate finance collectively financed USD27bn in

climate change related programs in 2012 (their own resources), and managed between USD1.6bn-2.14bn in external resources intended for climate change (Haites, 2014). However, of their own resources, only 20% were intended for Adaptation purposes, totalling USD5.4bn in 2012 with the remainder supporting mitigation actions (see Table 3.1). This financing was principally invested in developing countries, but Table 3.1 also includes support for 13 EU member states.

Climate finance also travels through specific climate change related trusts. But, investments in Adaptation from multilateral development banks vastly overshadow disbursements from Adaptation funds (Table 3.1). Since its inception in 1991, the Global Environment Facility (GEF) has provided over USD66bn for environment related activities, including climate change. However, Figure 3.3 demonstrates that this is highly uneven over time. As subcomponents of the GEF, and official funds designated to address climate change by the UNFCCC, the Least Developed Country Fund (LDCF), and the Special Climate Change Facility (SCCF) have financed over USD1.8bn and USD1.5bn in adaptation investments respectively since their inception in 2001 in the Marrakesh Accords. All of the LDCF, SCCF and GEF demonstrate general increases in financial flows over their duration, with significant dips in 2010, perhaps for external reasons (including the financial crisis) or the fact that competing climate funds were announced and Fast Start Finance pledges were committed. Climate change related projects and programs financed by these official multilateral climate funds are implemented through official partners, most commonly the World Bank, the United Nations Development Program and the United Nations Environment Program (Cadman, 2014).

	2011	2012	2013
Multilateral development bank investments			
African Development Bank	593	445	
Asian Development Bank	585	821	
European Bank for Reconstruction and Development	181	188	
European Investment Bank	225	179	
Inter-American Development Bank	288	139	
World Bank	2,304	3,813	
Disbursements from adaptation funds			
Adaptation Fund	86	69	21
GEF Trust Fund (GEF 5)	170	238	290
Global Climate Change Alliance (EU)	77	48	69
Least Developed Country Fund	32	167	283
Pilot Program for Climate Resilience (World Bank)	155	192	209
Special Climate Change Facility	18	41	14

Table 3.1: Multilateral development bank investments in climate change adaptation and disbursements from various adaptation funds (USDm)
Source: data from Haites (2014) and Buchner et al (2014)

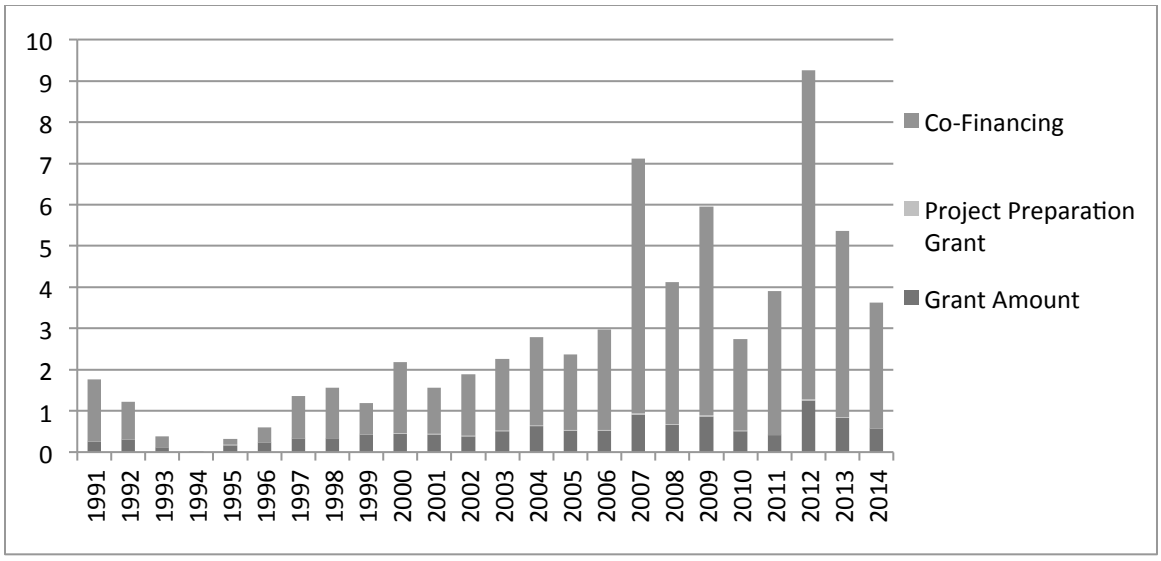

Figure 3.3: Total Global Environment Facility disbursements per year by funding type, 1991-2014 (USDbn)
Note: Project preparation grants are very small, and so are difficult to discern on this graph. They are, however, included here.
Source: GEF data (Global Environment Facility, 2014)

A final source of climate finance is the recently established UNFCCC Green Climate Fund. By December 2014 following its pledging conference, the Fund had received USD10.2bn in pledges (Green Climate Fund, 2014). The Fund aims to contribute to mobilizing USD100bn annually by 2020 for mitigation and adaptation activities. In the lead up to reaching this USD100bn target, UNFCCC signatories agreed to mobilize fast start finance between 2010 and 2012, and USD33bn was distributed over this period through various bilateral, multilateral and private sources.

In summary, the *Landscape* report shows that the finance for adaptation programs in the most vulnerable countries (i.e. non-OECD countries) is only a fraction of the global climate finance, which is principally for mitigation, stays in its country of origin, and is increasingly private. The adaptation finance that can be followed from richer to poorer countries, and through complicated institutional structures is, therefore, a very small subset of climate finance (some 9%

of global climate finance, as calculated by the *Landscape* report) and should be characterized quite differently.

3.3 Following the money in the Pacific Adaptation Complex

3.3.1 How much finance is there in the Pacific?

This section follows the money within the Pacific Adaptation omplex, and highlights the significant nodes and connections between sites. As at the global level, accounting for adaptation finance in the Pacific region depends on the sources consulted, and the definitions used to classify investments. According to the OECD's Rio Markers which track development assistance against environmental categories, adaptation finance between 2010-2013 generally increased, totalling USD741m over the period (see Figure 3.4). Using the Rio Markers data, some 2.8% in 2012 and 1.7% in 2013 of global adaptation finance was spent in the Pacific region. This is only a small proportion; but for comparison, the population of 'Oceania' makes up only 0.16% of the total population of aid recipients for which the OECD tracks ODA. In turn, the Oceania region has the highest portion of ODA receipts per person, at USD226 per person (in 2012; 2011 constant prices) nearly ten times the global average (OECD, 2015).

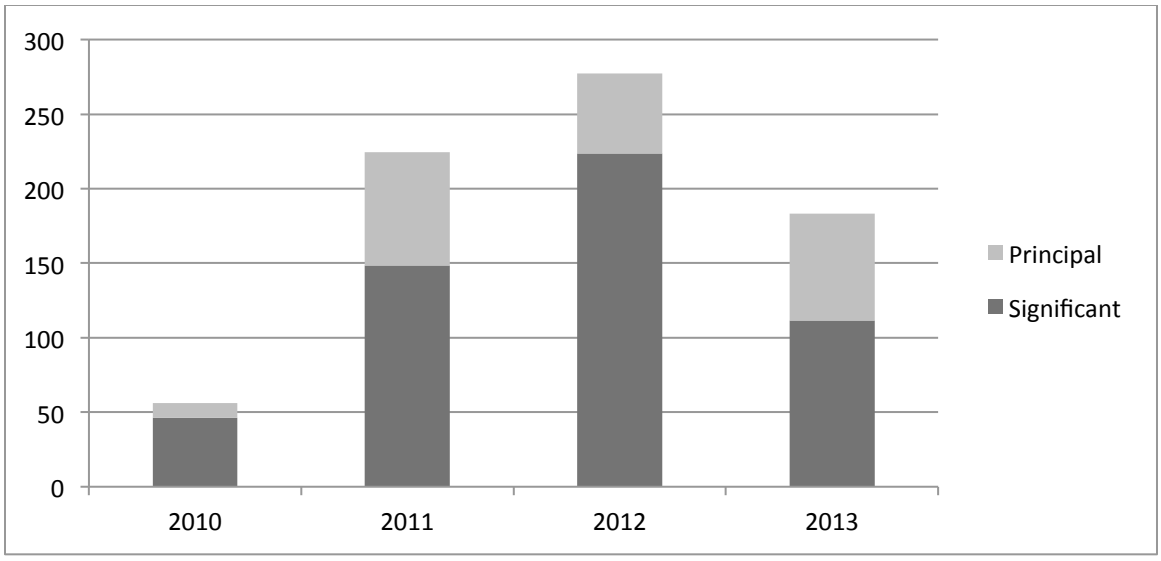

Figure 3.4: Total climate change adaptation finance in the Oceania region reported to the OECD DAC Rio Markers, 2010-2013 (USDm)
Source: OECD Rio Markers (OECD, 2015)

As a complement to the OECD Rio Markers data, the AidData3.0 dataset also collects sectoral and purposive data, but includes a wider range of country and multilateral donors (Tierney et al., 2011). Rather than relying on predefined groupings, using the broader descriptions that AidData3.0 provides, several different classificatory systems were used to sort and categorize each data-point between 1992-2012 in the Pacific region.[11] Recognizing the significant impact that the definition of adaptation and associated classification has on resulting adaptation finance numbers, categorizations included: Explicit, where climate change adaptation is mentioned in the project title or description, Implicit (BIOP) where a narrow biophysical

[11] The AidData analysis was conducted as part of an interdisciplinary research project (see Donner, Kandlikar, & Webber, In Preparation). The project assessed the impact of accounting assumptions on climate 'aid' using the AidData3.0 (Tierney et al., 2011) project-level database of overseas development assistance with a focus in 'Oceania.' Each of the 30,794 Oceania ODA projects from 1992 to 2012 in the AidData3.0 dataset was classified based on project descriptions and project 'purpose codes' as either 'Explicit' adaptation, 'Implicit' adaptation, mitigation or not-climate related. The 'Implicit' category embraces the widest range of activities, which could reduce societal vulnerability to external stresses like climate events.

definition of adaptation is mobilized, and Implicit (NAPA) based on the broad adaptation categories included in NAPA assessments. As shown in Figures 3.5 and 3.6, the definition of adaptation has fundamental impacts on the amount of adaptation finance that is counted. Both Figures 3.5 and 3.6 demonstrate moderate increases in climate change adaptation finance over this twenty-year period. In 2012, three different methodologies and categorizations report adaptation finance in the Pacific at USD277m (Rio Markers), USD345m (with a narrow biophysical definition), and USD888m (using a broad NAPA categorization). Such a divergence (more than threefold variation between the figures) suggests the impact that the categorization methodology has on total reported adaptation finance.

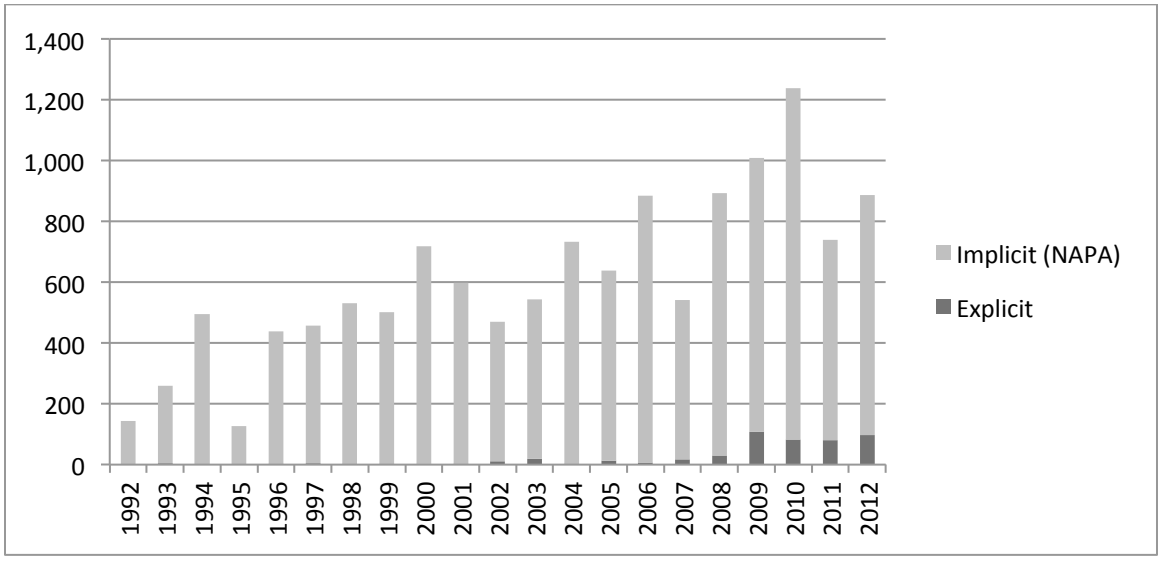

Figure 3.5: Climate change adaptation finance in Oceania, 1992-2012 (USDm)
Note: 2011 constant prices
Source: AidData3.0, classified using assumptions Implicit (NAPA) and Explicit

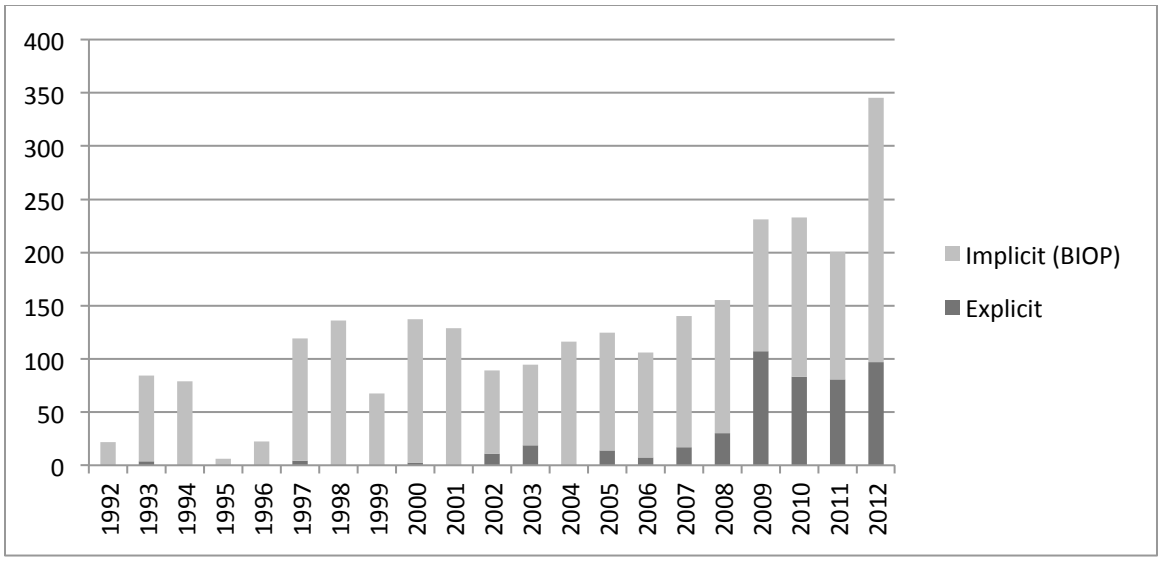

Figure 3.6: Climate change adaptation finance in Oceania, 1992-2012 (USDm)
Note: 2011 constant prices
Source: AidData3.0, classified using assumptions Implicit (BIOP) and Explicit

In summary, this section has summarised different methodologies for accounting for adaptation finance in the Pacific region. The OECD Rio Markers found almost USD300m in adaptation finance in 2012, whereas the AidData analysis shows anywhere from USD345m to USD888m in adaptation finance in 2012, depending on the definition of adaptation finance.

3.3.2 How is adaptation finance distributed geographically within the Pacific?

The AidData3.0 dataset also demonstrates the destination of several hundred million dollars in adaptation finance circulating within the Pacific. Figure 3.7 shows the recipients of adaptation finance in 2012. The figure shows that significant portion of this money is regional investments: principally financial flows that travel through the CROP agencies, which include the Secretariat of the Pacific Community (SPC), Pacific Islands Forum Secretariat (PIFS), and Secretariat of the Pacific regional Environment Programme (SPREP). The figure also demonstrates that the larger Melanesian countries receive the lion's share of adaptation finance: together Fiji, Papua New Guinea, Solomon Islands and Vanuatu received USD37m of the USD69m in explicit adaptation

finance. However, the countries of the Pacific region vary greatly in size – physically, demographically, and economically. If adaptation finance is charted per capita, then the smaller Micronesian and Polynesian states – particularly Niue and Tokelau – receive considerably greater investments. At least some of this unevenness relates to economies of scale, but there may be other, sometimes political, reasons too. Figure 3.8 shows explicit investment in adaptation per capita – the figure demonstrates that Tokelau receives nearly USD10,000 per capita in adaptation finance (in Explicit plus Implicit (NAPA) investments), while some countries receive no adaptation investments at all, and those larger Melanesian countries which receive the largest total investments, only actually receive around USD100 per capita (Papua New Guinea: some USD28; Solomon Islands: some USD130).

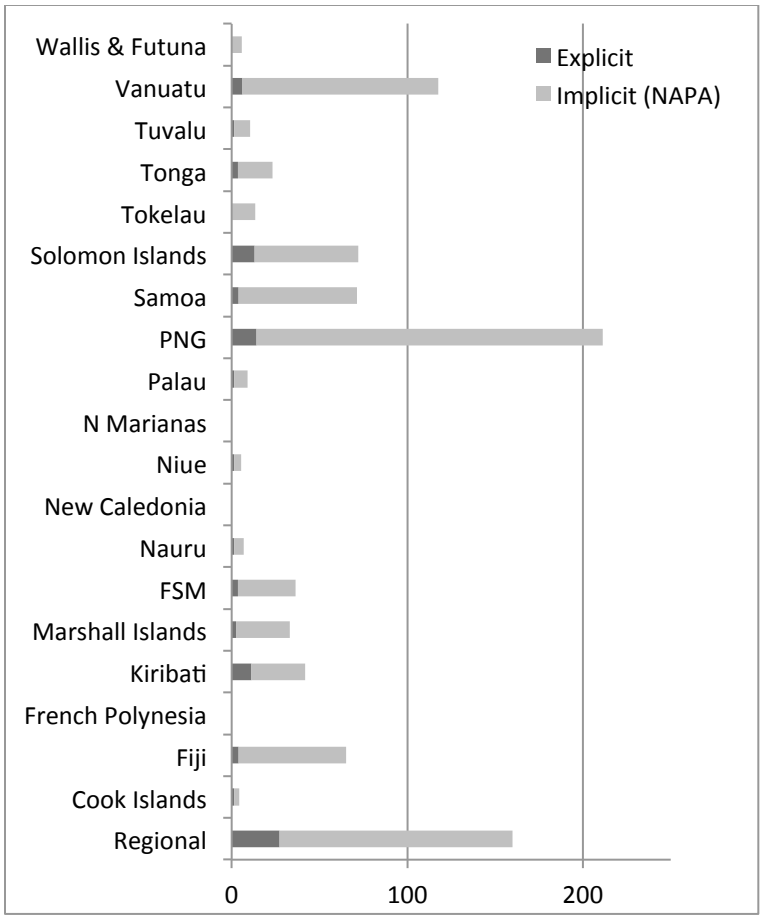

Figure 3.7: Climate change adaptation finance by destination in 2012 (USDm) for Explicit and Implicit (NAPA).
Note: FSM is The Federated States of Micronesia, N Marianas is the Northern Mariana Islands, and PNG is Papua New Guinea.
2011 constant prices
Source: AidData3.0, classified using assumptions Implicit (NAPA) and Explicit

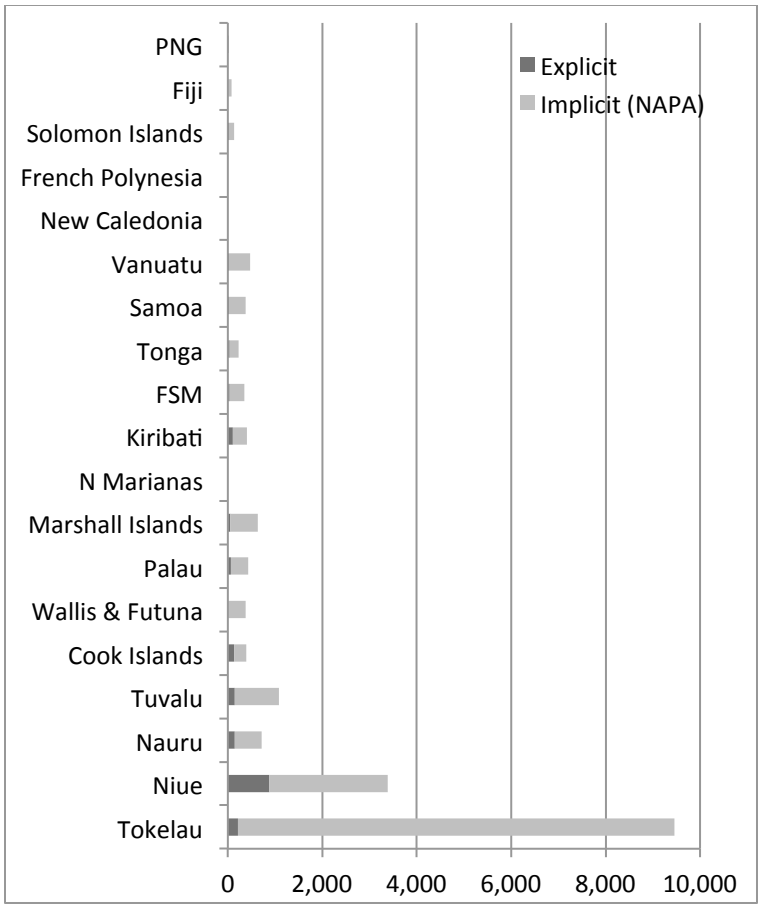

Figure 3.8: Climate change adaptation finance per capita by destination country (USD) for Explicit and Implicit (NAPA)
Note: Countries are listed in ascending order of population size, from Tokelau with 1400 residents to Papua New Guinea with more than 7 million.
2011 constant prices
Source: AidData3.0, classified using assumptions Implicit (NAPA) and Explicit

Using Kiribati as an example demonstrates that, at the individual country level, adaptation finance flows can be largely driven by single projects. The OECD Rio Markers show almost USD10m in adaptation investments and almost USD40m in significant adaptation investments between 2010 and 2013 (in 2011 constant prices). While there is not enough data here to observe a trend, there was a significant jump in adaptation investments in 2011, the year the Australian Aid Program committed to continuing investments in the Kiribati Adaptation Project, and to several other sanitation and water projects (see Figure 3.9). Again, the longer and

broader AidData3.0 set finds USD11m in explicit investments and USD30m in implicit investments in 2012, and shows that Kiribati has received an average of USD4m in explicit adaptation finance per year since 2006 (see Figure 3.10). Just as the Pacific region is over-represented as a proportion of global adaptation finance, Kiribati is over-represented in the region. According to this analysis, in 2012 explicit adaptation investments in Kiribati were almost 12 per cent of the regional total, but only 3.9 of implicit (NAPA) commitments. Interestingly, too, the ratio of explicit to implicit finance is much greater in Kiribati than in the region as a whole (1:2.7 in Kiribati versus 1:8.2 in Oceania in 2012 for NAPA assumption and 1:1.1 in Kiribati versus 1:2.6 in Oceania for biophysical assumption). This suggests that there may be pressure or desire – either from the Government of Kiribati or from donors – to explicitly mention 'climate change adaptation' in project names and descriptions. While financing is reported to tracking mechanisms – like the Rio Markers and the AidData portal – by donors and development partners, a project's name and ambition, and the overall objective of the development partnership, is established in conversations and negotiations between donors and recipients.[12] It is also possible that those countries with prior experience pursuing adaptation finance may be more successful at attracting more such funding. Through these development partnerships and priorities it may be possible to establish adaptation finance 'hotspots' in the Pacific region.

[12] AusAID officer, Bairiki, Kiribati, 13 August 2013

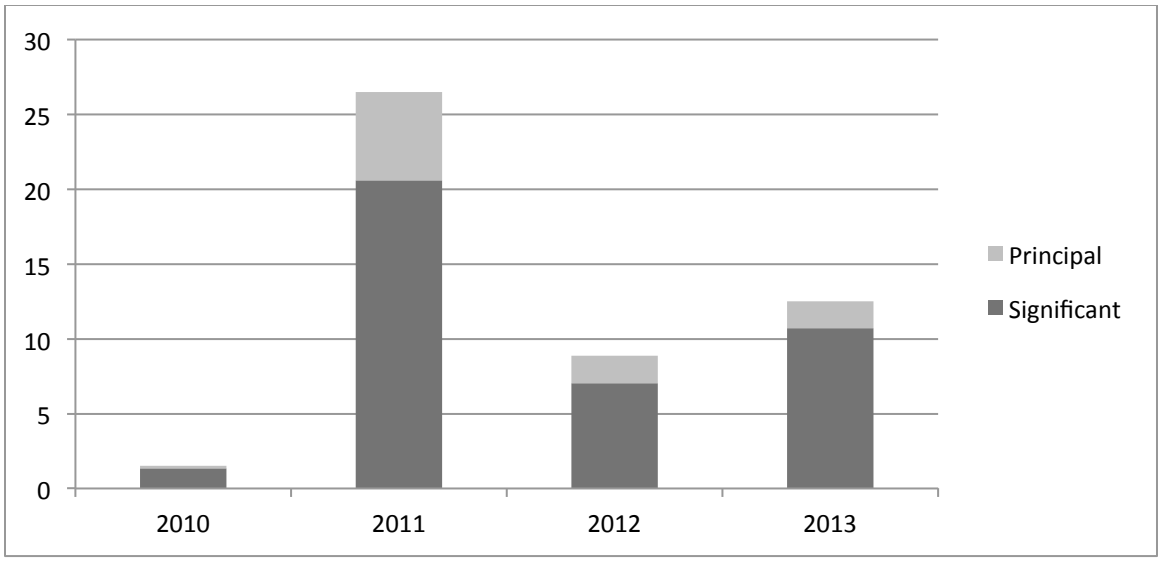

Figure 3.9: Climate change adaptation finance in Kiribati as reported to OECD Rio Markers (USDm)
Source: OECD Rio Markers (OECD, 2015)

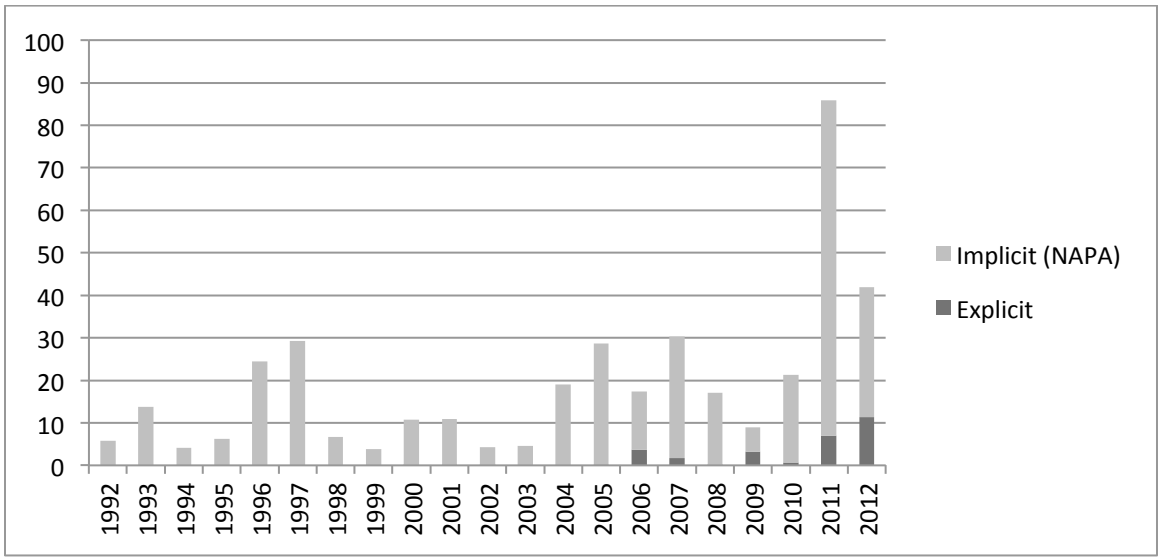

Figure 3.10: Climate change adaptation finance in Kiribati (USDm) according to Explicit and Implicit (NAPA)
Note: 2011 constant prices
Source: AidData3.0, classified using assumptions Implicit (NAPA) and Explicit

Following flows of adaptation finance within the Pacific reveals its uneven distribution. While many larger (in population size) countries receive greater total investments in Adaptation, many very small countries receive large sums of adaptation finance per capita. And some

countries do not receive any adaptation finance at all, for example, French Polynesia and New Caledonia. Although it may appear that there is sufficient adaptation finance (which is to say, current flows meet estimated needed investments) in the Pacific – as the ADB estimates some USD450m in adaptation costs per year until 2050, and our estimates find anywhere between USD277m (Rio Markers) and USD888m (AidData3.0 Implicit NAPA) in adaptation finance circulating in the Pacific – greater attention must be paid to the uneven distribution of these investments. Moreover, some countries may be 'hot spots' for concentrations of climate change adaptation investment and explicit labeling as such, as the example of Kiribati suggests. The data analysis also suggests that the regional organizations and centers remain important nodes for the distribution of adaptation finance and related investments (from observation, particularly for expert knowledge in the scientific, engineering and business sectors). These centers attract regional projects and contain concentrations of experts who collect and redistribute knowledge and financing.

3.3.3 Who are the major contributors to adaptation in the Pacific region and how do their investments get to intended sites?

Where the previous section discussed the quantity and form of climate finance in the Pacific region, this section explores through which institutions, and at which actors' behest, financial support for climate change programming circulates. Figure 3.11 provides a stylized diagram of the multiple passage points through which adaptation finance flows en route to its intended destination (see also Figure 3.12 for a demonstration of the major donors in the Pacific region, using Kiribati as an example). As noted, both private and public actors provide climate finance, but little of this is counted as contributing to Adaptation particularly in the Pacific. One indicator of this is that the World Bank's private development arm, the International Finance Corporation,

invested no money in the Pacific region between 2008 and 2012 (see Table 3.2). Within the world of public adaptation finance, there are also numerous actors and institutions. The principal division here is between multilateral and bilateral climate finance. Bilateral climate finance – that is, one country investing in climate change related activities in another – can be channelled through existing development assistance infrastructures and through dedicated bilateral initiatives specifically for climate change (and sometimes both). In addition to financing climate change related activities through their bilateral development arms, countries can provide finance to multilateral development banks to implement projects and programs. Such contributions may finance climate change related activities either through the regular development arms of the banks, or by providing funding to multilateral climate funds. One benefit of the former approach is that multilateral development banks can merge different sources of finance, for instance using climate finance to fund the additional incremental costs of an investment caused by climate change. By contrast, financial flows through multilateral climate funds often require co-financing, a complex and bureaucratic process (Ayers & Huq, 2009; Fenton et al., 2014). For example, some of the designated climate funds associated with the UNFCCC are only intended to meet the additional costs of investments caused by climate change.

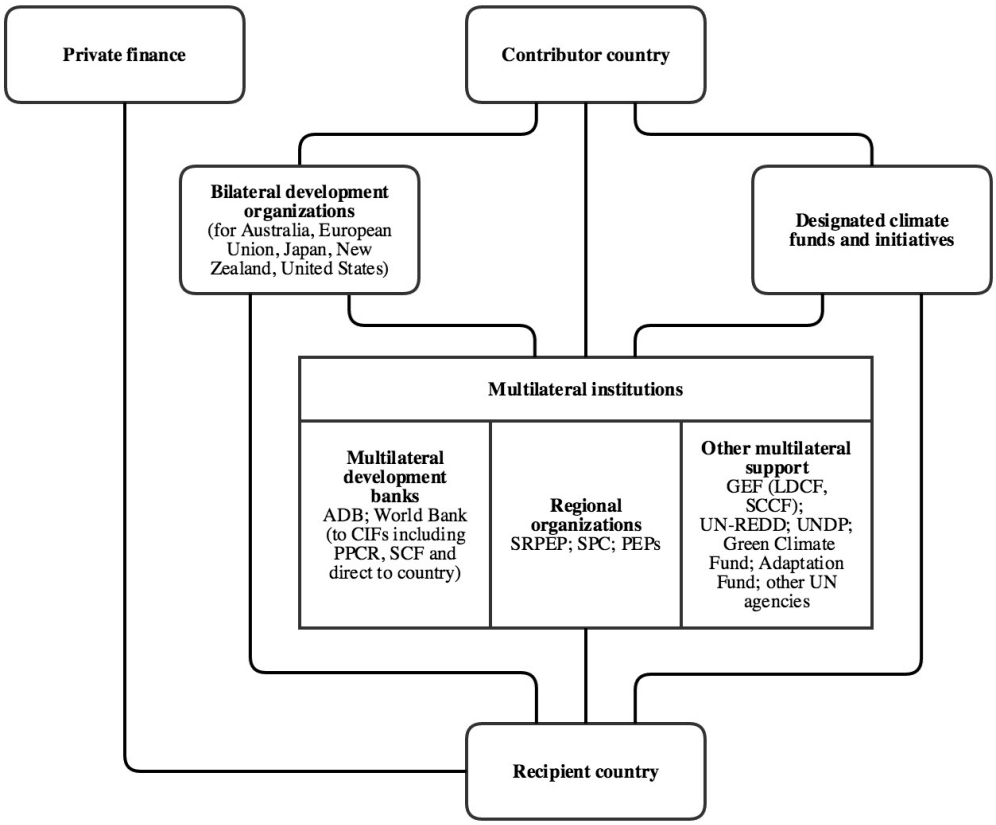

Figure 3.11: Stylized diagram of adaptation finance flows from public and (hypothetically) private sources to recipient countries
Source: Author's observation, Haites (2014) and World Bank (2013a)

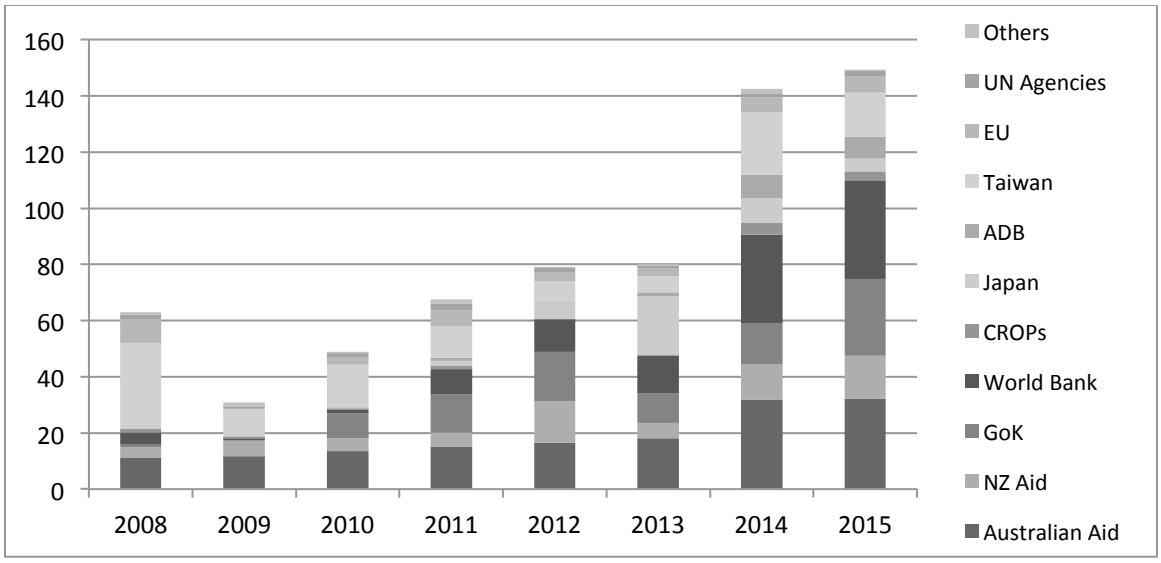

Figure 3.12 Total development budget by donor in Kiribati (AUDm)
Notes: Graph shows the predominance of bilateral assistance – from Australia, New Zealand, Japan, Taiwan, and the EU, and the growth in multilateral assistance from the World Bank, ADB, and the UN Agencies.[13] 2015 is only an estimate.
Source: Kiribati National Budget, Ministry of Finance (2009, 2010, 2011, 2012, 2013, 2014, 2015)

The major flows of funding for climate change Adaptation in the Pacific echo the principal financial sources for all development assistance in the region. As Figure 3.11 demonstrates (and Figure 3.12 shows with Kiribati as an example), the principal sources of funding for all development programs in the Pacific region are bilateral with the largest donors being the regional hegemons of Australia, New Zealand, Japan and Taiwan, and (although not

[13] Australian Aid includes AusAid before it's change to the Australian Aid Program in 2013, similarly for the NZ Aid and its former NZAid and the current New Zealand Aid Program. GoK covers all Government of Kiribati sources, including the Revolving Fund. The CROPs cover funding from the SPREP, the PIFS, the SPC, the Commonwealth Local Government Fund (CLGF), and the Forum Fisheries Agency. UN Agencies include the United Nations Development Program, the World Health Program, the United Nations Children's Fund, the United Nations Population Fund, the United Nations Environment Program, UN Women, and the International Fund for Agricultural Development. Other donors include France, Italy, the United Kingdom, India, Canada, unspecified non-governmental organizations, and unspecified others: these were grouped together in the graph to increase legibility, and because these donors were very inconsistent across the temporal period included here.

shown in Figure 3.12), the United States and France (see also Table 3.2). Figure 3.12 also shows that, for Kiribati, the significant growth in assistance is spurred by multilateral donors, particularly from the World Bank, the Asian Development Bank and the wide variety of UN Agencies.[14] Note, however, as demonstrated in Figure 3.11, some of the funding that is designated as coming from the Multilateral Development Banks is actually bilateral in form; for instance, a bilateral development partner can give funding to an MDB for it to implement a project.

In the Pacific, as much as 34% of all development assistance could be classified as implicitly (NAPA assumption) contributing to adaptation, compared to only 3% of explicit adaptation finance. For both development and climate change related programming, far and away the greatest donor to the Pacific is Australia: between 2008 and 2012 Australia invested some USD43m in explicit adaptation programs, and as much as USD500m in implicit adaptation programming (NAPA assumption, see Table 3.2). Japan and New Zealand also contributed significant amounts of implicit (NAPA assumption) adaptation finance – USD150 and USD92, respectively, between 2008-2012 – but little explicit adaptation funding. Note, too, the similarities in Figures 3.12 and 3.13, which outline the major donors to Kiribati for development and adaptation respectively. The analysis suggest that that the major development financers are also the major adaptation financiers in the Pacific region.

According to the AidData analysis, the major donors to Kiribati contribute a considerable portion of their development budget to implicit adaptation concerns: 41% of Australia's development budget, 44% of New Zealand's budget, and 76% of Japan's development budget

[14] The UN Agencies largely focus their programming on health, population, and women's rights and advocacy in Kiribati; United Nations officer, Bikenibeu, 5 August 2013

were implicitly designated for adaptation (using the NAPA method). However, only New Zealand and Australia explicitly invest in adaptation concerns, perhaps because of their early involvement in climate change adaptation programs in Kiribati, specifically the KAP. Note here, however, the difference between Figures 3.12 and 3.13 in relation to World Bank funding in particular. Figure 3.13 demonstrates growing financial assistance to Kiribati from the World Bank, and a principal component of this is contributions to the Kiribati Adaptation Project. In Figure 3.14, however, this investment is not captured as explicit adaptation finance for the World Bank; instead it is counted against Australia's financial contribution. This is because Australia contributed this funding to Kiribati via the World Bank.

	Explicit	Implicit (BIOP)	Implicit (NAPA)	Total
Australia	43,031,830	69,403,252	489,986,892	1,234,776,726
New Zealand	2,446,802	41,208,698	91,627,561	237,126,730
United States	812,979	4,292,832	28,735,222	226,755,282
Japan	0	92,247,685	149,612,200	221,572,658
France	2,218,477	10,738,027	15,280,691	149,176,669
ADB (ASDB)	0	11,475,485	17,812,527	102,414,844
European Communities	7,178,264	30,684,350	45,757,085	97,721,869
World Bank (IDA)	0	686,836	2,033,697	87,270,392
ADB (ASDF)	0	0	0	58,358,797
Global Fund to Fight Aids, Tuberculosis and Malaria	0	4,891,662	4,891,662	27,368,885
GEF	8,481,749	81,347	2,166,385	20,140,132
Germany	7,465,257	4,395,726	4,507,428	14,794,787
Canada	5,498,068	65,949	705,589	8,113,508

	Explicit	Implicit (BIOP)	Implicit (NAPA)	Total
Taiwan	0	0	0	7,955,889
UNDP	468,684	1,416,498	2,617,455	7,580,233
UNICEF	590	633,585	986,907	7,342,079
Korea	59,898	1,699,836	2,977,835	6,541,914
United Kingdom	59,830	231,763	2,593,067	6,461,436
IFAD	0	315,811	315,811	4,448,295
OPEC Fund for International Development	0	1,800,000	1,800,000	4,200,000
WHO	0	1,313,865	3,252,671	3,723,265
Global Alliance for Vaccines & Immunization	0	2,429,077	2,429,077	2,429,077
UNFPA	0	0	1,004,981	2,230,307
IMF	0	0	0	2,095,368
Finland	1,502,918	21,685	21,685	1,697,797
Joint United Nations Programme on HIV/AIDS (UNAIDS)	0	0	0	1,471,209
Spain	255,228	458,215	458,215	1,420,537
Norway	170,247	661,791	695,720	1,064,300
United Arab Emirates	0	13,321	13,321	1,041,147
Austria	0	54,763	55,024	941,883
UNHCR	0	431,052	431,052	431,052
Sweden	0	280,583	280,583	302,798
Italy	0	118,714	147,436	302,507
UNDEF	0	0	0	198,571

	Explicit	Implicit (BIOP)	Implicit (NAPA)	Total
Switzerland	42,155	40,701	40,701	179,658
Ireland	0	3,710	3,710	86,338
Luxembourg	0	28,499	28,499	65,949
Belgium	0	0	0	6,297
Netherlands	0	0	0	4,505
Islamic Development Bank	0	0	0	0
World Bank (IBRD)	0	0	0	0
World Bank (IFC)	0	0	0	0
WTO	0	0	0	0
Total	79,692,976	282,125,318	873,270,689	2,549,813,690

Table 3.2: Total donor contributions to explicit and implicit climate change adaptation programs, 2008-2012 (USD)
Notes: The donors are ranked by their total contribution to development assistance.
2011 constant prices.
Source: AidData3.0

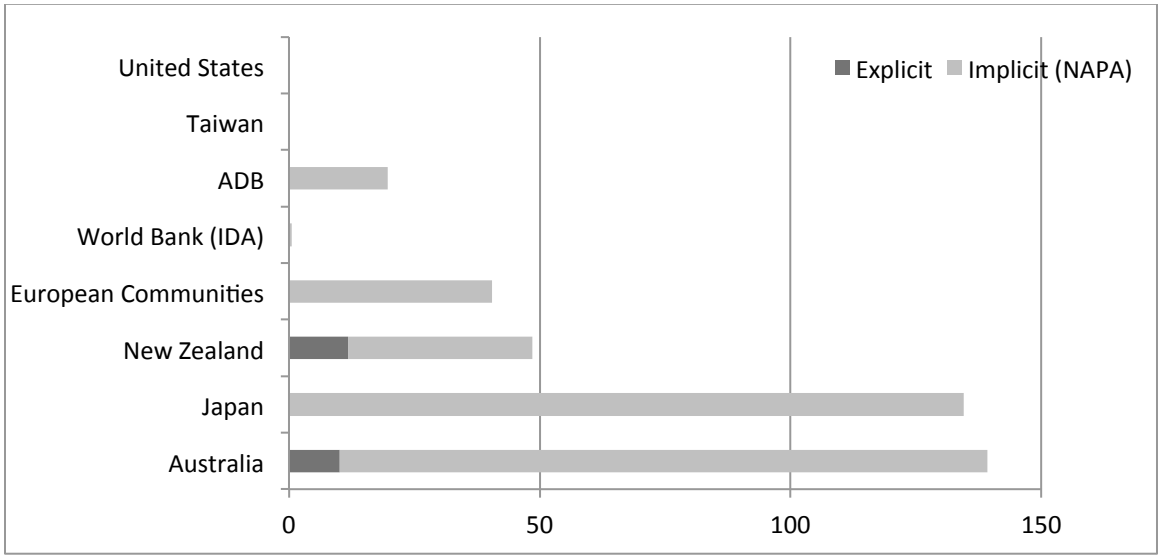

Figure 3.13: Total contributions to climate change adaptation in Kiribati, 2008-2012 (USDm)
Notes: From the major donors: those who contributed more than USD10m between 2008 and 2012 (for instance, United States and Taiwan both contributed more than USD10m in aid between 2008 and 2012, but none that contributed to adaptation). 2011 Constant prices
Source: AidData3.0, classified using assumptions Implicit (NAPA) and Explicit

In summary, following the money reveals that, aside from some outliers, adaptation finance travels along the well-established routes of development assistance. It is the same bilateral partners who fund both development and adaptation programs – that is, the major development partners are also the major funders of Adaptation (Figures 3.11 and 3.13) – although increasingly the multilateral development banks are also investing in the Pacific region. However, while significant amounts of funding may contribute to climate change adaptation outcomes – on the projects' own terms at least – there is very little explicit adaptation finance to date, even if this might be increasing somewhat (see Figures 3.4 and 3.5).

3.4 Discussion and conclusion

This chapter has 'followed the money' within the climate change adaptation complex in the Pacific region. Globally, adaptation finance falls well short of the annual USD70-100bn estimated to be needed by the World Bank, with different sources finding between USD11bn (OECD, 2015) and USD25bn (Buchner et al., 2014) in 2012 and 2013 respectively. In the Pacific, there is also a slight adaptation finance shortfall: the ADB estimates annual adaptation costs at USD447m, with current explicit adaptation finance around USD277m (according to the Rio Markers, (OECD, 2015)).[15] In the Pacific therefore, while there is a slight shortfall, it is proportionally far less than the global one. Additionally, per capita adaptation finance is ten times the global average in the Pacific region; suggesting an uneven distribution of climate change funding, favouring the Pacific region, perhaps due to issues related to economies of scale and likely also due to designations of extreme vulnerability in the area. But, alongside concerns

[15] Although, as noted previously, this estimate could be as much as USD888m using a catch-all NAPA definition of adaptation finance.

about this shortfall, critics lament existing methods of measurement and tracking that fail to ensure that adaptation finance is new and additional (Haites, 2011; Smith et al., 2011; Stadelmann et al., 2013).

Within the Pacific, adaptation finance is also distributed unevenly. Regional organizations remain major recipients of development finance, and do implement adaptation programs in the region. The larger Melanesian countries get the majority of funding, but on a per capita basis the smaller countries receive far greater investments. Several countries in the region do not receive any explicit adaptation funding, but Kiribati does: an average USD4m per year between 2006 and 2012. While this has grown over time, explicit adaptation investments remain a small fraction compared to the rapidly expanding development budget in Kiribati (see Figure 3.12). Moreover, these small sums can be driven by singular projects. The principal funders of Adaptation are the major bilateral development partners in the region, specifically Australia, New Zealand, Japan, the United States, France, and the ADB and World Bank. Of these donors, however, only Australia and New Zealand explicitly invest in Adaptation in the region. The analysis also shows the growing role of multilateral development banks and institutions: while they are not always investing their own money (often implementing projects with bilateral money), the International Development Association financial mechanism was one of the ten biggest spenders in the region.

In the Pacific, therefore, this analysis reveals that there is some adaptation finance circulating, mostly along the well-worn paths of development assistance. Although these investment flows are growing, it remains unclear whether this represents a qualitative change in the official development assistance of the region. Adaptation finance principally comes from the major donors, spreads throughout the Pacific, with an over-representation of smaller countries,

through the same complicated institutional structures as development finance. Given this, at least in the contemporary adaptation landscape, it seems difficult to imagine increasing climate finance creating new and additional geographical configurations of investment. Extrapolating from the analysis here would suggest that the Pacific will remain a stronghold of traditional, public, mostly, bilateral adaptation finance, travelling along established partnership routes, at least in the short-term.

Yet, the climate finance literature hopes to establish fine-tuned tracking and measurement systems in order to address the expected complexities of future adaptation investments. It is hoped that better measurement and tracking will enable coordination and integration of adaptation and development (Smith et al., 2011); but as this analysis demonstrates, it appears that the two are well integrated within the same development partners and structures – with many of the same actors and institutions funding development and adaptation, and with these investments flowing along well-worn and replicated routes. It is assumed in this literature that better tracking and measurement will encourage funding that is new and additional to development assistance, but the choice of definition for adaptation and the associated categorization of financial flows can lead to wildly different estimates for investments (Bowen, 2011; Smith et al., 2011). Tracking mechanisms will always be partial, and an overemphasis on refining measurement technologies confuses political and technical concerns, eliding the question of who ought to pay, to whom, and for what, with questions of how to track these financial flows when they arrive. Indeed, critics of existing climate finance measurement and tracking methodologies, are principally invested in expanding Adaptation: ensuring greater circulations of adaptation finance from new sources to new spaces and at increasing speeds. There remains an assumption that Adaptation is a benevolent endeavor that can, and must, ameliorate the deeply unjust impacts of

climate change, even while some localized projects remain ineffective. However, as is discussed in the remaining chapters of this dissertation, many Adaptation projects of the Pacific region are extraordinarily complex in practice, and largely fail to achieve their stated objectives. It is not clear that adaptation can be achieved in a piecemeal, development assistance approach. The latter chapters discuss instead, the institutional work of the Pacific Adaptation Complex.

In the process of characterizing flows of adaptation finance, this chapter also trials an empirical 'follow the money' optic. While proponents of such an approach (Christophers, 2011) have detailed the theoretical difficulties it entails, this exploration has demonstrates the very basic, data- and categorization-driven challenges. Where Christophers (2011) outlines conceptual problems for instance, delimiting the start and finish of financial flows, here I have shown a more elementary issue: what if there is no clear data of financial flows in general? Here, a politics of definition and categorization, and a need to be seen spending big on both adaptation and development has created intermingled flows of financial investment. Although a necessary endeavour – and one that reveals a confusion and abundance of technical and political concerns – 'following the money' may be more challenging than previously thought.

Chapter 4: Mobilizing adaptation through sticky experiments: Circulating best practices and lessons learned in climate change adaptation

4.1 The World Bank and best practices/lessons learned

The World Bank prides itself on its ability to share lessons across its investments and country-partners. It is, after all, the World Bank, and its prowess in development lies in its ability to draw 'successes' from across its global practices and expertise. This chapter examines the complexities and implications of producing so-called success stories, drawing from a case study of 'best-practices' in climate change Adaptation.

When World Bank employees are asked what their institutional comparative advantages are in pursuing a climate change agenda, they reply: "we have better information than anyone, we are very much aware of the threat to development from climate change, and I would argue that we understand it as well as anyone."[16] Or, as stated by a disaster and climate risk specialist:

> Our comparative advantage is… it is the knowledge, that's how to steer a boat. The fact that we have an anchor that focuses on knowledge services that goes into the operational [program]. The fact that we're a global bank: that we can bring in lessons from different regions, people working across regions.[17]

Again, a renowned climate economist states: "I mean… there is the best technical expertise here, I think some of that's an issue of scale. I think, having that global experience so that you can pull

[16] Former lead urban specialist, Toronto, 14 May 2013
[17] Disaster risk management specialist, Washington DC, 8 May 2013

the Caribbean people to help in the Pacific… I mean I think that's a real advantage."[18] And simply: "Knowledge. Global knowledge."[19]

Employees also recognize the Bank's international convening power, and the ability to shift the climate change agenda from the Ministries of Environment to the Ministries of Finance to ensure extended uptake. But, with most frequency employees suggest that the Bank's success derives from its enormous body of analytical works examining their projects, policies, and potential investments, as well as the ability to draw lessons from around the world. This chapter examines the complexities of producing so-called success stories, drawing from a case study of 'best-practices' in climate change Adaptation. In conversation with current studies of the mobilization of policy, I use this critical case study to foreground the difficulties of experimentation and replication, as well as the importance of failing-forward – for the World Bank and for policy success. This chapter then explores the institutional complex in which policy models and analytical products are created, suggesting the importance of this work for building internal and external legitimacy and relevance. Knowledge work reinforces the World Bank as a center of development programming and expertise and establishes new avenues for investment.

Much research has assessed the World Bank and its hegemonic knowledge work, examining the institution's unparalleled ability to influence the terms of development debate through persuasive paradigm maintenance and its World Development Reports (M Goldman, 2005, 2007; Mehta, 2001; Roy, 2010; Wade, 2001, 2002). Goldman's (2005) treatise traces how the World Bank has become a global knowledge Bank that uniquely produces information about development through its research institutes, frameworks, data sets, professionals, networks, and

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[18] Senior economist, Washington DC, 21 March 2014
[19] Senior environmental specialist, Sydney, 18 September 2013

policies. For Goldman, however, the Bank must work to maintain that "*its* worldview, *its* development framework, and *its* data sets [are] the ones that people around the world choose above others" (2005, p. xv).

The World Bank as Knowledge Bank has culminated most recently in a focus on the 'the science of delivery.' Through this agenda, recently appointed President Jim Kim aims to collect and distribute evidence of 'what works for development' (World Bank, 2013; see also Banerjee and Duflo, 2011). For Kim, like his employees:

> One of the World Bank Group's key comparative advantages is that we have partnered with communities and policymakers across nearly all developing countries in every sector; to become a solutions bank we need to systematically leverage and apply the lessons from these experiences (Kim, 2012, p. np).

This push to share lessons learned is part of transforming to become a leaner, more responsive "solutions bank", that "demand[s] that we are honest about both our successes and our failures. We can, and must, learn from both" (Kim, 2012). The legitimacy and relevance crisis that precipitates this transformation is explored further below. Following Goldman, I explore the potential gaps between the rhetoric and practice of sharing 'lessons learned' in how this solutions bank is made.

This chapter engages with recent geographical literature on 'policy mobilities' to explore how global expertise works in practice and in context within the World Bank. The growing policy mobilities literature is concerned with the globalization and transnationalization of policy-makers, technologies, and practices. Following this literature's interest in the social mobilization and deployment of policy models, this chapter asks two simple questions of the World Bank's practice around experimentation: do these mobile programs travel as their originator claims?

And, what else does this practice of experimentation do for the World Bank? I ask these questions by studying climate change adaptation policies and programs in the Pacific Islands and at the World Bank. Specifically, this chapter explores how best practices are mobilized from the experimental Kiribati Adaptation Project and taken up in the Community Resilience to Climate Change and Disaster Risk in Solomon Islands Project. This case reveals the importance of failure, and the difficulties of experimentation, modeling, and mobilization.

The two adaptation projects might seem strange comparisons. After all, the two island countries have different physical characteristics and abilities to cope with anticipated climate changes. Both the low-lying atolls of Kiribati and the mountainous Solomon Islands must adapt to increases in temperature, rainfall volume and intensity, sea-levels, and coral bleaching events (Australian Bureau of Meteorology and CSIRO, 2014). However, Solomon Islands must cope with the impacts of extreme rainfall events and tropical cyclones triggering flooding and landslides, and the impacts on climate sensitive resources like logging and agricultural production , whereas Kiribati seeks to address the impacts of climate change on their freshwater lens and coastal infrastructure. Climate impacts and adaptation strategies are mediated by local social and environmental conditions. For instance, in South Tarawa – the capital of Kiribati – adaptation must also contend with rapid urbanization and population growth, which negatively effect the volume and quality of the freshwater lens and coastal stability (Duvat et al., 2013; Storey & Hunter, 2010).

These differences in climate change impacts and adaptation options, however, make this relational case study particularly compelling. Because, despite these differences, the World Bank explicitly and continuously mobilizes the KAP as a source of best practice for the CRISP. This chapter, therefore, explores the ways that the World Bank attempts to bring these projects – and

diverse experiences of climate change and Adaptation – together through the mobilization and citation of best practice projects. As Robinson (2011) prompts, such "circulations are created – they cannot be assumed" to exist due to similar physical and social geographies or climate change impacts. Instead, following Robinson, this chapter attends to 'topological spatialities', which examine how people and places are drawn 'close' through projects and phenomena.

The argument of this chapter unfolds in the following manner. The next section outlines the recent literature on policy mobilities, in particular highlighting contributions to conceptualizations of modeling, inter-referencing and mobilization-mutation. Section 3 then opens up the case of the Kiribati Adaptation Project, one of the pre-eminent experimentations in climate change Adaptation for the World Bank. This section sets up the KAP as its own process of experimentation-emulation-evolution, as well as demonstrating the necessity of these pilot-projects for the World Bank by outlining how this case has featured in analytic reports intended to encourage best-practice Adaptation. Section 4 then discusses the relational case study of the KAP and CRISP, which continue to reference each other as successful Adaptation despite large-scale project failure and limited mobilization of best-practices and lessons learned. Following this, I argue that the mobilization of best-practices serves to build momentum for the World Bank as it navigates internal and external problems of legitimacy and relevance. Therefore, studies of policy mobilization must attend to the differences between successful experimentation in rhetoric and practice when they do such political work for the World Bank.

4.2 Policy mobilities, adapted

Both the World Bank and scholars of policy mobilities are interested in the conditions under which policies can travel (fast), emphasizing borrowing 'what works' from experimental localities for implementation in other sites. This literature stands in contrast to the concept of

policy transfer and related positivist theorizing in political science that evaluates policy success and posits hierarchies of innovative governance. Principally concerned with documenting the actors involved in policy transfer, this literature often assumes "optimizing, rational actors, who know what they are after and scan 'the market' for possible solutions, making decisions and trade-offs over which policy products to adopt" (McCann and Ward, 2012, 327). Moreover, studies of policy transfer are focused on the national scale and assume literal transfer over space, tending "to suggest the importation of fully-formed, off-the-shelf policies" (Peck and Theodore, 2001, 449). Instead, the field of policy mobilities studies "how, why, where and with what effects policies are mobilized, circulated, learned reformulated and reassembled" (McCann and Ward, 2012, 326). Policy mobilities research suggests policy making is a social, inter-scalar, and relational process, where policies are not simply transferred intact, but their "form and their effects are transformed by these journeys, which also serve to continuously remake relational connections across an intensely variegated and socio-institutional landscape" (Peck, 2011, 793). Here, fast policy is a condition, a tension between fixity and motion that must be problematized (Peck & Theodore, 2015). Accordingly, rather than a simple celebration of policy technologies that travel further, faster and along new routes, the contradictions between policy-as-model and the stubborn stickiness of implementation must be explored.

Policy actors, boosters, gurus, consultants and other experts (Larner & Laurie, 2010; McCann, 2013; Prince, 2012) are embedded in elite networks (Peck, 2011; or even assemblages, see McCann and Ward, 2011). Alongside policy agents, representations, discourses, persuasive stories, informational infrastructures, and mobilizing technologies are enrolled in policy-making networks to interpret policy problems and package institutional fixes (McCann, 2011). These interpreted, produced and circulating best practice models are not merely emulated in new sites

of replication, but "mutate and morph" (Peck & Theodore, 2010, p. 170). Such technologies of mobilization create relations between sites of experimentation and replication, and policy problems in need of solutions, forming webs of "experimentation-emulation-evolution" (Peck & Theodore, 2012). And, while policy models are constantly remade, as bundles of "persuasion and motivation" (Temenos & McCann, 2013), so too are the sites of implementation (N. Clarke, 2012; McCann, 2011).

There are three concepts from the policy mobilities literature of particular relevance for this chapter. In their volume exploring the 'worlding' of Asian cities, Ong and Roy (2011, 4) find that city ambitions and formations "are reimagined in relation to shifting 'forms and norms' of being global… [including] seemingly unavoidable practices of inter-city comparison, referencing and modeling." Key here: 'modeling' is a practice through which an urban form – or, for our sakes an adaptation project or policy – is "disembedded from its hometown and adopted in other sites… [being] raised in the imagination of planners" (Ong, 2011, 14). Modeling involves discursive and material practices that hope to capture an element or essence of the model that can be invoked, emulated, but never reproduced. Second, these models are vital components of constellations of inter-referencing, wherein citation, comparison and contrast bring policies and places into (topological) relations (Ong, 2011). Inter-referencing practices can open up aspirational 'elite dreaming' where citation of successful antecedents can have discursive power and effects, reinforcing particular policy choices (Bunnell, 2013). Third, policies on the move do not simply transfer from place to place, but instead mutate, morph, and evolve in motion, in unpredictable and often contradictory ways. Peck and Theodore (2015) find policy models – participatory budgeting and conditional cash transfer – that mutate from a radicalizing project of deep democracy to tokenistic budgetary devolution and from disciplinary

neoliberal reform to neo-welfarist experimentation, respectively. But, although these mutated policies maintain reference to their antecedents, how much can a policy evolve before it becomes a different model altogether? Is the inter-referencing of a policy model and claims of replicating best practices sufficient for successful policy mobilization?

This chapter builds on the policy mobilities literature by examining the complex and intensive work required to make a mobile policy and the degree to which these policies fail and are stubbornly rooted in places. Taking cue from warnings to "[guard] against the risks of sliding into affirmative (or even celebratory) accounts of the cosmopolitan 'spaces of flows'" (Peck and Theodore, 2012, 21), this study focuses attention on the stoppages, failures and tensions of policy making; an attempt at avoiding 'unfettered flowsterism' (Jones, Woodward, & Marston, 2007; Marston, Jones, & Woodward, 2005). Here, multiple failures and stoppages are pertinent: failure in project outcomes, failure to mobilize, failure to implement in replication sites, and, most importantly, failure that becomes success through iterative extraction and interpretive processes for extra-local learning. The relational case study drawn across Kiribati and Solomon Islands, and sustained institutional research with the World Bank also allows an examination of the connections between sites of experimentation and emulation, beyond merely circumstantial evidence of documentary citation and personnel similarities. Hoping to avoid swiftly touching in and out of policy sites along with policy models (N. Clarke, 2012; Jacobs, 2012), and becoming a "dupe of the policy network" (Peck and Theodore, 2015, xxi), I look to the contextualized and contingent to dig beneath the surface of supposed connections.

4.3 The KAP in/and the World Bank

In order to understand discourses and practices of policy modeling, referencing, and mutation this section outlines the critical case-study of the Kiribati Adaptation Project. One of the earliest

adaptation projects implemented by the World Bank, the organization continuously claims that it serves as an exemplar of best-practice and sharing lessons learned. Here, I introduce the KAP, the objectives of the KAP for the World Bank, and the multiple scales of failure that the practices of mobilization have entailed.

4.3.1 The Kiribati Adaptation Project

The Kiribati Adaptation Project is one of the earliest World Bank climate change investments. After completing a preliminary study of climate change in the late 1990s – *Cities, Seas, and Storms* (World Bank, 2000) – its authors were interested in constructing an adaptation project based on their experiences and knowledge, and chose Kiribati for this initial project.[20] Historical involvement was "a clear rationale for the Bank to continue its involvement in climate change issues in Kiribati" (Global Environment Facility, 2005, 3); as one early project manager described: "after that [the report], we started thinking, now we have the study, let's do some operation and do something about it [adaptation]. And that's how the KAP came up."[21] The KAP-I, funded by the World Bank/Global Environment Facility and the Japanese Climate Change Fund from 2002-2005, had two principal components. First, it conducted extensive National Adaptation Consultations and Mainstreaming, and second were Project Preparations and Technical Support including in the areas of social, environmental, and economic assessment. Principally, the KAP-I prepared for greater adaptation investments in policy and planning.

The second phase of the KAP, funded by the World Bank/Global Environment Facility, Australian Aid Program, and NZAID from 2006 to 2011 intended to trial the proposed adaptation investments. The original design of the KAP-II involved five components i) policy

[20] Lead adaptation specialist, Washington DC, 6 April 2010
[21] Lead adaptation specialist, Washington DC, 6 April 2010

planning and information, including awareness raising; (ii) land use, physical structures and ecosystems; (iii) freshwater resources; (iv) capacity-building at the island and community level; and (v) program management. In 2009, however, the scope and geographical location of these projects were vastly reduced due to insufficient progress. A rare occurrence for World Bank projects, the KAP-II was officially judged unsatisfactory through the mid-term review process (Global Environment Facility, 2009). After this restructure the project focused on freshwater resources, and coastal planning and protection in the capital, Tarawa, where climate change impacts intensify local environmental degradation of the freshwater lens and coastal ecosystems.

The intention of the third phase of the KAP was to 'scale-up' Adaptation, taking implementation beyond Tarawa. Within the KAP, therefore, the KAP-II was to serve as the experimental pilot policy phase, to be mobilized and deployed during the KAP-III. Has the KAP-III has been successful in this measure? First, despite intentions the KAP has found it prohibitively difficult, in terms of cost and time, to extend any experimental best-practices into the outer-islands to constitute a geographical policy mobilization. Second, inasmuch as the KAP-III has retained a focus on freshwater resources and coastal protection, this has not necessarily entailed either scale up, or building on techniques honed in previous phases, as shown below.

Consider the case of freshwater resources. During the KAP-II, the primary focus of the freshwater resources component of work included numerous freshwater policies, completion of an infiltration gallery, rainwater harvesting and storage facilities in several sites in South Tarawa, and some monitoring and assessments of the freshwater lens through boreholes and modeling. There were also one-off adaptation measures, including to the hospital water supply. With regards to rainwater harvesting, for example, practices were specifically developed to

> look at piloting different types of first flush devices and different pipe gutters, and looking at what works, what's suitable for here and ... what's affordable in this context and what's not, for households…. That's the difference, we're not doing [the rainwater harvesting work] so much for getting places done, as to look at different styles of techniques…. [It's] realistic best practice.[22]

Later, reflecting on the freshwater resources work, one member of the KAP team declared that the greatest successes were the water resource assessments, "because they tell us how much water we've got there that we can pump… We've got to have that data for everywhere, otherwise we're stuffing up the country… We sort of piloted it [during the KAP-II], so that's probably what I'm proudest of."[23]

The KAP-III has not extended these successes. Other climate change and water related projects have taken up some of the practices of the KAP: for instance, a KAP water engineer has discussed findings with the New Zealand Aid Program, has taken members of the European Union funded KiriWatSan program to examine the rainwater harvesting investments that they might replicate in outer islands, and has worked closely with an Australian consulting team who are modeling groundwater reserves. Yet, the KAP-III remains concentrated in Tarawa, and is primarily engaged with negotiations around, and governance of, the groundwater reserves (the land on top of which people are not permitted to reside). As the KAP engineer reiterates with regards to the assessments and rainwater harvesting: "But [they] finished with the KAP-II."[24]

The example of coastal protection is similar, although it also involves negotiations related to what constitutes best practice in Kiribati. During the KAP-II the coastal protection component aimed to pilot ecosystem (mangrove) based approaches and physical protection measures (sea

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[22] Senior water engineer, Tarawa, 10 May 2010
[23] Senior water engineer, Tarawa, 9 August 2013
[24] Senior water engineer, Tarawa 9 August 2013

walls) for protecting shorelines from erosion and sea-level rise. While mangrove planting is not sufficient in mitigating the impacts of sea-level rise, this component has been rated highly successful and is one of the few measures that could really be judged to 'roll-out' during phase III with implementation in priority sites throughout the Gilbert group of islands (the western islands of Kiribati). To pilot and construct seawalls at four key sites in South Tarawa, a foreign firm was hired to design and oversee construction, resulting in a variation on a vertical sandbag seawall augmented with an apron to protect against overtopping (see Figure 4.1).[25] Shortly after completion, these seawalls were already causing erosion, and within two years of being built one will be replaced. For one consultant to the KAP, the seawalls were an egregious failure – deplorably behind the times – which fail to dissipate wave energy, lack flank protection, and do not attempt to resuscitate reef health.[26] For other observers, they simply reflect an appropriate solution within the Kiribati context, limited by access to resources such as concrete and freshwater and technical engineering skills: these are seawalls that the Ministry of Public Works and Utilities can replicate.[27] One observer describes: "they did a good job within their brief.

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[25] Seawalls in the Pacific Islands are ubiquitous, and much debated in everyday life, policy and political options, and academic circles (Donner & Webber, 2014; Nunn, 2009). Artificial structures – seawalls – are built in order to cope with coastal erosion and retreat caused by a number of multiplying factors including encroaching coastal settlement, beach mining for aggregate, and sea-level rise and storm surges. However, in many instances these hard protection measures are inappropriate, or even damaging because there is insufficient understanding of coastal dynamics to design the best solutions, and they are expensive to properly build and maintain. The effect of these factors is often to exacerbate coastal erosion. While there are *better* seawall designs – for instance, those that reduce wave energy through vegetation, and have shallower slopes – it is not clear that such hard coastal protection measures would ever mitigate the effects of sea-level rise. Indeed, it is not clear exactly which measures would protect atoll coastlines from sea-level rise.

[26] Senior coastal engineer, Tarawa, 7 August 2013

[27] Project manager, Tarawa, 20 August 2013

Because it is repeatable by the average person who builds their own seawall, and that's what they were to do."[28]

Figure 4.1: Seawall with apron in South Tarawa, Kiribati.

Source: photo by author

A combination of factors contributed to dissatisfaction with the seawall construction, including a rush to disperse funding before the project ended and hiring engineers inexperienced with atoll environments and contexts (Donner and Webber 2014). As noted above, central to this dispute is whether seawalls should be international best-practice with cutting edge technologies, or echo locally specific and contextually adapted measures that i-Kiribati can replicate. Nonetheless, due to widespread dissatisfaction – including among policy-makers, technical experts, and development partners – these seawalls will not be replicated by the KAP-III.

[28] Senior water engineer, Tarawa 9 August 2013

Instead, for each new site, unique and integrated ecosystem and concrete protection will be developed by a consulting firm, suggesting the persistently local character of best-practice.[29] Coastal protection is not a highly mobile technology.

As a result, having piloted for almost ten years and spent more than USD10 million the KAP-III is, once again, experimenting. Its entirely new components include: (i) infiltration galleries and associated extensive community engagement, voluntary land agreements, and local water governance legislation and frameworks in two North Tarawa towns;[30] (ii) water and land governance for the freshwater lens that supplies South Tarawa including renewed rental agreements with land owners to keep squatters/tenants away; (iii) and a novel and extensive water reticulation and leakage detection system for South Tarawa. And, although both previous phases of the KAP invested heavily in national adaptation planning and mainstreaming, the KAP-III has repeated – perhaps duplicated – these investments by contributing to the Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management. In short, despite being explicitly programmed as a design-experiment-roll-out process, even within the KAP the World Bank failed to mobilize their developed best practices.

4.3.2 The KAP for the World Bank

While the KAP had its own internal cycle of 'experimentation-emulation-evolution' (Peck & Theodore, 2012), it also contributes to these webs within the World Bank. At the beginning of the KAP, the World Bank had limited experience in designing adaptation projects. An adaptation specialist at the World Bank since the late 1990s observes:

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[29] Program manager, Tarawa, 5 May 2014
[30] Community engagement specialist, Tarawa, 4 May 2014

> Well, it's [adaptation] become much more visible since Kiribati, hey? At the time of Kiribati there was no one interested, we were basically chasing [money], it was completely new. Ah, and, you know we used some pilot funds that were available here and there, and squeezed it through, but there was very little experience of how to do it. … We had done quite a bit of analytical work, the *Cities, Seas and Storms*. So we had that basis in order to do an investment project, but we didn't yet have the experience.[31]

The KAP investment was driven by experiences producing analytical works in Kiribati, and the desire to experiment in adaptation programming to generate knowledge and expertise in the sector.

Since then, the KAP and its results have featured in numerous analytical reports intended to report and share best-practice expertise in Adaptation at the World Bank. For instance, the *Lesson Learned* report discussed further below, hopes that reporting on the 'innovative' KAP "will be an inspiration for other adaptation efforts around the world" (World Bank & GEF, 2008, p. vi). Table 4.1 provides an overview of several such reports and the way these reports positioned the KAP as a model project. A review of these documents suggests that the KAP played a central role in earlier reports dating from the 2000s, although very recently other larger projects and investments play a central role (for instance see World Bank and GFDRR, 2013). After the Strategic Framework for Development and Climate Change in 2008 was initiated and alongside financial investments and sources such as the Pilot Program for Climate Resilience and the Global Facility for Disaster Reduction and Recovery, adaptation projects and lessons have

[31] Lead adaptation specialist, Washington DC, 1 April 2014

grown immensely (Independent Evaluation Group, 2012). These recent investments still draw extensively on the practices of the KAP.[32]

Report	Purpose of the report	Recommendations from KAP
An Adaptation Mosaic: A Sample of the Emerging World Bank Work in Climate Change Adaptation (Mathur, Burton, & van Aalst, 2004)	The report explores some preliminary "experiments and the valuable lessons from the 'learning by doing'" of the Bank's efforts to integrate "climate risk management in policies and projects in client countries" (2).	Most of the chapters are analyses of the risks climate change poses to sectors, and previous attempts to cope with disasters. The Kiribati Adaptation Project is the exception to this, and offers an example of dealing "directly with adaptation measures and policies themselves" (3). The document includes a summary of the *Cities, Seas and Storms* report, and how this has fed into the Kiribati Adaptation Project as the sole example of 'operationalizing adaptation'.
Look Before You Leap: A Risk Management Approach for Incorporating Climate Change Adaptation in World Bank Operations (Burton & van Aalst, 2004)	The paper aims to elaborate a 'climate risk management approach' for the World Bank to mainstream climate change into development activities in a just manner.	Pilot adaptation in Kiribati is a key activity, has led to the following key messages: (i) there is elite interest in climate change adaptation; (ii) adaptation must be integrated into national economic planning; (iii) and it

[32] Independent evaluator, Washington DC, 18 March 2014

Report	Purpose of the report	Recommendations from KAP
		must consist of 'no-regrets' actions which face current and future risks (17).
Not If But When: Adapting to Natural Hazards in the Pacific Islands Region. A Policy Note (Bettencourt et al., 2006)	The Policy Note aims to address the concerns that there is a lack of "political will" to mainstream risk management into national development planning. It also reviews the trends and lessons of pilot risk management initiatives, paying attention to incentives, institutions, and instruments.	The Kiribati Adaptation Project is one of several Pacific pilot programs from which lessons are drawn, specifically related to addressing perverse incentives, building institutions and appropriate instruments, the authors declare: (i) participatory consultations are key; (ii) place adaptation planning within coordinating bodies; and (iii) often major infrastructure investments are not required, just subtle behaviour changes.
Managing Climate Risk: Integrating Adaptation into World Bank Group Operations (van Aalst, 2006)	This paper looks at early experiences in climate change and highlights how the World Bank can help better manage the risks that climate chance poses.	The Pacific region was key in turning the World Bank to the importance of climate change. Key lessons from the KAP include that the World Bank needs to ensure that: climate change is treated as an economic and social risk, short and long-term vulnerabilities are

Report	Purpose of the report	Recommendations from KAP
		addressed, there is high-level coordination, it is mainstreamed into economic and sectoral planning, there is a link between bottom-up consultation and top-down policy, existing regulations are enforced and strengthened, and that no-regrets strategies are pursued.
Lessons Learned from the Kiribati Adaptation Program: Improving Climate Risk Management by Linking Bottom-up Participation with National Economic Planning (World Bank & GEF, 2008)	"Similar efforts [to the KAP] are now starting in a number of other countries" (v). This report describes the lessons from the 'innovative' project for 'inspiration' in other adaptation programs.	The KAP "is the first such program of the World Bank to successfully integrate climate risk management into national economic planning." This has been achieved by linking participatory consultation and development planning, and it has pioneered connecting risk management through existing ministerial operation plans. There are eight lessons from the KAP, explored more in the text of this chapter.
Adapting to Climate Change: Assessing the World Bank Group Experience. Phase III of the	With its Strategic Framework for Development and Climate Change (FY09-11), the World	The report identifies that although the World Bank Group has made progress on coping with climate

Report	Purpose of the report	Recommendations from KAP
World Bank Group and Climate Change (Independent Evaluation Group, 2012)	Bank initiated increased attention to adaptation. Before this, however, were three pioneering projects that provide lessons for these efforts. This report seeks to reviews and learns from existing investments in the World Bank Group.	change it lacks an operational system to identify climate risks at the project level. The report also assesses the successes of long-term planning. Alongside early projects in Colombia and the Caribbean, the KAP has succeeded in building national and regional capacity to adapt. While these were all hampered by thin resources and capacity, the projects combined planning and investments.
Building Resilience: Integrating Climate and Disaster Risk into Development. The World Bank Group Experience (Gitay et al., 2013)	This report assesses promising approaches, lessons learned, and remaining challenges associated with bringing the climate resilience and disaster risk management communities of practice together, and in turn integrating them into broader development processes.	This report outlines lessons from several adaptation and disaster risk management programs, including in Samoa, the Philippines, Mexico and Colombia. The KAP is mentioned only in passing and in relation to the importance of a high level convening power for implementing adaptation.

Table 4.1: Review of World Bank adaptation analytical documents and their lessons from the KAP

Several key lessons from the KAP echo throughout these analytical reports, as evident in Table 4.1. For focus, however, it is worth delving into the specific recommendations of *Lessons Learned from the Kiribati Adaptation Project* (World Bank & GEF, 2008) and assessing them against the outcomes of the KAP. This report was written by three former World Bank Task Team Leaders (TTLs), or managers, of the KAP who have gone on to implement similar programs in other countries. They describe the KAP as a source of inspiration with "similar efforts now starting in a number of other countries" (World Bank and GEF, 2008, v). The authors find eight key best practices for successful adaptation from the KAP: (i) climate change should be treated as an economic and social risk; (ii) prepare for long term climate change by addressing short-term vulnerabilities; (iii) adapt through policy changes and regulations rather than physical investments; (iv) adaptation should be flexible not structural; (v) institutions cannot be underemphasized, there needs to be management from a ministry that can coordinate investments; (vi) adaptation must be integrated into national economic and sectoral planning; (vii) investments need to be informed by community consultations and national planning; and (viii) a consultation framework is key.

Multiple methods are deployed to encourage replication and circulating citations to the KAP. The report declares that other projects have drawn from the KAP's 'innovative' lessons already. And despite many difficulties the KAP has encountered, these are recast as problems overcome, slipping from lessons learned to best practices. A necessary ambiguity haunts the recommendations too (Cohen, 2015). For instance, as articulated in the *Lessons Learned* document and others in Table 4.1, it is important to build climate change concerns into national and sectoral economic planning, and to maintain momentum for adaptation through bottom-up community consultations and top-down planning. These two practices make reference to

planning phases of the KAP-I where relevant ministries were required to specify some climate change practices in budgetary work plans (although were given limited funds to implement, and their actions were subsequently abandoned), and the mass national consultations the KAP-I undertook to generate adaptation options (most of which were also over-ridden during the KAP-II restructure). That the 'best practice' consultations and ministerial planning were forgotten over the KAP-I and the KAP-II transition is obscured by vague reference points and inexplicit methodologies for formulating recommendations. It is precisely this ambiguity that encourages the citation of the KAP best practices, particularly through obligatory 'peer review' processes (discussed further below) within the World Bank. As policy mobilities scholars would anticipate, explicit modeling and mobilization is necessary – through informational infrastructures, key champions and authorized experts – yet this is not always sufficient.

Nonetheless, the report recognizes that not all components of the KAP are replicable. While the eight key lessons have been sufficiently abstracted from their geographical and historical specificity in order to be replicated in other sites, Kiribati remains an 'atypical' environment for a World Bank project. Kiribati is unlike other potential sites for emulation given that "it has a small population and a small economy… and is rather isolated from the rest of the world" (World Bank & GEF, 2008, p. 27). The size of the country, government, and economy, means that a relatively small World Bank project attracts attention and is able to command an audience with senior government officials and implementing agencies. While this is unique, the report counters by linking to future sites of replication, noting that they may also suffer from the difficulties of sectoral silos within post-colonial government and the need to raise the political profile of climate risks and support for addressing them. Others may also benefit from the novel funding model, where a national program is supported by international finance (World Bank and

GEF) that brings together multiple sources of official development assistance (New Zealand and Australian aid programs). Such inter-referencing creates relational connections between experimental and duplication sites bringing each other into adaptation policy mobility circuits. Both 'pilot' and 'roll-out' projects rely on each other: the former for evidence of scale-up, -out and – forward, and the latter as proof of thorough consideration of those projects on which it builds. Indeed, relational inter-referencing maintains the World Bank as a site of learning and improvement, almost irrespective of evidence of successful project implementation.

In summary, the KAP process has failed to create cycles of "experimentation-emulation-evolution" and instead fails forward within the World Bank. The KAP represents best-practice in official World Bank documents, yet has been officially and administratively labeled a 'failure' (Global Environment Facility, 2009), and only 'moderately satisfactory (World Bank, 2011). Despite this, the KAP is recuperated and continually and successfully populates World Bank analytical documents expounding potentially replicable adaptation best practices. The following section outlines how the KAP has been taken up – is mobilized and remodelled - in the CRISP.

4.4 Taking KAP to the CRISP

4.4.1 The CRISP

One project that claims to take the lessons and practices of the KAP is the Community Resilience to Climate Change and Disaster Risk in Solomon Islands Project. The USD10.2 million project has only recently been approved by the World Bank; it began disbursements and programming in June 2014 and will run until 2019. Co-financed by the Global Environment Facility and the Global Facility for Disaster Reduction and Recovery (GFDRR), the project "aims to contribute to resilient and sustainable economic and social development" by "increasing the capacity of selected rural communities to manage natural hazards and climate change risks" (World Bank,

2014b, pp. 5–6). The project proposes to meet these goals through four components: integrating climate change adaptation and disaster risk reduction into government policies; strengthening climate and disaster early warning systems; investing at the community and provincial level including in risk planning and implementation; and project management and monitoring and evaluation. Within the project there will also be priority areas in water supply and sanitation, human settlements, education on climate change, adaptation in low-lying areas, coastal protection, and resilient infrastructure. It is difficult to judge how well the best practices of the KAP will be implemented given the preliminary stages of the CRISP. Nonetheless, in this section I examine how the KAP lessons have contributed to planning the project thus far. Even given limited implementation, the CRISP appears to directly contradict the stated and implicit lessons of the KAP. The section that follows explores this, before discussing in section five what this implies for the World Bank as Knowledge Bank.

4.4.2 Implementing the KAP in the CRISP

In its Project Appraisal Document, the CRISP claims to draw from several World Bank and donor initiatives already ongoing in Solomon Islands. This includes the Rural Development Program, which has developed a participatory mechanism for delivering small grants for infrastructure investments, and the Pacific Catastrophe Risk Assessment and Financing Initiative that provides risk methodologies and products. The KAP also plays a central role in the "lessons learned and reflected in project design" (World Bank, 2014b, p. 9): "I mean, obviously the KAP in Kiribati brings in a lot of lessons,"[33] states one project manager. Practices said to be followed by the CRISP in official documents (World Bank, 2014b) include ensuring: the implementing

[33] Country manager, Washington DC, 3 May 2013

agency is adequately prepared for the project; that risk information is used in planning; a geographically focused project for feasibility; and engagement among community members for behavioural change to reinforce adaptive capacity instead of only investing in structural measures.

There are several mechanisms through which lessons from the KAP could contribute to the CRISP. For two very brief periods, the projects had the same TTLs at the World Bank. Knowledge of the KAP was, therefore, embedded within CRISP personnel.[34] This embedded knowledge is key in mobilizing best practices; a Pacific specialist explains: "we do a lot of training, we do a lot of guidance notes and whatever. [But], I don't think there's any substitute for the people,"[35] particularly the 'circulating staff' instituted through the "3-5-7 rule which is basically that your minimum time in a region is three years, your average time is 5 years, the maximum time is 7 years. And after that you're expected to move … and take your skills and your learning with you."[36] Best practices *may* be held within the experiences and knowledges of TTLs – as one early KAP manager notes: "those early lessons that we learned in KAP were then very useful, for me, in trying to design similar operations in Madagascar, and in Sao Tome and in Zambia"[37] – but in the KAP-CRISP case, the brief time for cross-fertilization may have limited actual sharing. When pressed to describe the practices shared between the KAP and CRISP, one of these TTLs could only muster:

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[34] Embedded, perhaps, but not very deep: One of the TTLs with a long-standing involvement with the KAP worked on the CRISP for mere weeks, and the reverse is true for the second. Such a high rotation is typical of the smaller projects and smaller countries in the World Bank; in its 11 years life the KAP has had at least six TTLs, and three over the last three years.
[35] Economist, Tarawa, 30 July 2013
[36] Economist, Tarawa, 30 July 2013
[37] Lead adaptation specialist, Washington DC, 1 April 2014

> It's the same kind of model, its both the policy aspect, but also some investments. … I think it's a good combination of both policy reforms and, you know, concrete investment on the ground. I like that. … we don't want to only focus on TA – Technical Assistance – we also want to include some investments, just to demonstrate what can be done.[38]

Given that the TTL who recently managed both the KAP and the CRISP could only find similarities in their combination of technical and financial assistance – which is common to most, if not all, World Bank projects – it seems that best practice was not mobilized through this route. Although we can locate the project managers at the site of the two projects and we might therefore expect successful policy mobilization-mutation, in this case personnel are not sufficient.

Beyond the ambiguous policy-and-investment model shared by the two projects, the lessons drawn from the KAP in generating the CRISP are superficial, even given the expectation of mutation and not policy replication (Peck & Theodore, 2010). There are few similarities between the 'best practices' from the KAP and those that the CRISP seeks to implement or has been able to replicate. This is obvious from matching the lessons learned in Table 4.1, with those claimed in CRISP documents, and the institutional context of each of the projects. For instance, where the KAP lessons emphasized achieving the right institutional fit with high-level implementation capacity amongst the in-country partner, the CRISP will be coordinated through the Climate Change Division of the Ministry of Environment, Climate, Disaster Management and Meteorology who currently employ two full-time staff. In the CRISP, therefore, not only does climate change remain siloed as an environmental concern rather than transitioning to an economic and social risk approach as the KAP implores, but implementation capacity within a

[38] Senior environmental specialist, Sydney, 18 September 2013

small, relatively new, and inexperienced office, already coordinating numerous climate change programs, is obviously low.

In other instances, the practices of the CRISP stand in complete contrast to the lessons suggested by the KAP. For example, when asked to cite a lesson learned from KAP that they recommend to other projects, one observer from a large regional organization recommends "Just don't do pilot projects"[39] as they are frustrating for the implementation team, the public and the government.[40] Instead, they recommend fully integrated, whole of Province, long-term, 'Ridge-to-Reef' programs to overcome the "piecemeal, 30 years of pilot projects, and climate change this and that… do one model village, and then leave"[41] Yet, pilot programming is essential to the CRISP where a Japanese grant will provide "funds to pilot what we would hope to do under the big project."[42] Both of these examples also indicate that circulating best practices relate primarily to citations of name and form and not to specific practice. While both projects hope to build capacity, learn along the way, and get the institutions right – and who would disagree with these goals – the exact governmental intervention remains unclear.

Given that the lessons generated by the KAP are not substantively instituted in the CRISP, there cannot be said to be mutation. Instead, mention of these lessons – of the model and its references (Bunnell, 2013; Ong, 2011) – in project documents serves to satisfy institutional requirements at the World Bank and produce internal success-stories. All projects at the World Bank are required to demonstrate how they build on existing country and sector programs, and,

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[39] Country program manager, Honiara, 1 November 2013
[40] Senior water engineer, Tarawa 9 August 2013
[41] Although, note that the projects this observer works on are 'reef-to-ridge' projects, a kind of competitor policy-model to the KAP.
[42] Country manager, Washington DC, 3 May 2013

as part of the peer review process, elucidate best practices from diverse yet relevant contexts. The core of the peer review system is twofold: project documents must cite existing best practices and demonstrate replication, and projects must be reviewed by sectoral experts. The system is an essential component of 'quality control' for the World Bank system.[43] A CRISP manager describes the process:

> So I mean we are asked to do some work to draw some lessons from previous projects… similar lessons have been observed from DRM [disaster risk management] and adaptation projects - the KAP. [Then comes] Project implementation da da di, da da da.[44]

For another observer, the limitation of the peer review process – as indicated in the flippant dismissal of 'lessons learned' – "The problem is that everybody is way too busy, and people don't read."[45] The peer-review system enforces citations of existing and ongoing project successes, or representations thereof, without ensuring sustained uptake. The effects of the model and its references within the Bank are explored further in the following section.

4.5 World Bank analytics

If documents like those analyzed in Table 4.1 do not substantively contribute to the replication of lessons learned or the mobilization of best practices for climate change Adaptation, then what do they do? Or, phrased slightly differently, why does the World Bank invest so heavily in 'analytics', as they are named internally, and with what effect? In order to explore this question we shift from an examination of climate change adaptation programs in Kiribati and Solomon Islands to consider World Bank adaptation investments more generally. The example of the KAP

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[43] Environmental specialist, Washington DC, 9 May 2013; Country manager, Washington DC, 3 May 2013
[44] Senior environmental specialist, Sydney, 18 September 2013
[45] Senior economist, Washington DC, 21 March 2014

and the CRISP opens up questions related to the purpose of analytical works and the ways that climate change challenges and reproduces the World Bank. There are several plausible reasons provided by observers of and participants in climate change adaptation programming within the Bank, each of which I will explore briefly, before considering the maintenance of contested 'circuits of capital and truth' in climate change and development (Roy, 2010).

Some interlocutors at the World Bank parrot the official 'knowledge bank' line: being "the big player… the big one"[46] in climate change and development investments requires that the World Bank's programming is directly informed by the most up to date information. Another specialist working in the climate change anchor suggests:

> You need to be aware, you need to be top-of-the-line on bringing what is the most available – what is the science saying, what is the most up-to-date information – so your decisions are really based on what's the best available type of underlying foundations. … So we try to work on building knowledge, [the] capacity building aspect. So we do a lot of reports, a lot of key resources or key documents on key aspects for it to influence the agenda how to push forward with some key issues.[47]

In a similar vein – and to return to the quotes at the start of this chapter – as the *World* Bank, the institution is able to garner knowledge on disparate circumstances and redistribute it to new projects, programs, and experts. "Because we have a global responsibility," the Bank must continue to publish in its areas of expertise, in order to spread its 'message' on climate change and development.[48]

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[46] Former lead climate change specialist, Washington, DC, 7 May 2013
[47] Climate change specialist Washington, DC, 7 May 2013
[48] Lead adaptation specialist, Washington, DC, 1 April 2014

Yet, as we explored in the case of the KAP/CRISP previously this does not always result in mobilized and redeployed policy paradigms. World Bank employees know this too, recognizing that if knowledge does travel across the organization this feat is perhaps only circumstantial.[49] States one, now retired, senior environmental and climate change specialist: "you can lead a horse to water [analytical documents] but you can't make him drink [use the results in programs]."[50] Indeed, there are some perverse incentives for not sharing and replicating lessons due to the Bank's emphasis on innovation and making a mark.[51] While some employees believe in the World Bank as knowledge bank and constantly work for its achievements, others are sceptical.[52]

Analytical documents also do political work inside the World Bank. There are different audiences for these analytical documents including internal, external and public, and technical, in-country or ministerial ones.[53] For internal audiences, an analytical report or document can secure internal coalitions and build momentum for a particular issue, sector or approach, as a kind of "one ring to bind them all together. … Sometimes the manual or document can take on that role."[54] As such, these document signpost the positioning of current Bank programming. One former climate change specialist notes

[49] Junior professional associate, Washington, DC, 10 May 2013
[50] Former senior advisor in sustainable development, Washington, DC, 29 April 2013
[51] Junior professional associate, Washington, DC, 10 May 2013
[52] Former lead urban specialist, Toronto, 14 May 2013
[53] Senior environmental specialist, Washington, DC, 6 May 2013
[54] Former lead urban specialist, Toronto, 14 May 2013

> the reason that I initiated some of that knowledge base and the portal and so on wasn't because I thought that was the thing that people most needed. It is what *they* saw that they most needed and basically people weren't prepared to move forward unless they had that.[55]

Another TTL describes:

> Those studies basically are good, I think, for two or three things. One is basically it creates a synergy between people who work on the same thing that are open to a new perspective, to think through… things they didn't think before, so it's very project initiative specific. Another one sometimes can be that it can address debates that are happening either in the World Bank, the sector, or in the development community.[56]

To reiterate, knowledge documents can align disparate parts and areas of expertise of the institution, building "partnerships … of interested parties,"[57] securing internal Bank coalitions and signalling approved governance actions. Knowledge work signifies that an object, problem, or situation is known as outlined in a report, and can therefore be acted upon through specified programming approaches.

4.5.1 Circuits of 'capital' and 'truth'

Perhaps most importantly, however, is that these analytical works enable and produce what Ananya Roy (2010) calls 'circuits of capital and truth.' Following Roy, the World Bank circuits of capital and truth consist of its knowledge about how to manage global poverty (i.e. truth) – and in this case, climate change – in tandem with its programming, lending, and grants (i.e. capital). In particular, capital and truth are co-constitutive of development legitimacy – in maintaining and producing the World Bank as a 'center of calculation' and 'chief arbiter' of

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[55] Former lead climate change specialist, Washington, DC, 7 May 2013
[56] Former senior advisor in sustainable development, Washington, DC, 29 April 2013
[57] Former senior advisor in sustainable development, Washington, DC, 29 April 2013

development (M Goldman, 2005, p. viii). Within this circuit – and also actively constitutive of it – the World Bank disseminates its consensus, "circulat[ing] best practices and models and data management" (Roy, 2010, p. 36). As I show here, with regards to the problematic of Adaptation and its governance, the World Bank and its practitioners link lending and investments with analytical and policy work in actively making and legitimizing its climate change adaptation circuit.

Consider for example the Climate Change Knowledge Portal (World Bank, 2015) which houses downscaled climate data and anticipated climate change impacts and links these projections to analytical reports about climate change interventions and attempts to govern impacts through 'World Bank financed activities'. Speaking of the CCKP, a climate change specialist describes how the Bank explicitly attempts "to pick up information, the science component of climate change, … and then [link that to] what does it mean in terms of climate proofing [investments]… and different actions."[58] She summarizes that the work of the climate change anchor (so called as it sat at the centre of the Bank; but now called the 'beam' as it runs across Bank programming) is to de-mystify climate change information and previous best practices for actual users/TTLs to "put it on the ground and use it" in their investments. Through the CCKP and similar analytical tools and resources, the middle-people in the anchor/beam create relations between information about climate change impacts, previous governance efforts, and the financial resources to implement such an investment.

Another program that generates knowledge that is explicitly linked to investments are the Climate Investment Funds (CIFs). The CIFs were originally established by the World Bank and

[58] Climate change specialist Washington, DC, 7 May 2013

other development partners to tide over climate change financing until the Green Climate Fund came 'online.' However, as the Green Climate Fund has slipped out of World Bank control, the CIFs will remain in parallel – trialing Adaptation and mitigation investments 'at scale'. One of the CIF programs is the Pilot Program for Climate Resilience (PPCR) which is investing considerably in a broad range of resilience programs in just a few countries; that is, rather than investing in small adaptation programs in many countries, it is hoping to achieve national adaptation in a few countries. As noted above – and as its name indicates – the PPCR aims to experiment with adaptation interventions, both building on the KAP and like the KAP before it. Fundamentally, however, the PPCR is the joining of "knowledge of learning and best practices"[59] and investments in adaptation programming. As one manager of a PPCR investment in the Pacific describes, his projects are "really captur[ing] the knowledge, best practices, the lessons that are coming out of … the three individual programs [in the Pacific] … and also further pilot[ing]… some of these promising technologies."[60]

This strategy of aligning analytical work with actual investments is common throughout climate change programming. In relation to the Pacific climate change portfolio, one climate change specialist notes that there are two complementing focuses:

> the first is really to make sure that we put in place … policies and institutions related to climate change. … We work on the science part and make sure that decisions are taken on facts and figures, that it is an evidence based decision-making process, so we are also strengthening data collection and information related to … climate change adaptation [projects].[61]

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[59] Senior natural resources management specialist, Washington, DC, 3 May 2013
[60] Senior natural resources management specialist, Washington, DC, 3 May 2013
[61] Senior environmental specialist, Sydney, 18 September 2013

For the Pacific portfolio, therefore, a preliminary focus is on the knowledge work to enable climate change investments. This is combined with investments; the climate change specialist continues:

> So that's more, I would say the enabling environment. Then the investments: … they are planned in a way that is resilient to climate change and disaster risks. So [investments] is the second area, or pillar, of our climate change management. … It's important to ensure that the knowledge will be … linked again to some initiative.[62]

Another interlocutor in the Sydney World Bank office calls this linking "talk to cargo" – that is, combining global knowledge (talk) with financial investments (cargo). He continues: previously in the Pacific, the Bank

> only did really advisory, analysis, and TA [technical assistance], but without bringing the cash, without putting the cash on the table, they could bring the best global knowledge, but the traction is still difficult; without the infrastructures and money, there is no traction.[63]

Like the KAP and CRISP – which, as described above, are a "good combination of policy reforms and, you know, concrete investment on the ground"[64] – Pacific-wide climate change programming also pegs 'capital' to 'truth' to maintain hegemonic World Bank interpretations of, and investments in, Adaptation success.

One mechanism through which climate change analytics helps maintain circuits of capital and truth is in creating relations of equivalence between adaptation and development programming. Working through "good robust analysis… good reports, simple reports but factual,

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[62] Senior environmental specialist, Sydney, 18 September 2013
[63] Senior country specialist, Sydney, 18 September 2013
[64] Senior environmental specialist, Sydney, 18 September 2013

you know it's got a good robust analysis behind it"[65] makes it "hard to differentiate what is climate and what is development… a lot of adaptation is just the need to do development a little differently, to be able to adapt to the challenge."[66] Another observer notes: "the policy and the practice notes and the engagement note is really trying to bring climate change adaptation, disaster risk, and development together in one team… it really makes a lot of sense."[67] Similarly, a central climate change specialist at the Bank urges that

> if you're going to make progress on adaptation, you really have to make it into climate resilient development. … So you really have to make it as part of development; the Bank is a development agency and organization and everything here gets looked at through the lens of development.[68]

This stance – that Adaptation is climate adjusted development to be achieved through Bank investments – precipitates and consolidates the development programming of the Bank, but in a new name and configuration. Conveniently for the World Bank, they are well situated to append climate resilience to development: "the World Bank really spans the value chain"[69] of climate change and development.

4.5.2 Circulation, relevance, and legitimacy

Yet, given that these analytical works detailing best practices and lessons learned are rarely read and deployed, World Bank/climate change adaptation circuits of capital and truth require continual work. As Roy (2010) demonstrates, any centrality through which such a circuit is maintained and produced is "a terrain of contestation and negotiation." In the case of the KAP and CRISP this fragility is ambivalently so, with indifferent and careless citation of best

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[65] Country manager, Washington, DC, 3 May 2013
[66] Climate change specialist, Washington, DC, 9 May 2013
[67] Disaster risk management specialist, Washington, DC 9 May 2013
[68] Senior environmental specialist, Washington, DC, 6 May 2013
[69] Lead environmental specialist, Washington, DC, 1 April 2014

practices that fail to influence actually existing implementation in climate change adaptation programming and which rarely reflect project implementation and outcomes. Whether the World Bank is able to negotiate this ambivalence and maintain its hegemonic interpretations of adaptation and development through circulatory best practices and financial interventions will be worked out through its current legitimacy and relevance crises. Indeed, the circulation of capital and truth is particularly necessary during times of legitimation and reputational crises. As Goldman (2005) explores, expansive and expansionary knowledge worked to 'green' the Bank and 'mainstream the environment', necessary when the institution faced hostile criticism for its large infrastructure (particularly hydro-electric dam) investments. In implementing its environmentally and socially responsible agenda, the Bank became "simultaneously global lender, policy maker, civil-society actor, and knowledge producer… it has successfully determined the parameters in which we speak and act in the name of development" (M Goldman, 2005, p. xviii). This was an era of 'reform or die' for the World Bank, which it met by merging of the 'Finance Ministry' agenda and the 'Sustainable Development' knowledge agenda, forging capital and truth (M Goldman, 2005).

There is also a contemporary crisis. As one long-term employee of the World Bank noted, "it's always – I mean that's what you get when you get old – but it's always been like that, at the Bank, there's always been a crisis and things have changed, and [there's] always an emergency."[70] Now, when asked why the World Bank invests in climate change programming, employees note an existential threat that stem from both a potential loss of status and financial risks to its investments. For instance: without pursuing climate resilience the Bank would "go

[70] Former lead urban specialist, Toronto, 14 May 2013

bankrupt… it's impossible for the Bank… not to think now and really get their act together otherwise… what the Bank does is going to be futile"[71] Another notes, "we'll get left behind, basically"[72] if the Bank avoids climate change. Or more brutally, the cost of maladaptation is "Death. We would become irrelevant."[73] Potential irrelevance due to climate change is occurring at a juncture in which development death is quite literally a possibility; or rather, at a time during which employees, management, partners, clients, and observers diagnose potential and existential institutional insignificance.

The current legitimacy (and associated financial) crisis at the World Bank has various facets and manifestations. A sense of unease about the future of World Bank development festers at the institution and it showed itself to me subtly on several occasions during my visits. After attending a launch at the World Bank for a book that discussed the state of development knowledge and policy, I wrote in my notes:

> Good talk, I think. Also interesting to reflect on the latent conversation, or underlying theme in many of these seminars. Development and the World Bank seem to be operating in something of a crisis, or a fear of an immanent crisis. This is related to both the financial crisis, which has left the Bank in not-great financial shape compared to the past, but also to other factors. There is a sense that there is shifting ground, related to climate change, to the changing and shifting geopolitical powers from the EU/North America to the BRICS. And so what would this mean for the World Bank in terms of their endowments and projects, and for their future investments?

When I discussed these sentiments, this simmering feeling of legitimacy and relevance crises with two open observers and employees of the Bank, one agreed, citing 'an overwhelming sense

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[71] Climate change specialist Washington, DC, 7 May 2013
[72] Senior natural resources management specialist, Washington, DC, 3 May 2013
[73] Climate change specialist, Washington, DC, 9 May 2013

of unease'[74] in the institution. In May 2013, this observer pointed to recent organizational reforms and restructures – for instance, various levels of senior management will now be subject to strict four-yearly reviews with possible demotion, and there were rumored changes to the retirement age and other employment benefits. When we discussed this in 2014, she described pervasive dissatisfaction and distrust among Bank staff of President Kim and his restructure, which began when he assumed presidency in 2012. Most recently, frustration with the three-fold internal reorganization (consisting of a $400m 'squeeze,' general financial constraints, and an internal-structural reorganization to remove regional groups) – or 'change process' as it is dubbed – led to a general employee strike for the first time in the organization's 70 year history (Devex Editor, 2014).

As noted above, the reorganization aims to break-down the Bank's regional 'silos' so that sharing can occur across the regions and within sectoral 'global practices' (Lowrey, 2014) – things like health, climate change, and agriculture. In doing this, Kim also hopes to find and reduce 'inefficiencies', which have manifest in cuts to staff benefits, including travel allowances and increasing uncertainty about the future of their programming. One younger employee describes: "I mean certainly [a] lack of resources is being very keenly felt, by people across the Bank. Certainly people of my kind of age [comparatively young], and level, and just above me… people aren't getting jobs."[75] There is concern among staff that these cuts are affecting their ability to 'do development': for instance, "the budget cuts influenced the level [of] task team leaders that you assign to these operations. Some of them have been quite junior with not very much experience. Because more senior staff are more expensive, it's been quite difficult to

[74] Lead urban specialist, Washington DC, 10 May 2013
[75] Disaster risk management specialist, Washington, DC 9 May 2013

assign them [to projects], you know."[76] While staff appear dissatisfied with the process of reorganization including a lack of communication, especially as to when it is going to be completed, there are also reports of staff concern as to the outcomes of the reorganization: creating more silos (sectoral rather than regional) than previously, new management layers, greater centralization of decision-making, and budget discrepancies where the good work of development gets short-shrift, but management is rewarded with bonuses (Devex Editor, 2014).

In addition to the restructure, and associated with its justification, there is also a sense that the Bank is become increasingly distant to the global governance of poverty – it's central goal. Journalists and media observers write that many of the Bank's big clients – the one's who resolve the organization's demand-side problem – are now able to access capital cheaply on financial markets, without any of the Bank's burdensome bureaucracy (Editorial, 2014; Harding, 2014). This leads to the common refrain that the Bank needs China more than China needs the Bank.[77] One employee riffed for a few minutes, describing her observations about the Bank:

> I haven't worked in other private sector organizations, but sometimes I wonder how competitive we are against private sector organizations, and whether we're as good as we think we are. And I think the Bank sometimes just leans on its laurels, and does a lot of talk about 'we are the knowledge bank', 'we are the global practice leaders', but it's not really … So I am not sure that the institution functions as the most competitive institution.… I think it's too cumbersome… it takes years to prepare a project. And I know that part of that is because there's so many checks and balances. … But, you know, it takes the same amount of effort to prepare a two million dollar project as it does to prepare at 20 million dollar project. It's not an agile institution; it's not a

[76] Lead adaptation specialist, Washington, DC, 1 April 2014
[77] Heard in small restaurants in Tarawa as frequently as in the halls of 1818 H St NW.

> responsive institution. And I think that we're probably going to become a little less relevant in that context, unless we change.[78]

Note here also that the Bank is described to exist independent of its objective to address poverty, or climate change, and instead is the global knowledge institution and best-practice programmer. As a result of being burdensome – which is what President Kim sought to address – the Bank "is no longer the sole or even major supplier of funds to developing countries" (Birdsall & Subramanian, 2007, p. 1). Bank staff are also feeling 'the age of austerity'; commenting on a trust fund related to disaster risk reduction, an employee noted: "the GFDRR felt like a limitless fund. And now, we've got much less because donors aren't maintaining. … You know, the money's just not coming."[79] During my last interview at the Bank in 2013, a young Central American environmentalist somewhat disillusioned with the institution agreed with the underlying sense of illegitimacy, and asserted that climate change is an attempt to stay relevant, to reform to meet demands, and if the Bank were not to address it, the organization would cease to be relevant. Climate resilient development: "its good business,"[80] it's "finances,"[81] "it would be stupid not to."[82] The World Bank is clearly on shaky grounds; circulations of climate change adaptation truth and capital seek to shore things up, for now.

4.6 Conclusions: On success

This chapter has examined how the World Bank mobilizes climate change adaptation best-practices and with what effect, drawing from the relational case study of the Kiribati Adaptation

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[78] Disaster risk management specialist, Washington, DC 9 May 2013
[79] Disaster risk management specialist, Washington, DC 9 May 2013
[80] Junior professional associate, Washington, DC, 10 May 2013
[81] Country manager, Washington, DC, 3 May 2013
[82] Senior environmental specialist, Washington, DC, 6 May 2013

Project and the Community Resilience to Climate Change and Disaster Risk in Solomon Islands Project. I have examined whether and how these lessons and practices have travelled between the model site of the KAP and the replication site of the CRISP. For the World Bank, the KAP serves as its own cycle of experimentation and roll-out, as well as an experiment for other adaptation projects, including the CRISP. This example demonstrated that the KAP is formulated as a best practice adaptation policy model through numerous analytical documents and key champions that package mobile insights that are sufficiently prescriptive yet vague, and which create relational and referential connections between the experimental and potential replication sites. Additionally, the example provides insights into the work required for the World Bank to produce potentially mobile projects and policies: creating analytical documents and requiring compulsory peer review which create citations of success and extend interpretive networks of success (Mosse, 2005).

Following recent calls among scholars of policy mobilities to avoid fetishizing and reinforcing successes and flows, I have demonstrated the need to examine that which does not circulate, and where contradictions lie in attempts to mobilize best practices. This is only possible through a contextual examination of mobile and mobilized policies and their effects, which considers situated policy practices and outcomes in relation to abstracted documents and stories. Indeed, the apparent and widely reported production of circulating, best practice, Adaptation is an effect of the modeling and inter-referencing work of the World Bank, and we must recognize it as such. Failing to be sufficiently attentive to the institutional contexts in which policies are mobilized and redeployed, and to potential disruptions in flows, risks reinforcing the World Bank's circulatory capacity and expansionary tendencies, becoming enrolled in its interpretive echo chambers.

In addition, this chapter has assessed the political work of the production of best practice models. Given that adaptation policy models are not replicated in new sites, I asked: what do analytical reports and policy models do for the World Bank? I argued that adaptation programming works to stabilize the World Bank, creating novel circuits of capital and truth related to climate change. The circulation of interlinked knowledge and investments – at a time of organizational disunity and seeming global poverty irrelevance – operates to reproduce the World Bank as a global knowledge and solutions organization. Proclaiming and referencing success independent of program achievements produces new areas of expertise, new sites for investment, and reasserts the relevance of the Bank.

This compulsive citation of experiences, best practices, and models of Adaptation builds internal and external legitimacy. Within the World Bank, a model and its inter-references can secure an internal coalition to pursue the cutting edge development issue of adaptation, and signposts the current position of World Bank programming. Externally, 'circuits of capital and truth' (Roy, 2010) – consisting of adaptation best practice and expertise, and the financial tools to pursue further adaptation programs – are co-constitutive of development legitimacy and essential for maintaining the World Bank as a 'center of calculation' and 'chief arbiter' of development (Goldman, 2005, viii). Analytical works and interpretive networks peg 'capital' to 'truth' to maintain dominant World Bank interpretations of, and investments in, Adaptation success. Attending to the differences between what is mobilized in rhetoric and in practice is, therefore, particularly important in the case of the World Bank, especially at the current juncture, where the World Bank is threatened by financial and developmental irrelevance.

Failing to be sufficiently attentive to the institutional contexts in which policies are mobilized and redeployed, and to potential disruptions in flows, risks reinforcing the World

Bank's circulatory capacity and expansionary tendencies, becoming enrolled in its interpretive echo chambers. As Goldman (2005) has shown, the World Bank has a demand-side problem where it must continually seek new avenues for its interventionist finance. As I have demonstrated, analytical works and interpretive networks are key in securing these opportunities, legitimizing the World Bank as a successful programmer in climate change Adaptation. This is particular;y the case as the Bank seeks to restructure itself in order to remain a relevant and legitimate hegemonic global development authority.

Chapter 5: Making and moving climate services

5.1 Introduction

The Fiji Meteorological Service collects and stores daily weather data, and can provide a range of 'packaged', 'on-demand' services including annual and monthly climate summaries and climate outlook products. In addition to facilitating daily forecasts the Fiji Meteorological Service, in collaboration with foreign climate institutions, provides a monthly El Niño Southern Oscillation (ENSO) Update: a 7 page report of the current ENSO conditions and predictions for the coming season. The Fiji Meteorological Service also generates additional information for the sugar industry and electricity providers, with the objective that they might adapt their planning to suit anticipated climate conditions. According to one analysis (World Meteorological Organization, 2011, pp. 156–160), the Fiji Meteorological Service has successfully and innovatively linked public and private sector interests, and, through the Update and other tools, is able to provide client-focused products and services that address the country's development and industrial needs. However, within the Fiji Meteorological Service there remain technical capacity limitations, which may be further strained by climate change.

The Fiji Met Service ENSO Update is an example of a climate service. Climate services[83] are "easily accessible and timely scientific data and information about climate that help people make informed decisions in their lives, businesses, and communities" (National Ocean and Atmospheric Administration, 2011). They can contain simple information such as historical data sets or more complex 'products' such as climate and weather predictions, computer programs or

[83] This is not the only potential definition of a climate service. For instance, a climate service might be a corollary to an ecosystem service (see Cooter, Rea, & Bruins, 2013). Confusingly, a climate service is also an institution that provides climate services, that is a similar to a weather service. Here, according to 'industry' notation, we continue with the above definition.

decision-making platforms. Key to climate services is a focus on decision-making, such that the products must be scientifically credible but also technically accessible to a wide variety of decision-makers. In addition, climate services should be on-demand for individuals, business, and governments to use. Accordingly, transforming climate science into 'actionable information' (Parker, Marra, & Muth, 2013) is integral to adapting to climate change through sector policies and plans, especially in vulnerable developing countries (World Meteorological Organization, 2011).

Since 2009 government weather and climate modellers and researchers have been encouraged to shift their focus from basic climate science research to applied climate services and products in aid of climate change adaptation. Participants at the 2009 World Climate Conference called upon the World Meteorological Organization (WMO) to develop an institutional framework to inspire a greater focus on decision-making. The resulting Global Framework on Climate Services entitled *Climate Knowledge for Action* (World Meteorological Organization, 2011) hopes to "strengthen the provision and use of climate predictions, products and information worldwide" (World Meteorological Organization, 2013a). The Framework is premised on three assumptions: we are all affected by climate; climate services can help people manage risks and optimize the impacts of climate change; and there is an existing gap between the need for climate services and their provision, particularly in "climate-vulnerable developing countries" (World Meteorological Organization, 2011, p. 3). Although the implementation of the Framework[84] is still in its infancy, the WMO has instigated pilot projects and regional

[84] Although, the WMO has limited ability to implement the Framework and instead encourages its member governments to take onboard the narrative of climate services and encourage this commercial governance regime in public sector science organizations.

workshops, and created a network of international agencies to assist in implementing the program, including United Nations agencies and the World Bank (World Meteorological Organization, 2013b).

This chapter casts an analytical eye over the production and consumption of climate services. It draws empirical evidence from participant observation at the Pacific Island Climate Services Forum (the Forum) held in Suva in January 2013, and subsequent interviews with climate and weather service providers, consultants, and environmental scientists associated with the Pacific-Australia Climate Change Science and Adaptation Planning (PACCSAP) program, and with meteorological officers and climate change specialists in Kiribati and Solomon Islands. As with previous chapters, I engage this multi-sited evidence to examine how scientific products and financial incentives circulate in the Pacific Adaptation Complex. In this instance, I find that while scientific products in the form of climate services certainly circulate from Australia to intended sites of consumption in the Pacific Islands, there is only very limited uptake and application. That is: the production of climate services are supply-driven in the context of public sector austerity (in this case) in Australia, but fail to influence adaptation decision-making.

In critically examining the production and consumption of climate service products, this chapter argues that climate services are an application of commercialized and neoliberalized logics to the management of climate science. A pervasive narrative of usefulness governs the logic of providing services for consumers rather than basic science research. Therefore, in contrast to the preliminary academic engagement with climate services – which will be outlined below – this chapter explores the contradictions inherent in the circulation of climate services, which follow from commercialized governance. These contradictions also arise from the material characteristics of dynamic and fluctuating climate science, particularly around uncertainties in

climate projections, trade-offs over accuracy and precision, and the expectations of scientists and decision-makers. This chapter argues that in order to properly account for tensions in the commercialization of climate change science, both the internal processes and practices through which climate services are produced, consumed, and negotiated, as well as the external political economic conditions through which commercial logics govern public climate science, must be considered. Only through such an 'internal' and external' approach (Muellerleile, 2013) can the emergence and failure of the climate service business model be explained.

One caveat is required. Currently, climate services are primarily funded by governments. The service products discussed in this chapter are funded by re-allocating Official Development Assistance away from Pacific Islands and towards Australian government scientists. However, I would counter by arguing that a focus on producing climate, and climate change, information in package-able formats for use in policy-making represents a structural shift. Climate service producers hope that providing such products will encourage new demands – and demand that is able to be monetized – so that in the future they may be able to circulate, as commodities and for profit maximization. Indeed, the Climate Services Centre in Germany is engaged by private clients to produce individualized climate fact sheets, in one instance creating climate projections for a potential tourist operation in Central America (Fischer-Bruns & Brasseur, 2013). For now, climate services are publically subsidized – but with a hope that they will one day be not.

5.2 What is a climate service?

"Climate services are already here… go tell your people… this is not something you have to wait for,"[85] declared one of the organizers of the Pacific Island Climate Services Forum. So if climate

[85] PICSF organizer, Suva, 24 January 2013

services are here – as per the organizer of this regional workshop that hoped to concentrate and facilitate the circulation of climate services in the Pacific Islands – then what exactly are they? Beyond scientific advancements necessary for a climate service, such as climate predictions, outlooks or scenarios, such services entail the concerted effort to establish institutionalized and 'on-demand' climate predictions; or "climate forecasts like we now have weather forecasts" (Brasseur in Heffernan, 2009). That past climate is no longer indicative of future climate means that 'actionable information' is imperative for governmental planning (C. Hewitt, Mason, & Walland, 2012). Currently, General Circulation Models are not 'downscaled' to the Pacific Islands, so there are no regional-scale climate change predictions for the area.[86] Amongst other things, climate services in the Pacific attempt to address this gap. A key point of clarification is necessary here: there is an elision in the discourse about climate services between seasonal forecasts and climate change forecasts (a climate model would only be used for the latter). This chapter discusses one of each of these climate services – a seasonal forecast service (COSPPac; and there are many similar services that have been provided in the Pacific for a long time) and a climate change projection service (PACCSAP, which are relatively novel).

There are several competing climate service providers in the Pacific region.[87] For instance, the New Zealand National Institute for Water and Atmospheric Research (NIWA) has long prepared the Island Climate Update (ICU), a seasonal forecast. Towards the end of every month, NIWA emails all its subscribers a detailed summary of the monthly climate in the

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[86] The Australian Government and its international development assistance and scientific organizations have also attempted to address this gap by producing the PACCSAP reports (Australian Bureau of Meteorology and CSIRO, 2011).

[87] These are principally government entities that have been oriented towards profit-making, even if the promise of increased financial independence through service provision has not been met.

tropical South Pacific islands, and an outlook for the upcoming three months. The ICU is a climate service based on dynamic models using a multi-model ensemble approach formatted for the tropical Pacific to generate tropical diagnostics, including an El Niño Southern Oscillation, and South Pacific Convergence Zone outlook, and a rainfall and sea surface temperature (SST) seasonal forecast. In addition, through a USAID grant, the United States National Oceanic and Atmospheric Administration (NOAA) recently conducted several workshops – one of which was the Pacific Island Climate Services Forum – in order to encourage collaboration between service providers and potential users. Numerous climate service providers participate in these workshops, including the NIWA, the German Climate Services Center, and NOAA, whose Pacific Regional Integrated Sciences and Assessment provides data analysis, climate forecasting, and decision support tools (NOAA, 2014).

This chapter focuses on two climate services provided by Australian public science bureaucracies. The chapter explores the operation of the Climate and Oceans Support Program in the Pacific (COSPPac) that is managed and implemented by the Australian Bureau of Meteorology and funded by the Australian aid program (Australian Bureau of Meteorology and CSIRO, 2015). COSPPac has created the Seasonal Climate Outlooks in Pacific Island Countries (SCOPIC) tool, which generates probabilistic predictions based on historical correlations between a predictor and a predictant. A common predictor is SST anomalies, which are correlated with rainfall. For instance, to use SCOPIC to predict the probability of an above average rainfall year in Tonga, one would first need to 'train' the model using historical monthly time-series data that establishes the shape of the relationship between the predictor and predictant. After entering current SSTs, the tool searches through historical records to find similar anomalies and, based on the distribution of these observations, provides a probabilistic

prediction for seasonal rainfall. SCOPIC is a climate service that uses historical, observed patterns to issue seasonal forecast predictions.

This chapter also examines the Pacific-Australia Climate Change Science and Adaptation Planning program. The PACCSAP was also funded by the Australian aid program, and was an amalgam of the Pacific Climate Change Science Program and the Pacific Adaptation Strategy Assistance Program. Bringing these programs together encouraged the science to be more responsive to planners' needs (to be service oriented) and the adaptation planning to be more 'evidence-based.' However, the two components were administered through different federal agencies – the science through the Australian Commonwealth Scientific and Industrial Research Organization, and the adaptation planning through (what is now named) the Department of the Environment. The PACCSAP officially finished in mid-2014, and the future of the program is uncertain given strict austerity measures focused on Australian aid, science, and climate change programs.[88]

The PACCSAP generated climate change profiles for each participating Pacific Island and East Timor. These are the first dedicated climate change projections for the Pacific region; but they are strictly scientific reports based on cutting-edge climate science and in an academic format. In addition, the PACCSAP created the Pacific Climate Futures tool, an online platform that provides national and sub-national climate projections in the Pacific region. Based on CSIRO's Representative Climate Futures Framework (J. Clarke, Whetton, & Hennessy, 2011), the tool provides projections for a given spatial, temporal, and global climate model or emissions scenario. The tool has been designed "to provide information and guidance in the generation of

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[88] Science manager, Melbourne, 13 January 2014; Science manager, Melbourne, 5 February 2014. This is discussed much more at length in the final section of the paper.

national climate projections and facilitate the generation of data for detailed impact and risk assessments" (Bureau of Meteorology & CSIRO, 2014). Some of the models have been dynamically downscaled. Both of these tools – the Climate Futures, and the SCOPIC – were discussed at the Pacific Island Climate Services Forum. Both are also familiar to, if not always used by, the national meteorological services in Kiribati and Solomon Islands.

The ICU and SCOPIC have been provided to the Pacific Island national meteorological services for at least ten years, and the science component of PACCSAP is ongoing since 2007. All three of these efforts, therefore, pre-date the climate services idea. However, these products have been reinterpreted, renamed, and recast as climate services to contribute to the effort and to fit within its institutional structure. Part of this reorientation is in labeling, and hiring new personnel to focus directly on climate service provision.[89]

5.2.1 What are the foundational components of a climate service?

The differences between climate services and climate research center on form and purpose. First, a climate service is more than just raw data; this data is manipulated in some way to give a projection of a particular format and interpretation intended to help decision-making. As one meteorological service[90] officer from the Solomon Islands Meteorological Service describes:

> *Met Service officer*: We have come a long way from issuing raw data, raw climate data to… clients, to now doing, using the raw data to do seasonal forecasts, to redo seasonal rainfall outlooks, looking at the current status of the climate. And with the PACCSAP, PCCSP, [Pacific Climate Change Science Program] and we can now look at the climate projections, with the

[89] Climate service provider, Melbourne, 29 January 2014

[90] Meteorological services in the Pacific Island countries are confusingly both consumers and producers of climate services. They use the services such as Climate Futures and SCOPIC, but they also use these tools to generate their own climate services for their governments and citizens in the form of seasonal outlooks and climate forecasts.

> Climate Futures. Yeah, looking at projections for the future climate. So, as I said, the climate services have come from just issuing and archiving climate data, and issuing raw data.
>
> *Interviewer:* You mean before it's just observations, rainfall, temperature, humidity, pressure, etcetera?
>
> *Met Service officer:* Yeah, yes. Those sorts of things. Before, when I joined the Met Service, that's basically what they do. Collect, file, and then issue the raw data to interested people. But now, we are I think two steps [beyond issuing raw data].
>
> *Interviewer:* What are the two steps?
>
> *Met Service officer*: The two steps now:… we do seasonal predictions. And then, the second step is, we can also now do long-term projections. … But then, one of the things we are now working on is application of [that] information. And it's pretty hard. … The tools are there now, the information [is] there, we can do this. But then, how can we use it, or teach the users that [this is] the information that you can use to do your planning, or your engineering, your designs.[91]

As this quote demonstrates, a climate service moves beyond the collection and distribution of data and instead involves issuing seasonal and climate projections, alongside interpretive frames of where and how it is to be used.

Meteorological services seek to institutionalize the use of these products. The Solomon Islands Meteorological Service officer indicated they are working on this through several pilot projects, discussing an attempt to create malarial alerts using seasonal forecasting. A pilot program is a necessary first step to promote the usage of these 'useful' tools; currently, the Solomon Islands Meteorological Service creates and emails the bulletin to the ministries:

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[91] Meteorological service provider, Honiara, 16 October 2013

> but we don't know what happens. … I say, look at your outlook, that information has been passed to you people. That's the problem, we give [seasonal forecasts] out, but we don't have a sort of monitoring system that, you know, ensures that the information is passed down to the users. For example, with the Ministry of Agriculture, a lot of the farmers have been asking for – especially on the plain, the Guadalcanal plain. … they have been asking for this [climate service] information. … But we passed that to the Ministry of Agriculture and they never pass that information down to the farmers.[92]

Climate services also focus on utility. As another observer from the Solomon Islands notes (a sentiment many echoed through interviews):

> Currently there is a lot of focus on trying to understand the science, yes, but there needs to be, I think there needs to be that balance between understanding the science [and] addressing the implications of that science as we move along. As compared to trying to understand the science on an ongoing basis, without … translating that into action, concrete projects.[93]

The end users of climate services in the Solomon Islands, therefore, emphasize that climate services should involve prediction of some variety – either statistical or dynamical. Additionally, these consumers insist on the necessity of usefulness: products have to be demonstrably put to work in planning, decision-making or investments. At its core, climate services must be put into action in adaptation decisions.

Scientists engaged in producing climate services also emphasize a focus on the end- or next- user and on defined products that are useful and used. Public sector scientists involved in the PACCSAP program recognize that the distinction between basic climate research and applied climate service products is blurry. Nonetheless:

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[92] Meteorological service provider, Honiara, 16 October 2013
[93] Aid coordinator, Honiara, 21 October 2013

> with climate science research, you're investigating things and you're trying to understand things… you are certainly working as part of a team to do it, but you're not trying to do something directly … that a client can use as such. It's not a really clear line, but I define a service as something where you are actually… trying to deliver a product. … A service, in my mind, is something where the client says, I need your data, basically, or some information that I can use directly in my application.[94]

A CSIRO colleague emphasizes that science is just one aspect of the service product. Although crucial, the science, observation, and raw data are not sufficient. A good service product also comes with guidance on how the results can and should be used.

> *CSIRO Scientist:* For projections, particularly for people who are used to working with climate data, say from the Bureau [of Meteorology] – the observed data – they don't necessarily understand that they can't just treat the future data in exactly the same way. And that I think is a key role for climate services to provide guidance to people on how to use the results, why it's not appropriate just to have a single number, and whatever.
>
> *Interviewer*: And so, a climate services is it a package, or is it a person, or report, or conversation, all of these things to produce a particular outcome that a client needs?
>
> *CSIRO Scientist*: Depends if it's a good one or not! [laughs]. But I think a good one is all of those things… And that requires both the science and the interpretation of the science to be available at a range of levels so that non-experts can understand but also so that experts can see what methods have been used so that they can do further work with the results. Yeah, so quite a bit of guidance material required.[95]

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[94] Research scientist and science team leader, Melbourne, 7 February
[95] Climate service provider, Melbourne, 29 January 2014

For scientists, service providers, and meteorological officers, a climate service has to be in a digestible format for consumers. Switching status from basic climate information to climate service knowledge requires predictive mediation: a transformation involving entering data or climate conditions into statistical and dynamical models to produce projections for end users to apply. But, climate services must also be approachable, comprehensible for the end users, coming with instructions and stipulations as to how they can and should be used. While climate services production is a process driven by consumers, it also focuses on potential consumers, hoping to enrol more users into the climate service movement. As a Bureau of Meteorology service provider summarizes: a good service "isn't useful unless somebody is using it."[96]

5.3 Commercialized science and the science-policy interface

5.3.1 Science-policy 'in theory'

While this discourse of usefulness drives the production and circulation of climate services within the movement, it is also pervasive within academic literature discussing the science-policy gap in governing climate change. Proponents of climate services in the academic literature diagnose a "persistent gap between production and use" of scientific information in environmental decision-making (Kirchoff, Lemos, & Dessai, 2013, p. 393). This gap has remained despite efforts over the last fifty years to encourage science-society relations that emphasize interdisciplinary, complex, interactive, and problem-solving centered knowledge.[97] According to critics, climate science remains disconnected from adaptation policy; that is, this information "lacks any relevance to what users actually need" (McNie, 2013, p. 14). Moreover,

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[96] Meteorological service provider, Melbourne, 27 March 2013

[97] And away from a linear model of science whereby knowledge is produced by scientists, and then those who need it apply it in the way its creators intended (MJ Goldman, Nadasdy, & Turner, 2011; Lave, 2012).

contextual, credibility, trustworthiness and comprehensibility issues remain (McNie, 2013). Underlying this diagnosis is an assumption and expectation that science should and can "help inform human decisions about societal change" (Tribbia & Moser, 2008, p. 316; even though it often does not, see Sarawitz & Pielke JR, 2007). However, unlike an emphasis on 'more and better' scientific information to improve planning and governance (see Jasanoff, 2004), this science-policy literature demands co-production or a two-way process of creating, transferring, and using knowledge (Tribbia & Moser, 2008; Vogel, Moser, Kasperson, & Dabelko, 2007).

Accordingly, there is a need for a service orientation that can bridge a science-policy division; this need is particularly salient in the case of climate change where there are limitations with both the form and content of science. The gap in decision-making related to climate change stems from, on the one hand, limited translation of "climate data and science … into a needed product or service," rendering this information "of limited value" (Brooks, 2013, p. 810). On the other hand, it is also the case that the kinds of information decision-makers might value – in particular, medium range projections, at the local level – are difficult for scientists to produce (Graham et al., 2011; Lubchenco, 2011; Visbeck, 2008). Although there have been improvements in, for example, dynamical ENSO forecasting, seasonal forecasting, and multi-model ensembles, there remain numerous unknown and systematic errors within these models (Asrar, Hurrell, & Busalacchi, 2013). Moreover, there is growing demand for downscaled climate projections for adaptation planning, but this remains 'foundational research' and can lead to 'over-interpretations' (Hewitson, Daron, Crane, Zermoglio, & Jack, 2014).

However, there are existing problems within climate service provision. Countries can be unwilling to share climate data, given potential commercial and national interests at stake (Heffernan, 2009). Attempts to provide climate services have also led to unsophisticated and

inadequate provision of products, due perhaps to poorly resourced national meteorological services (as in the Pacific Islands) with few employees, and limited technological capacity and infrastructure (C. Hewitt et al., 2012; Semazzi, 2011). The presence of any projections can foster unattainable expectations among consumers of climate services, and projections may not reach the certainty expected of policy-makers (Heffernan, 2009; Strachan, 2013). As will come up later in the empirical examples, there are also issues related to communicating and accommodating uncertainties and probabilities (Graham et al., 2011). Despite the evident stubbornness of the science-policy gap, and difficulties in implementing service organizations, commentators continue to reassert the need for post-normal and open-knowledge delivery institutions and products (Krauss & von Storch, 2012) that are useful for decision-making and that "serve society's needs" (C. Hewitt et al., 2012, p. 831).

5.3.2 Neoliberal science

It is certainly the case – at least from extended observation in Pacific Islands – that climate science rarely informs climate change adaptation decisions (evidence of this is discussed further below; briefly though: decision-makers use general projections in making claims for adaptation and assistance, but decry limitations around precision and uncertainty in climate projections). However, to consistently point to gulfs between scientists and decision-makers and persistently assert the importance of climate service products and institutions in overcoming these gaps oversimplifies the climate service movement. In particular, scholars of the science-policy interface neglect a consideration of the political economic circumstances in which services arise. Moreover, they overlook the echoes of neoliberal scientific management in the climate service movement, which influence the method and outcomes of climate services production.

We must situate an examination of the processes through which climate services are produced and consumed with attention to the political economic circumstances and effects in which the movement emerges. That is, understanding the climate services discussed in this chapter requires attending to public sector austerity surrounding all functions related to climate change, the environment, science, and official development assistance that has been growing in Australia. As Lave argues, conceptualizing science management requires an "explanatory framework that includes both structural forces and the deeply independent relations among the production, circulation, and application of scientific knowledge claims" (Lave, 2012, p. 5). This intellectual lacuna omits more than just climate services: as geographers have recently argued, where the production of science has been considered by science and technology geographers in detail, these scholars have shied away from engaging with and theorizing structural forces and ideologies such as neoliberalization and commercialization (Lave, Mirowski, & Randalls, 2010; Mirowski, 2011). As with many aspects of social, political and environmental life (Bakker, 2005; Harvey, 2005; Heynen, McCarthy, Prudham, & Robbins, 2007; Peck, 2005), however, neoliberalization has been increasingly influential in the management of science since the 1980s with profound impacts on its production and consumption.

While there are key principles concerning knowledge and how it is governed and organized (Mirowski, 2011) – including increasing private and decreasing public investment in science, encouraging collaborations between commercial/industrial and basic research interests, a shift towards applied research, and a privatization of knowledge through mechanisms such as intellectual property (see Rajan, 2006) – neoliberal scientific management takes a specific spatial and temporal form in the case of climate services (as with neoliberalization more generally Peck & Tickell, 2002). The climate service movement in Australia and the Pacific is driven by supply-

side dynamics. Service providers certainly hope that an orientation towards useful and actionable knowledge will help adaptation decision-makers. At the same time, service providers seek to monetize their innovations, and reduce the financial impacts of state austerity towards bureaucracies.

For instance, in a recent article in the *Bulletin of the American Meteorological Society*, Mark Brooks (2013) argues for greater innovation in climate services. Indeed, Brooks asserts that "virtually all economic growth is… attributable to innovation" and such innovations are needed to deal with climate change: "a business dilemma threatening increased costs… [affecting] the availability of business inputs, supply, demand and access to resources" (Brooks, 2013, p. 807). Brooks continues: climate services can "help clients manage climate-related risks and capitalize on favourable conditions." Throughout this article, Brooks draws on corporate language and business models, including arguing for greater "technology-to-product-market linkages" and building management structures to encourage provider-client engagement, and to support entrepreneurship. Another proponent comments that it is commonly "agreed that, while gaps exist today between data/information needs and availability, those gaps are rich with opportunity" especially for private enterprises (Asrar et al., 2013, p. ES9). Indeed these commercial actors find that

> there's a business case to be made here. On the one side are the people who create and 'own' the data… and on the other side are users. In between there's the chance for private companies to take the data and use it to deliver more detailed, relevant information to decision-makers who need it (Asrar et al., 2013, p. ES9).

The commercial language of usefulness, 'clients' and 'products' is ubiquitous in climate services, and common is a drive to 'exploit' new corporate opportunities (see for example Gropp, 2009).

Most research on commercialization, neoliberalization and the management of science relates to its effects in universities. This research has found that commercialization and privatization matters for the types of science produced and the manner in which it is consumed. While universities may have never been intellectually 'free,' the past thirty years has seen a trend towards competitive global service industries where "universities are exhorted to become more like corporations, whose products are 'information' and 'human capital', and whose customers are students" (Mirowski, 2011, p. 23). In the case of climate services, however, the producers are primarily in national government science institutions, where a service-orientation threatens to override research output. A recognition of the impact of neoliberalization on the production and consumption of science is not a facile conceit that previously science was 'pure'. Indeed, science "has always been beholden to its patrons" (Lave, 2012, p. 3). It is, however, a recognition that the nature of governance – in this case commercialization, and perhaps privatization – matters for the types of science produced and the manner in which it is consumed.

Commercialized governance regimes in Pacific climate services are not yet as blatant as the above authors espouse. However, commercialization pressures and contradictions profoundly impact struggles to produce and consume climate services. A discourse of commercialization from science managers and policy-makers structures climate service production, but so does political-economic austerity in funding public science. Additionally, the specific characteristics of climate change science continually confound attempts to take climate service products 'to market', to turn climate services into commodities. This chapter, therefore, attends to the

'insides' and 'outsides' (Muellerleile, 2013) of the neoliberalization and commercialization of climate science, holding in tension the 'internal' processes and practices through which climate service products are produced and circulated, as well as the 'external' political-economic conditions through which 'usefulness' guides public climate science.

5.4 Circulation breakdowns

5.4.1 Relationships versus products; SCOPIC versus POAMA

Australian researchers and service providers produce climate services with Pacific audiences in mind, and also produce them in collaboration with the Pacific national meteorological services. The Pacific national meteorological services draw primarily from the SCOPIC tool to provide seasonal forecasting using historical analogues and established correlations between observations and future conditions. The process by which the Kiribati Meteorological Service produces a seasonal forecast follows these steps. First, the SCOPIC team based in Melbourne will send through Online Climate Outlook Forms, which the climate division of the Kiribati Meteorological Service will complete with observed monthly rainfall data from monitoring stations dispersed throughout the country. Second, these rainfall observations are verified against the projections produced several months prior to generate a consistency score for model performance. Third, following a guide and check-list provided by the COSPPac team, the rainfall data is entered into the online interface of the SCOPIC tool. The SCOPIC tool then generates predictions for the following three-month period, and these are also entered into the Online Climate Outlook Form. The Online Climate Outlook Form also requires predictions from the

POAMA (Predictive Ocean Atmosphere Model for Australia)[98] model. Following completion, the Kiribati Meteorological Service forwards the Online Climate Outlook Form to the COSPPac team who will review, compile and circulate summaries of Pacific seasonal climate to be discussed at a monthly teleconference. Finally, following discussion and confirmation, the Kiribati Meteorological Service will use the Online Climate Outlook Form projections to populate their Kiribati Climate Outlook, which is distributed to interested sectors and parties.

According to one of its managing staff, the pillar of the COSPPac program is outcomes, not outlooks. Therefore, while their tools and products must be scientifically sound, they principally have to be accessible to and used by national meteorological services.[99] In order to ensure usage and accessibility, the products must be simple – the manager referred to the 'K.I.S.S.: Keep It Simple, Stupid' acronym – and be accompanied by continued training materials and workshops for the national meteorological services. COSPPac also reiterates the importance of usefulness: to become an outcome rather than just an outlook, the data and predictions have to journey off the shelf and into products and tools, entering the "open source, open market."[100] For this manager, becoming useful – becoming an outcome not an outlook – is a transformation synonymous with becoming a product, but also requiring in-country 'ownership' whereby the meteorological services manage their own data, create their own seasonal forecasts, and apply their projections in adaptation planning or projects. As another

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[98] This will be discussed more later; for now it is a competitor of sorts, a dynamical coupled model that also produces seasonal forecasts, but which the COSPAcc is unfavourable towards.
[99] Meteorological service provider, Melbourne, 27 March 2013
[100] Meteorological service provider, Melbourne, 27 March 2013; However, these tools are not yet open-market and continue to be funded by the Australian government.

manager clarifies: it is not the service provider's job to prescribe the Adaptation, the science is just the means to the end.[101]

The SCOPIC example demonstrates the practices necessary for creating a climate service product: collecting data, entering it in online user interfaces, generating basic tables, and issuing seasonal forecasts. Integral to the generation of seasonal outlooks is the monthly teleconference during which the national meteorological services and the COSPPac team discuss any issues, compare processes, and verify the SCOPIC generated predictions. The teleconference serves a dual function of providing authority to the seasonal forecasts, and continually building and reinforcing the relations between the Australian and Pacific meteorological service providers. When discussing the important components of turning science into services, a member of the PACCSAP program notes:

> Oh yeah, I think building the relationships, and training, and communicating. … talking and communicating to the right people is the right start. … And that's what I've noticed in my last couple of years, it's building those relationships and opening up those channels and breaking down those barriers [that] is so important.[102]

Indeed, the COSPPac and SCOPIC are dependent on these relations, or 'customer service': it is through such channels that useful products can travel.

Consider the demonstrative example of the competition between the SCOPIC and POAMA tools. The POAMA forecasting tool is more sophisticated than SCOPIC, producing inter-annual seasonal forecasts using a coupled ocean-atmospheric model. POAMA also performs well in the Pacific due to its skill in predicting ENSO and associated tropical rainfall

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[101] Science program managers, Melbourne, 25 March 2013
[102] Capacity building and communications manager, Melbourne, 5 February 2014

patterns (Cottrill et al., 2012). Yet, POAMA is not used extensively in the Pacific meteorological services, where the national meteorological services are explicitly instructed by COSPPac to use the SCOPIC in preference to the POAMA tool. Although the POAMA predictions might be discussed during the monthly conference, especially when the results differ, the seasonal forecast reports are to refer to the SCOPIC predictions. One climate officer in the meteorological office prefers SCOPIC simply because it reports confidences, strength of prediction, and bias.[103]

Yet POAMA is the 'next generation' of seasonal forecasting: POAMA is 'good enough' for Australia which has stopped using statistical forecasting, so why is it not 'good enough' for the Pacific?[104] The CSIRO/PACCSAP produced a POAMA tool for the Pacific region. Indeed, the Pacific meteorological services have access to POAMA – the software sits on their computers. Both COSPPac and PACCSAP are funded by Australian aid program, but "they haven't been feeding in properly, for a whole world of reasons, but I think it comes back to communicating."[105] Officially, the COSPPac supports the use of POAMA,[106] but, instead of collaborative relations, political economic circumstances dictate competition between the tools: "in this tight budgetary time, everybody is concerned about the dollar that's not there."[107] Therefore, through its longstanding COSPPac program the BOM continues to recommend the SCOPIC tool for seasonal forecasts. The POAMA tool comes without the relational support of the COSPPac, without the encouragement that has been built over ten years of training,

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[103] Meteorological Service Provider, Tarawa, 6 May 2014
[104] Science program manager, Melbourne, 13 January 2014
[105] Capacity building and communications manager, Melbourne, 5 February 2014
[106] Science program manager, Melbourne, 13 January 2014
[107] Capacity building and communications manager, Melbourne, 5 February 2014

workshops, and discussion, and simultaneously SCOPIC is enabled through these relational networks; indeed it only becomes a product – that is to say, is used – through this network.

Yet, there is a contradiction between the commercialization of scientific information through the creation of service products, and the necessity of building and maintaining relations between scientists and adaptation policy-makers. Climate service providers want to be considered collaborators with policy-makers because providing scientific information is only one component of a service model that also requires conversations about needs and the uses and limitations of the information provided. Pacific meteorological services and adaptation planners recognize these relations as necessary for asserting the need for sectorally specific information that is key to the timing of decision making. These relations cannot occur through one training session, conversation, or workshop, but through continued discussions and trusting personal relationships where people can ask questions, make suggestions and requests. Climate services do not, therefore, operate through the provision of more detailed, timely information – as scholars of the science-policy interface note – but through conversations and relationships.

Precisely the same providers who want to be considered collaborators see a service ethic as, for instance, an online interface that clients can always access and which serves most clients. Another potential service for these providers is the fulfillment of a contractual request; "if the Hilton Hotel comes to us and says we want to build a hotel in say Bali, or Timbuktu, can you provide us projections, we can. We can provide global projections for anywhere around the world, that's no problem."[108] Therefore, it is precisely these dense networks of relationships that transmit climate services that the climate service model hopes to erode, by creating products that

[108] Climate service provider, Melbourne, 29 January 2014

decision-makers can consume independently from those who produced them, and the circumstances in which they were produced.

5.4.2 Navigating confounding downscaling and uncertainties

In order to overcome the limited uptake of the science and tools produced by the PACCSAP, a series of adaptation sub-contracted consultancies were instigated to bring together planning and policy operations and climate science information.[109] In the Solomon Islands this manifest in a program in the Ministry of Infrastructure Development to initiate a risk management policy in which engineers will use the PACCSAP science reports and projections to design and maintain road infrastructure. A technical assistant employed through the PACCSAP operated as a conduit between the end-users and service providers in Honiara, and worked to maintain the relationships essential for the circulation and consumption of climate service products. The technical assistant's role was to bring together engineers and scientists, where previously "never the two shall meet,"[110] by focusing on what "the key issues are for infrastructure, what the climate means in terms of each of the impacts for the infrastructure, and then identify ways for those to be addressed. And also using this process of risk assessment as a triage for focusing on the most important issues as opposed to all the issues."[111] As an example, major water crossings are designed to resist all but a one in one hundred year flood. To 'climate-proof' the new major water crossings, they added a 20% increase in rainfall and runoff. The number 20% was an 'extrapolation' based on the PACCSAP reports, whereby the ministry:

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[109] Director in Ministry of Environment, Canberra, 27 June 2013
[110] Transport sector and adaptation consultation, Honiara, 23 October 2013
[111] Transport sector and adaptation consultation, Honiara, 23 October 2013

> looked at daily extreme rainfall, and from a hydrology perspective they're looking at much shorter duration events. Um, so we thought it was fairly conservative to say that, ah, you know, projections show up to a 20% increase in wet season rainfall… and so what we did was assume that, for the design events for the bridge, we put in an extra 20% of rainfall for that design event and assume a one-to-one catchment response to the rain events, which is very simplistic but there is not alternative, because we don't have a high enough resolution or information to say what the response would be. So we thought it was very conservative, and those increases were able to be accommodated by that design.[112]

But incorporating climate science into adaptation planning confronts problems in the form of, and uncertainties inherent to, the climate services that are provided. Again, those involved in the use of the projections that PACCSAP provide are frustrated; when they request projections from the team, they also receive:

> a long email from CSIRO basically saying, you know this is software that we use, this is resolution it comes out, and this is the format it comes out as, these are the uncertainties, da da da da da da da da da, well that's all great, but here's a table of what I would like, if you can fill that then that would be great, I don't care about all the other stuff because that's not going to help an engineer design a bridge, they want to know if its going to rain more or less, if its going to be hotter or colder.[113]

The scientific work is too detailed with too much emphasis on the science and its uncertainties. This implies that there is

> an issue: climate outputs couldn't be interpreted by the engineers, they didn't really know what to make of it, you've got reports that are 100+ pages long, you know, with details on global

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[112] Transport sector and adaptation consultation, Honiara, 23 October 2013
[113] Transport sector and adaptation consultation, Honiara, 23 October 2013

> circulation models, downscaling, uncertainty and all this… that is very important in a model, but not for an engineer to take up and use in designing something.[114]

Simultaneous to this division between what the service provides and what the policy-makers and engineers desire, is a mismatch in expectations of what can be produced. Almost all of the project, program, and policy-makers I interviewed requested more precise downscaled climate projections, and projections with less uncertainty. For instance, a senior climate officer in Kiribati requested "the sort of information that would make us adapt quickly to the business as usual scenarios. … At the end of the day it [would] have to be at the island level otherwise we will have to be too generalistic in our activities."[115] Moreover, for the sector level decision-makers "it's getting the exact shifts, you know, exact changes. … Then I think we will be in a good position to be able to address [climate change] four or five years from now." Others in-country echoed these requests for sector specific or applied projections, that is precise and downscaled to the island (in Kiribati) or sub-island (Solomon Islands) level. Here, there is a mismatch between products provided and demand driven by uncertainties.

Scientists and service providers also recognize that decision-makers often equate usefulness with downscaling.[116] However, in many instances downscaling is not meaningful or is very costly for limited results. One hopes that when investing in downscaling you might get more reliable results by better capturing the atmospheric and oceanic process, especially where there is a process that operates at a small scale, or if it makes sense, physically, to measure a process at that particular scale. However, this is no guarantee, and in some instances results from

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[114] Transport sector and adaptation consultation, Honiara, 23 October 2013
[115] Senior policy advisor, Tarawa, 6 August 2013
[116] Senior research scientist, Melbourne, 21 January 2014

global climate models may be more reliable and easily evaluated.[117] This is particularly true in flat islands like Kiribati where physical geography does not affect climate processes, and downscaling remains computationally expensive and time-consuming.[118] This means that the PACCSAP team have to 'manage the expectations', because

> obviously in places like Kiribati… it's just a bunch of coral atolls. You know, the whole idea of dynamical downscaling is we're trying to get more refined detail, but the main information is coming from the surface information – the landmass, the mountains. And so, those [flat] islands that don't have that, we don't actually add much value [when downscaling].[119]

Given limitations in funding, there is no added value to downscaling in atolls, where topographical features will not affect results. Where downscaled projections can often mean a trade-off between precision and uncertainty, island decision-makers demand both, thinking that "the two go together" in localized projections where the opposite is often the case.[120]

In addition to being expensive, and not always a huge 'value-add', often downscaling demands trade-offs with uncertainties.[121] The downscaling work that has been undertaken as part of the PACCSAP program only sub-samples models from the Climate Futures tool. This implies increased uncertainty due to limits in the number of possible futures compared to the global models.[122] As one astute policy maker noted:

> one of my favourite catch cries: … it's better to be almost right than precisely wrong. And I think there's been a push historically … [to] give themselves more confidence around what the future

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[117] Climate service provider, Melbourne, 29 January 2014
[118] Senior research scientist, Melbourne, 21 January 2014, Research scientist and science team leader, Melbourne, 7 February
[119] Research scientist and science team leader, Melbourne, 7 February
[120] Climate service provider, Melbourne, 29 January 2014
[121] Senior research scientist, Melbourne, 21 January 2014
[122] Research scientist and science team leader, Melbourne, 7 February

> looks like, when you've probably seen all those diagrams of cascading uncertainty, basically the more you go into detail the more uncertainty there is.

There is, therefore, a conflict between demands for more localized and more 'exact' projections and the projections that can be provided within the limits of the science. These contradictions are inherent to the commercialized model of climate service provision that seeks primarily to meet clients' demands and for products to be consumed. In attempting to create commodified products for unattached circulation in climate service markets, this process of disconnection leads to problems around uncertainty, downscaling, and usefulness.

5.4.3 Climate entrepreneurialism and climate futures

The climate services paradigm emerges – particularly in Australia, but also within the United States – within fluctuating political economic and budgetary circumstances. This section delves into these circumstances in Australia, as an ideal example of the effects of austerity and its contradictions with providing scientific information. Initially the PACCSAP was part of a huge expansion in the Australian aid program originating in a Rudd-Labor election promise of 2007.[123] The (almost AUD400 million) International Climate Change Adaptation Initiative (ICCAI; Department of the Environment, 2014) signaled a windfall change in Australia's governmental stance towards climate change and development assistance after more than a decade of conservative rule and associated climate denial policy. Accordingly, in 2008 addressing climate change became one of the overarching principles of the Australian aid program – or AusAID as it was then called – and of governmental policies in general. Indicative was the establishment of a Department of Climate Change. Over the five subsequent years –

[123] Head of mission, Tarawa, 13 August 2013

which included the complex downfall and resurrection of former Prime Minister Kevin Rudd – the Department of Climate Change became the Department of Climate Change and Energy Efficiency, then the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education, and finally was submerged altogether within the Department of the Environment with the election of the Abbott-Liberal government in November 2013. These name changes were symptomatic of the fate of climate change within the Federal Government.

Amongst the biggest – and most symbolic – changes to Australian federal policy in 2013 were those made to the Australian aid program and the government's stance towards climate change. Indeed, Prime Minster Abbott regularly espoused that the 2013 federal election was a referendum on Labor's 'carbon tax' and its climate change policy more broadly (Griffiths, 2013). More surprising was the post-election battering the Australian aid budget received: AusAID was 'integrated' into the Department of Foreign Affairs and Trade and accordingly focus shifted from poverty reduction to economic development, trade, and private sector development. States the departmental Secretary: "Our aid program will be designed and implemented to support Australian foreign and trade policy" (in Grattan, 2013). Reflecting on their backgrounds in diplomatic versus development worlds, one aid observer notes: "DFAT and AusAID employees - they're just different people."[124] This observer may have exaggerated, but he contrasts AusAID and DFAT employees by their different approaches to Official Development Assistance: "the AusAID folks are concerned about alleviating poverty, but the DFAT folks are only concerned with economic growth and governance in Australia." [125] Simultaneously, the aid program received an immediate and surreptitious 2013-2014 financial year AUD600-700m budget cut and

[124] Science program manager, Melbourne, 13 January 2014
[125] Science program manager, Melbourne, 13 January 2014

projected restrictions of AUD4.5bn over the following four years. It is also anticipated that the brunt of public sector redundancies – at around 12,000 people federally – will be in the areas of environment and development.[126] Most of these budgetary and personnel cuts were focused on the aid program outside of the Asia-Pacific region, but there were also restrictions to programs in small islands of the Pacific, and all funding for global environmental work – including climate change – was reduced to only AUD0.5m for the 2013-2014 financial year (Davies, 2014).

These changes – financial and ideological – hit the PACCSAP program and the Australian providers of climate services at a challenging time. PACCSAP was to be completed in mid-2013. Its managers created a one-year carry-over program called Science Informing Pacific Climate Adaptation Planning in order to complete outstanding work from PACCSAP, maintain staff capability, and plan for the next stage. Their timing was terrible: the SIPCAP formal approval documentation landed on the appropriate Australian Aid Program desk just as the 2013 election was announced, which requires all such decisions be frozen. As a result, the program went into hiatus: they "lost capability, and the science has been decimated, with our team reduced to close to zero."[127] PACCSAP became completely reliant on discretionary time from senior, non-contract scientists.

Australian climate and development politics are complex, and this quick discussion serves only to demonstrate the austere circumstances in which the climate services business model has consolidated itself over the last two years. As a result, one PACCSAP employee notes that challenges in providing services emerge from:

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[126] At least anticipated by those I interviewed.
[127] Science program manager, Melbourne, 13 January 2014

> the current state of Australian politics, and the budgetary things that are coming out, and the priorities that are changing and, this goes back to a bit of supply and demand stuff. You know, I think with the program, our program, and possibly other ones, we've got a time frame, you need to get the proposals in quickly, and instead of going out and going in country and really doing some really good work-shopping and understanding to design the program, to understand the needs, and build on strengths, I think a lot of that is just tick-the-box.[128]

When I followed up, enquiring whether there was a competitive rather than collaborative approach to providing climate services, the PACCSAP employee noted that:

> a lot of these organizations like CSIRO and BOM are being flipped on their heads and they have got to bring business development people into CSIRO now, because we can't rely on Federal funding so we're going to have to promote our services. … So I think that brings the competitive thing in.

Feeling the effects of changes in the development and climate change policy positions of the Australian government led this commentator to diagnose competitive commercial interests within the PACCSAP program.

Given that climate services are not necessarily driven by requests from the next or end user, but instead designed by scientists with them in mind, there are mismatches in the provision and uptake – or supply and demand – of these services. Of course, scientists do want their work to be useful, especially given the projected impacts of climate change in Pacific Islands, reporting that it is "so good seeing the science and research we do, finally actually being applied."[129] Indeed, some have left research oriented jobs to focus on improving service provision and helping decision making: one scientist noted that since joining the PACCSAP

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[128] Capacity building and communications manager, Melbourne, 5 February 2014
[129] Senior research scientist, Melbourne, 21 January 2014

program he has only managed to be a secondary author on a few papers, which has not been good for his career but has been very rewarding.[130] There is no doubt that climate service providers are in the business in order to help adaptation in vulnerable-to-climate-change places; but they also must assert a business model for their services, leading to competition between different service providers each urging uptake of their products.

In an interview, two scientists involved in the PACCSAP program began to talk among themselves about a recent report which duplicated their expensive and time-consuming dynamical downscaling. Discussing this report:

> *CSIRO Scientist 1*: And did they go into the uncertainties of the economic projections? … I already know the answer to that. [i.e. no; laughs]
>
> *CSIRO Scientist 2*: I was interested that they contracted out to a group in Indonesia for the downscaling.
>
> *CSIRO Scientist 1*: Which downscaling model did they use? Bloody Poms [Australian slang for English people]?
>
> *CSIRO Scientist 2*: No it wasn't the Poms…. It's Italians?
>
> *CSIRO Scientist 1*: So they're out flogging their wares as well.

This snippet of the interview occurred towards the end of the conversation as we were discussing the dire future prospects for the PACCSAP program and CSIRO in general. The precise content (Italians and Poms, and economic projections) of the quotes are not important, but it is suggestive that in discussing their program's uncertainty – "the news is all bad… we're not hearing positive things"[131] – the scientists turn to discussions of their competitors 'flogging their

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[130] Senior research scientist, Melbourne, 21 January 2014
[131] Service provider, Melbourne, 29 January 2014

wares' around the world: these scientists are forced to compete for commercial consumers. One Australia climate service provider described this as the "whole supply-demand thing is way out of whack."[132] That is to say, climate services are pushed from the supply side – from the scientists, and their organizational demands – much more than the demand side – from the Pacific Island countries seeking to make adaptation decisions. Federal budgetary and priority changes in science and international development assistance are leading scientists to seek increased policy relevance and more varied sources of funding. This has caused a breakdown in the climate service model.

As is also evident from these quotes, while the climate service business model is supply-driven it also, necessarily, seeks to cultivate entrepreneurial scientists. Here the production of climate services inescapably hails entrepreneurial scientists working in the marketplace of ideas (Robertson, 2007, p. 52). This is best illustrated with the example of the Climate Futures tool – the online modeling platform that produces climate predictions, given emission, spatial, and temporal parameters that could be marketed, and sold as a climate service product. The development and presentation of Climate Futures was hotly contested in CSIRO where some scientists pride themselves on their pure science prowess and where the entrepreneurial and objective scientist clash (Lave et al., 2010).

When interviewing development and adaptation actors in Solomon Islands, Kiribati, and Fiji, I asked them what kinds of information they would find useful for their projects, programs and policies. Invariably people asked for downscaled projections, and for sector specific projectors. But some also requested that the Climate Futures tool include sea-level rise:

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[132] Capacity building and communications manager, Melbourne, 5 February 2014

> *Meteorological service officer*: You know the Climate Futures, the tool for the projections, it doesn't have sea-level. It's in the report, but it's not in the Climate Futures. And for us, it's important that we have that within the Climate Futures. … I think they had some issues with the technicalities of putting sea-level in there. But, it's important for us. … But there are others, you have heard of the SimClim? … We tried to work with that, because they have sea-level within it. … But then, the license expired already. So we need to get a new license. It's very expensive. So those are the sorts of things, if that can be built into a free tool, like the Climate Futures, that would really be interesting for us, rather than getting the SimClim with 10,000 USD for one license.[133]

The Climate Futures platform does not include sea-level rise. The current version of the tool (version one) is a platform that displays global climate model data in a grid for the Pacific region. In short, the Climate Futures interface displays the results of each model, and encourages a consumer to use the variety of outputs to help make decisions. Key here is that the tool does not select certain models for use in designing investments or policy decisions, but simply provides the variety of projections. The tool displayes these climates with 'plain English' categories, like hotter and drier; "really basic signals, in an attempt to help end-users get their heads around what's going on." They hope that this presentation

> allows users to look at the spread in a really simple kind of matrix, so that when they're coming at an impact assessment they can identify which parts of that spread are relevant to the decisions they have to make. And usually what they end up doing is choosing the best case and a worst

[133] Meteorological service provider, Honiara, 16 October 2013

> case, and evaluating those. And they usually are interested in that kind of maximum consensus case as well.[134]

But the Climate Futures tool also requires model validation based on performance. First, the producers rejected six models of the 24 considered because they did not perform well enough in the Pacific region. Of the remaining 18, there are four that are only used in some circumstances – for instance, two models simulate the South Pacific Convergence Zone poorly, so any projections for a country whose climate is particularly influenced by the South Pacific Convergence Zone will flag these results as unreliable. There is also a function for choosing the most 'representative' model according to a climate variable (e.g. rainfall) and ranking the models based on how well they fit the mean. There are always problems in ranking models, because:

> it completely depends on the method you chose to evaluate. Sometimes, when people have been doing a hydrological study, they'll say rainfall is most important, we'll just evaluate according to rainfall, which is a bit more defensible, but still problematic, because they, by and large, do that in complete ignorance of where those model projections fall. So what they might actually be doing is choosing 4 or 5 models from the same projection space, and they really can't be sure that what they're selecting is truly representative, and there's a risk that they're ignoring some really key projections in their evaluation.[135]

Because the tool operates by taking all the results from the models individually, seeing where they fall, and then encouraging decisions, Climate Futures cannot include sea-level rise projections. "With the current state of the science, it's not defensible to take the sea-level results

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[134] Climate service provider, Melbourne, 29 January 2014
[135] Climate service provider, Melbourne, 29 January 2014

from individual climate models in that way," explains a climate service provider.[136] This is because of the multiple contributions to sea-level rise, not all of which can be simulated in global climate models. Climate models can simulate thermal expansion quite well, but the next biggest contributor, glacial and land ice: "the models don't simulate that at all well – not yet, not in the current generation of models." Because these:

> processes are not simulated at all well in the models, the ocean – the sea-level – scientific community basically say: 'don't ever just take the results from individual models'. Now, it's a bit of a judgment call, but they're the experts, so we respect their scientific opinions. So we don't make those data [sea-level rise] available through Climate Futures. … what they do to do sea-level rise projections is take the model results as a multi-model data set and say look at the average of what the collection of models say about the sea-level, and then they add in the other components through a combination of high-resolution modeling, expert opinion which is usually done through expert elicitation processes, those kind of things, to tell the whole story about sea-level.[137]

Later in the conversation the service provider also points out that sea-level rise is mostly felt through storms and wave events, which require high-resolution modeling of the ocean, and near shore 'sub-meter' bathymetry and storm surge modeling. This in turn requires LiDAR (Light Detection and Ranging) imagery – "the high-res stuff… It's a massive undertaking and it's incredibly expensive." So when it comes to the Climate Futures tool "there's just a limitation in what we can say;" especially close to the shoreline "there's a band where they're not willing to put any data."[138] This contest – between respecting the scientific authority of sea-level rise

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[136] Climate service provider, Melbourne, 29 January 2014
[137] Climate service provider, Melbourne, 29 January 2014
[138] Climate service provider, Melbourne, 29 January 2014

modeling which dictates that projections not be included in such an interface, and providing the climate projection useful for Pacific Island decision-makers – was heated within CSIRO. The climate scientists were pitted against the service providers and, in this instance, the scientists prevailed.

However, because there are no sea-level rise projections available through the Climate Futures tool, the national meteorological services will instead turn to the SimCLIM tool (see CLIMsystems, 2013), as the meteorological service officer mentioned above. On the one hand, Climate Futures is not able – using the commercialized language – to meet the demands of clients. Yet, on the other hand, the SimCLIM tool cannot satisfy the dictates of objective science. As well as providing sea-level data that the PACCSAP scientists find indefensible, SimCLIM claims to deliver downscaled data "at virtually any scale" to facilitate decision making for a range of clients. For the scientists and service providers, however, while SimCLIM is acceptable in principle, "the problem we have with them is overcooking the results" because they are "zooming in too far". SimCLIM are "snake-oil merchants"[139] – selling expensive interfaces to Pacific Island bureaucracies that, in fact, do not respect the limitations of the global climate models that are used to generate predictions. And, as in the Solomon Islands until their subscription ran out, adaptation investments are made based on these products. Thus there is a conflict between providing the services that the clients would like, or need, to use and the boundaries of what the climate projections can reasonably provide; a conflict between packaging services for consumption and providing objective science. Neither Climate Futures nor SimCLIM have been able to find a balance between these competing demands.

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[139] Climate service provider, Melbourne, 29 January 2014

5.5 Conclusions: Future forward

This chapter examined the contradictions within climate services, particularly those produced by the Australian federal science agencies. The chapter began with a description of the evolution of climate services, as well as a detailed engagement with what climate services are and how they are made. In the third section, I explored recent literature at the science-policy interface, which continues to argue for further investment in greater collaboration between scientists and policy-makers and in the climate service business model. Drawing from the examples of the Australian climate science providers, and from literature about the neoliberalization and commercial governance of scientific production, I argued, however, for a need to consider the political-economic circumstances which structure such production. This literature is also suggestive of the risks of embracing commercialization, given the impacts it has had in other areas of knowledge production: creating uneven accessibility to results and innovations.

Following a conceptual intervention in our understanding of climate services, I explored the inherent contradictions of the climate service model that arise from the particularities of scientific attempts to delimit climate change as a dynamic process, and simultaneously from the focus on 'usefulness' and the current austere political-economic environment. I demonstrated three contradictions, or breakdowns, in the climate service model: first, is an emphasis on relationships, but also on products that must circulate freely; second, are the tradeoffs between precision and uncertainty; and third are the conflicts between entrepreneurial and objective science. While they challenge public sector delivery globally, these contradictions are irreconcilable within the climate service model.

There is much at stake here. On the one hand, proponents may argue that the climate service movement might encourage the creation of useful services where there are currently

none. Indeed, perhaps such a commercial governance regime may spur innovation and begin a process of reconnecting sciences to their society. Yet, as these empirical examples have demonstrated, there remain un-eliminable uncertainties in producing climate projections which can be overcome for adaptation planning only through building relations and continued communication between scientists and decision-makers. It remains unclear whether providing more climate change information will assist investment and decision-making, but this will certainly not be resolved through a commercialized business model that erodes collectivity and relationships. In addition, the competition that this business model encourages between different national bureaucracies (both within and beyond Australia) undermines the sorts of collaborative and in-common efforts required for meeting the adaptation challenge. Moreover, these commercial logics may facilitate the complete privatization of climate change knowledge, placing this – currently publically financed – source of information out of the hands of many.

Despite these limitations, climate service providers remain future oriented. That is, they recognize these limitations and diagnose the solutions as greater communication and capacity building for further uptake of their service products. The problem, as identified by one PACCSAP program manager, was that the scope and scale of the scientific information was massive, like a huge block of concrete, created and set in perpetuity.[140] Decision and policy-makers are like mosquitoes flying around the concrete, taking a crumb at a time and going back to do their applied work with the science they have bitten off. This metaphor suggests an ontological gulf (of mosquito and concrete) between climate science and climate policy making, as well as a lot of intermediary 'noise.' To narrow this gulf requires better communication, and

[140] Science program manager, Melbourne, 13 January 2014

in-country capacity building, in order to "do themselves out of a job."[141] The problematization of climate services diagnoses the stagnation in service-informed Adaptation as originating a lack of suitably formatted and focused climate information with accompanying capacity building and communication. Limited consumption leads to demands for greater production, and for attempts to get the balance of technical and relatable right, and to increase communication and capacity development. Instead, it is the proposition sustained here that there are contradictory tendencies in the climate service model that lead to breakdowns in the circuit of climate service production and consumption.

[141] Science program manager, Melbourne, 13 January 2014

Chapter 6: Conclusion

6.1 Summary

This dissertation has wrestled with the Pacific Adaptation Complex, particularly examining flows of finance, best-practice policy, and climate change science produced for use in policy-making. The Pacific Adaptation Complex is an analytical concept that recognizes the work required to program climate change adaptation interventions: projects are not the rational, linear outcomes of the application of finance, policy, and science (see also Peck & Theodore, 2015). Instead, the idea of a Complex recognizes that vast institutional arrangements, bureaucracies, technical experts and expertise, project tools and technologies, and financial investments come together to make Adaptation happen. Similar to Roy's (2010) circuit of capital and truth, the Adaptation Complex emphasizes that multiple economic, developmental and climatological logics circulate along well-travelled paths but in a more-than-circular fashion. Instead, within the Complex experimental nodes are key, as are multi-directional flows. Drawing from empirical research conducted while trying to move within, and follow objects, projects and logics through this complex, the previous chapters have unpacked how finance, policy and science circulate. To oversimplify, I find that, overwhelmingly, these flows are dogged by persistent stickiness, and a rhetorical attention to mobility and success that is indifferent to practical outcomes.

In introducing the methodological approach, field sites and fieldwork conducted, I demonstrate that the Pacific Islands are key sites for understanding how Adaptation works. While many of these islands are extremely vulnerable-to-climate change places, equally important is the way they have been problematized as such, and thus designated as sites of intervention and experimentation in Adaptation. Kiribati and Solomon Islands will experience the impacts of sea-level rise, changing precipitation regimes, warming oceans and associated

coral bleaching; but they will also profoundly experience the impacts of official development assistance adaptation interventions. I showed, therefore, that the Pacific region is an integral site for understanding the unfolding adaptation promise, politics, and policies.

Following this introduction, Chapter 2 unpacked the conceptual, policy and financial mechanisms through which adaptation has been enrolled in the world and business of development. Drawing from geographer Gill Hart's (2001) conceptualization of development, I positioned adaptation as being comprised of two associated components: on the one hand, 'small a' adaptation is an imminent process of adapting to change, while 'big A' Adaptation is a project of intervening in, and transforming, vulnerable sites. Building on this conceptual distinction, I argued that Adaptation has been folded into Development. As a result of this amalgamation, Development is reinvented as increasingly necessary and relevant, and Adaptation is programmed within the confines of the Development industry and its routine practices. The Adaptation Complex is, therefore, a transformative space of mutual interaction between these project and policy objectives. As such, far greater effort must be made to critically problematize Adaptation. Indeed, I argued the need for a critical adaptation scholarship; one consideration of such an endeavour is the recognition of the absolute necessity of efforts that might assist vulnerable sites in mediating the impacts of climate change, but which demonstrates the insufficiencies of this assumed 'benevolent' and 'urgent' agenda (see also Cameron, 2012). It is such a critical study of the Pacific Adaptation Complex that unfolds in the subsequent chapters.

Chapter 3 examined financial flows and nodes within the Pacific Adaptation Complex. An analysis of diverse methodologies for adaptation finance accounting demonstrated general increases over a decade globally, within the Pacific, and within Kiribati, but the exact size of adaptation flows remains dependent on how adaptation is defined. In addition, this analysis

showed the major nodes within the Pacific Adaptation Complex: regional centers remain important for distributing climate change finance, the larger, Melanesian countries receive the majority of the funding, but on a per capita basis the smaller island states receive the most funding. Despite increases in adaptation finance, and the seeming proliferation of adaptation projects, this analysis showed that there remain limited, highly uneven (spatially and temporally) financial flows. The chapter also indicated that the majority of adaptation finance comes from long-standing development partners in the region. The analysis, therefore, suggested that adaptation finance is not completely transforming the official development assistance landscape in the region, reinforcing the need for greater fertilization between studies of adaptation and development.

A complementary conclusion about policy flows is reached in Chapter 4. Here, in conversation with geographical literature on policy mobilities, I examined the World Bank's claim to mobilize best-practice climate change adaptation policies from the Kiribati Adaptation Project – one of its early experiments in Adaptation – in the Community Resilience to Climate Change and Disaster Risk in Solomon Islands Project. First, I questioned how the KAP is transformed into a best-practice policy despite being officially adjudged a failure. I found that the World Bank relies on vague yet prescriptive analytical documents, which abstract necessarily from spatial contingencies and specificities. Then, I demonstrated that these abstracted best practices remain largely absent from the CRISP, a recent replication project in the Solomon Islands. Indeed, in many respects, the goals and practices of the CRISP directly contradict the lessons from the KAP. Given this, I argued that the mobilization of best-practice expertise, and experimental lessons from adaptation projects serves other political purposes within the World Bank – building citations of experimental successes and harnessing momentum towards a

common, novel objective. The production and circulation of best-practices maintains a coherent agenda among staff, and for external observers and critics, while the Bank negotiates a crisis of legitimacy and relevance. There remain frictions between project and program goals and the formulations of best-practices, yet these frictions tend to produce celebrated success stories, and therefore recast investment decisions as well as World Bank operations.

Having considered finance, and policy, Chapter 5 burrowed into the business of climate services – those 'useful' climate change science products intended to assist in adaptation decision-making. This chapter begins by examining how scientists and meteorological service providers produce climate services in and for different sites. Having outlined the potential, structural ambitions of the climate service model I drew from empirical research in Australia – with climate service producers – and Pacific Islands – with climate service consumers – to see whether climate services are put to use in adaptation decision making. I found that, while climate and meteorological service officers in Pacific Islands use, or consume, climate service products, these are rarely put to use in adaptation programs or policies. That is, climate services rarely contain the specific information that policy-makers value and would use in their investment prioritization and programming. Moreover, I argued that this is due to numerous contradictions in the generic climate service business model: between the need for relationships to ensure the consumption of useful climate science but attempting to undermine such connections; between the desire for localized, downscaled projections and the requirement for less uncertainty; and between scientists and service-providers, or the dictates of objective versus entrepreneurial science. Using these cases, I also argued the need to consider logics and processes internal and external to producing climate science; in particular I considered the effect of the political economic circumstances of public austerity directed towards aid programs, environmental

programming, and climate change related policies as the context in which climate services emerged.

Tracing the intermingling of Adaptation and Development, and following the circulation of finance, best-practice policies, and climate services product is necessary to understand and conceptualize the Pacific Adaptation Complex. Reading across these co-constitutive circulatory flows – only possible having spent time interviewing, reading, and observing in key experimental nodes, centers of knowledge production, and sites for scale-up and scale-out – reveals generative frictions and instabilities. Researching within the Complex also facilitates a certain scepticism towards the promises and achievements of Adaptation.

6.2 Research questions and themes

This analysis explored three related questions through the Pacific Adaptation Complex. First, it asked, how do finance, policy and science circulate in the name of adaptation? In Chapters 3, 4, and 5, I demonstrated that finance, policy, and science move through the Pacific Adaptation Complex in fits and starts, with mobilization achieved principally in rhetoric rather than practice. Indeed, in all three cases, mobilization is confounded by the project form of Adaptation investments: including their non-collaborative nature, and temporal and spatial limitations of official development assistance interventions. Projects are bounded in various ways, temporally limited at every stage of planning, programming, and assessment, and occur in strictly delimited sites of investment. These restrictions intensify action, but also continually struggle to contain contradictions and frictions.

In the case of flows in adaptation finance: although they are increasing, financial circulations are characterized by spatial and temporal unevenness and unpredictability. For policy, the illusion of circulations is superseded in practice by the place-based and stubborn

stickiness of adaptation investment. In the case of climate services, circulations of science are riddled with contradictions. To put it more strongly, this analysis has showed that the Pacific Adaptation Complex is sustained by a promise of circulations in finance, policy and science – the promise of adaptation – which is not matched materially.

Second, this dissertation asked a pair of related questions: What does Adaptation, through circulations, achieve for Kiribati and Solomon Islands? And: What does Adaptation do for the World Bank and other development actors? The projects and programs explored throughout this dissertation demonstrate that adaptation projects can fall well short of their stated objectives. New policies are written, new investments are secured, new physical infrastructures are built; yet, the temporal and spatial form of adaptation projects requires that structural and systemic concerns remain unaddressed. Over more than a decade, the KAP has only built several failing seawalls, some rainwater tanks, planted some mangroves and paid many technical assistants. The asymmetries in the outcomes of adaptation projects, the climate change impacts anticipated, and the types of measures that might begin to encourage the governmental and collective ability to cope with these changes are profound.

Yet, failure in country can be re-narrated as success institutionally, as is the case for the World Bank in Kiribati and Solomon Islands. Within development institutions there is a compulsive imperative to act in the name of climate change adaptation. This compulsion glosses over the politics of action: building momentum smooths contradictions and failures in best-practices, and produces expertise and credibility. Compulsion, momentum, cohesion, progression: all are key for the World Bank as it continues to negotiate internal turmoil, disaffected staff, and threats of financial and developmental irrelevance. While this dissertation has not considered the state-building work within sites of adaptation investment, such a

Ferguson-inspired (1994) study is certainly warranted and necessary. This dissertation did study, however, the case of Australian federal scientists producing packaged climate information and an entrepreneurial, supply-side push for a climate service business model. Although the provision of climate services wishes to encourage successful evidence-informed policy making, in the mean time it allows public scientists to just keep their hats in the game, with the hope of navigating a brutal fiscal austerity.

On one hand, this research has contributed to existing scholarship in the areas of mobility and circulations in the management of poverty and climate change. Specifically, it has demonstrated that mobility and stickiness are held in tension throughout the Pacific Adaptation Complex – the rhetoric of the former, and the practical manifestation of the latter do not impede the promise of adaptation. Adaptation experts and World Bank programmers hold mobility and place-specificity and contingency in contradiction in sites of policy modelling, and generate transformative 'successes' ripe for citation. The Pacific Adaptation Complex gains momentum. I have argued for the need to consistently trouble in both localizing and globalizing sites, the promise of mobility, success, best-practice and sustained structural change through the project form.

On the other hand, this case seems to consistently confound what we know about environmental governance. There is no unidirectional spectacular commodification of natural resources for their management through neoliberal logics, no extensive appropriation of the commons for private gain (see, for instance Bakker, 2005; Heynen et al., 2007; Himley, 2008), and little suggestion of violent, dispossesive intervention from the World Bank (which they are certainly still involved in, although perhaps not in the name of adaptation). There is not any evidence or suggestion that private investors have a principal role to play in adaptation finance,

globally (Buchner et al., 2014). Despite efforts to make Adaptation legible to the business and economics of development and commercial science – this study of circulations could best be characterized as beset by contradictions, roadblocks, and investments with limited potential for financial return. That is, if one looks to understand the operation of the Pacific Adaptation Complex in purely financial terms. Instead, this complex does political work – for the Australian government and other major bilateral partners in the region, including for the World Bank. Navigating the promise of united and co-beneficial Adaptation and Development, and reworking institutional and project friction and contradiction is no small feat. And, yet, the development engine keeps chugging.

6.3 Adaptation futures?

To be critical of adaptation is hard work. What is the alternative, I am often asked; what are the policy implications? This is particularly true given the profound impacts of climate change that are anticipated in Solomon Islands and Kiribati; what options remain, except to continue to intervene to improve socio-environmental conditions? While the goal of this dissertation was not to develop specific policy recommendations for adaptation, particularly in its project form, here I provide some reflections aimed at different constituents of the Pacific Adaptation Complex.

For multi-lateral development bank and other adaptation practitioners: the dissertation calls for critical reflection on the limitations of the bounded project form, especially for the spatially and temporally complex question of adaptation. Adaptation demands a profound transformation in socio-ecological relations, and these are impossible in short-term projects. If projects must continue, and perhaps they must, socio-ecological relations should not be reduced to only climate change considerations (Hulme, 2011), and much longer-term programs should be prioritized. Additionally, as an academic one can recognize the internal demands of creating

projects from which to publish reports, promote and market successes, and produce best practice – and to keep moving up the institutional hierarchy. But it is also easy to recognize short-sightedness here, especially when these booster products are read in conjunction with project outcomes. The competitive entrepreneurialization of World Bank work certainly cannot help Kiribati or Solomon Islands adapt to climate change.

For those climate scientists seeking to become service providers: in the most basic of science logics, submitting scientific output to business logics does not consider the null hypothesis. Quite simply, it remains unproven whether providing more detailed scientific projections of climate change will help adaptation decisions and investments. And in fact, this thesis clearly demonstrates the problems of applying commercial logics to the production of climate information. A first step towards addressing this limitation is to begin with a focus (in workshops and in conversations between scientists and policy-makers) on whether developing climate service products is the most effective use of in-country resources, before – perhaps – collectively identifying different product needs. At the same time, there is much at stake and at risk: if it eventuates that projections are vital to adaptation decisions, then such information must remain available without cost to island policy-makers.

Relatedly, I urge all adaptation practitioners to think very specifically about how projects might induce the kinds of adaptation they seek. When faced with a conundrum of this magnitude there is an urge to propose projects that do something – anything – for instance, providing more detailed climate projections. But too often such urges remain unaccompanied by practical details as to how these measures will induce transformative adaptation. As noted, it remains unclear whether and how producing detailed climate projections will impact adaption policy-making; continuing to reassert the need for less uncertainty and more local information reinforces

cleavages between science and policy. Adaptation is instead presumed, or promised. This is insufficient, in terms of financial and temporal investment.

In more general terms, for those communities, experts, and leaders labouring for adaptation in Pacific climates and demanding accountability and justice on the global scale, I have modest suggestions and preliminary propositions. It is not the purpose of this research to demonstrate the failures of adaptation so that such investments may cease, but to re-center adaptation that is focused on justice. What might be some principles of climate justice for Pacific Islands? First, a focus on justice for Kiribati and Solomon Islands extends attention beyond these locales, and links adaptation there to greenhouse gas emissions here. Justice highlights relational ties, maintaining linkages between cause and effect, between wealthy and vulnerable, between mitigation and adaptation. When we – in Vancouver and places like it – look to vulnerable sites such as Kiribati or Solomon Islands as in need of adaptation, we are immediately implicated. The problem with the dominant approach is that Adaptation is presented as an issue for localized resolution; indeed, for resolution by way of localized projects.

A second principle is that we must move beyond localism as the easy alternative to mainstream adaptation. When critically assessing – politically and economically – the processes and practices of the World Bank and other official development agencies, it is easy to revert to a romanticized imaginary of the promise of the local for delivering more sustainable, more just project interventions (for example, Ireland and MacKinnon 2013). This amounts to a claim that Adaptation has failed in the cases described here because it was not in tune with community demands; and, were global institutions and foreign development partners to become more culturally aware, participatory, and locally based, Adaptation would be successful. But, the failure here is not one of scale – the problem for the World Bank and the Australian aid program

is not that it succeeds locally and fails when scaling up. The inability to achieve stated objectives and the consistent tendency to be enrolled in contradictory processes occurs all the way up and all the way down. Localization, in this respect, may be part of the problem, rather than the solution.

This implies then, and third, that justice-oriented adaptation must look towards global, political-economic alternatives. This requires something like a global green new deal. Of course, this is not the Green New Deal of the United Nations, or the G20 that hoped to invest in green jobs to address both the global financial crisis and global climate change (see for instance Barbier, 2009). The first step for any remaking of carbon-intensive political economies is to tax all major greenhouse gas emitters at a set, high rate, and to redistribute the gains. Interventions ought to be located at sites of cause, rather than only effect. Where this differs from several existing scholars of transformation (for instance O'Brien, 2012; Pelling, 2011) is to demand a joint focus on deep greenhouse-gas emissions reductions *together with* adaptation. Transformative efforts should bring into relation those reductions in greenhouse gas emissions, and encourage coping, even thriving, in the face of anticipated impacts: to hold in tension mitigation and adaptation. Such a relational approach recognises that myriad responses to – or actions in the face of – climate change are necessary. This is, of course, no small feat, but this is what Pacific Islands require to withstand climate change impacts: a wholesale shift away from fossil fuel extractivism, followed by collective social justice measures focused on redistribution.

More concretely, a fourth principle is to maintain short-term a belief in the project of Official Development Assistance until this new settlement is reached. We must continue to invest in and hope for better aid, that is less reductionist in its approach to climate justice. As I write, the Australian Government continues to slash its development budget and reorient

spending towards geopolitical ambitions; I am told by Labor Party insiders that the Australian public do not care for foreign policy issues like ODA or climate change. This should not make us relish the death of aid, and the death of development (Moyo, 2009), even as we critique what these projects have achieved; but perhaps it provides an opportunity to rethink the role and purpose of development, especially in its contemporary form, as development-through-adaptation. In the immediate future, ODA should be recast as large, long-term, transfers from North to South, which take into account climate change, but only in addition to social and economic functions.

Specifically related to climate change and adaptation programming, there are some signs of initiatives that should be supported. These longer-term, systematic, and strategic adaptation investments should be linked, and contribute, to such a re-drawing of the rules of the game. To draw out a preliminary but promising example from Kiribati: its multi-donor funded and supported Joint Implementation Plan for Climate Change and Disaster Risk Management (Government of Kiribati, 2014) is a ten-year plan for government facilitated (with concomitant state-building) and foreign-funded action towards 'whole of country', sustainable resilience and adaptation. This is a strategic, coordinated, and long-term objective. It may eventuate in short-term, aid-style projects; but those cases should continue to be resisted and critiqued, even while the overarching strategy is applauded. The Government of Kiribati's three-pronged approach of mitigation, adaptation and relocation with dignity (through short-term labour migration, and improved education attainment in country to facilitate this) is also worthy. Such a strategy is riddled with inconsistencies: for instance, development partners question why they should invest in adaptation if the Government of Kiribati is encouraging migration. While these commentators note the inconsistencies involved in multi-pronged strategies that demand investment yet show

that these investments are rife with failure, such contradictions must be embraced and reasserted as inherent to responding to climate change. This approach recognizes the contradictory nature of multi-faceted, complex action in the face of climate change that takes place over multiple timescales. It is more hopeful, for now.

Finally, critical adaptation studies must continue to debunk the unrealistic promises of adaptation, both in theory and in practice. Some would argue that the urgency and profundity of climate change impacts in vulnerable small island states demands adaptation, in whatever forms it can be facilitated. But, as Cameron (2012) has elsewhere demonstrated, history is littered with problematic 'sweeping interventions' in vulnerable places in the name of urgency; and so taking time to critique adaptation is not 'folly,' as might be suggested. The Pacific Adaptation Complex case demonstrates the necessity of rejecting a binary of theory and practice, which suggests the futility of critique and the urgency of investment. This dissertation has argued that, if Adaptation routinely fails to meet its stated objectives and instead must be seen as a political-economic process to legitimize failing institutions and unachievable promises, then its urgency and benevolence must be questioned, even rejected. What is 'my normative statement' about Adaptation, as I was recently asked? Adaptation is just a promise, and a promise I have demonstrated to be radically insufficient for meeting the challenges of climate change impacts. It must be exposed as such: Adaptation is not the (only) answer to our climate change woes. In critically assessing climate change Adaptation I continue to hope that deep reductions in greenhouse gas emissions will return to the forefront of climate change politics.

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Appendices

Appendix A Details of interviews and participant observation conducted in each research site

Site	Dates	Research conducted
Suva, Fiji	20-29 January 2013	Participant observation at Pacific Islands Climate Services Forum and discussions with relevant experts
Honiara, Solomon Islands	29 January – 5 February 2013	6 interviews with different development partners and Solomon Islands government personnel
Melbourne, Australia	23-25 March 2013	2 interviews with CSIRO and BOM program managers
Washington DC	29 April – 10 May 2013	15 interviews with former and current staff of World Bank, and one GEF staff Participant observation at one high level planning meeting, and at numerous seminars, book launches, and public events
Canberra, Australia	25-28 June 2013	5 interviews with staff from AusAID and federal department with responsibility for climate change
Tarawa, Kiribati	27 July – 22 August 2013	26 interviews with development partners and government personnel working on adaptation related programs

Site	Dates	Research conducted
		Participant observation at program launches, internal meetings, and informal events
Sydney, Australia	18-19 September 2013	3 interviews with staff from World Bank Pacific Office
Canberra, Australia	16-18 September 2013	2 interviews with staff from federal department with responsibility for climate change
Honiara, Solomon Islands	1 October – 7 November 2014	24 interviews with development partners, government and non-governmental personnel working on adaptation related programs Participant observation at informal and expatriate events
Melbourne, Australia	13 January-7 February 2014	8 interviews with CSIRO and BOM staff
Washington DC	13-23 March 2014	5 interviews with current World Bank staff Participant observation at numerous seminars and public events
Tarawa, Kiribati	1-12 May 2014	10 formal interviews with development partners and government agencies working on adaptation Observation of community consultation events, and of internal project meetings Informal meetings with numerous government

Site	Dates	Research conducted
		personnel working on issues related to climate change Organize and present research symposium
Suva, Fiji	12-21 May 2014	Participant observation at CSIRO sponsored science event 8 interviews with regional organizations working on programs related to adaptation

Appendix B Interview questions

1. What does adaptation look like in Kiribati/Solomon Islands?
2. How does it differ from resilience or disaster risk reduction?
3. How do you measure successful climate change adaptation?
4. Can adaptation be achieved in development-style projects? What does an adaptation project look like, compared to development in general?
5. Can you briefly describe how climate change adaptation became a concern in Kiribati/Solomon Islands? When did adaptation projects emerge in Kiribati/Solomon Islands?
6. When did you first start seeing climate change adaptation? What did it look like, and how might it have changed since then?
7. What inputs does climate change adaptation need in Kiribati/Solomon Islands? What kinds of science, data, and information does CRD or CCA require? How can these be shared?
8. What lessons and successes did your CCA projects draw from (in other countries, other projects, other institutions)?
9. How do you go from national assessments and NAPAs to actions on the ground? How go from conceptualization in offices like this, to implementation on the ground?
10. What lessons and successes from development does adaptation, and resilience draw from (in other countries, other projects, other institutions)?
11. What differentiates climate change adaptation from development? What is similar between them?
12. In what ways does adaptation build on development?

13. Can adaptation be shared across places? How do you scale up, or across, adaptation?
14. How do CCA projects address other development concerns – health, gender, community driven development, and so on?
15. Is adaptation or climate resilient development transformational in Kiribati/Solomon Islands?
16. Why does your institution do climate change adaptation? What drives these investments (beyond the vulnerability of places)? What benefits does the institution get from doing climate change adaptation? What are its comparative advantages in implementing climate change adaptation? And what are the opportunity costs of not implementing adaptation?
17. What kinds of pressures or opportunities lead to your institution pursuing climate change adaptation?
18. If development is faddish, is this fad different?
19. What is a climate service?
20. Who uses climate services?
21. How can science be made useful for planning and projects? Are climate services useful?
22. How can you determine what might be useful?
23. How must scientific information be packaged to be useful?
24. How do you accommodate uncertainty in scientific information? And in planning and projects?
25. How do you incorporate climate scientific information into adaptation projects? How do you shift from providing information to ensuring adaptation?