The relationship between anthropogenic climate change and the insurance system: Imperatives, options and reflections on theory

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Statement of candidate

I certify that the work in this thesis entitled *The relationship between anthropogenic climate change and the insurance system: Imperatives, options and reflections on theory* has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree to any other university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research and it has been written by me, except as otherwise indicated. Any help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged.

In addition, I certify that all information sources and literature used are indicated in the thesis.

The research presented in this thesis did not require approval by the Macquarie University Ethics Review Committee.

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Abstract

Anthropogenic climate change is a phenomenon of the Earth system, altering the planet's familiar (to humans and our societies) climatic stability. This transdisciplinary study adopts a complex adaptive systems approach to conceptualise the Earth system, the global economy, and the insurance system as three interrelated social-ecological systems (comprising human-social and ecological elements) to: (i) explore the threat anthropogenic climate change presents to the insurance system; (ii) explore the potential for the insurance system to play a constructive role in effective and just climate change mitigation; and (iii) reflect on the application of theory in this thesis to contribute to ongoing theoretical development of complex adaptive systems approaches.

This thesis finds strong and ecologically effective mitigation is the only viable basis for the insurance system to manage its medium- and long-term climate risk. This result extends an earlier political economy analysis of commercial insurers that explained the currently limited insurance system responses to anthropogenic climate change, but provided little guidance to the ecological implications of such responses.

Building on this, the thesis proposes reflexive mitigation as an alternative insurance system approach to mitigating anthropogenic climate change. This approach recognises that the Earth system, the global economy, the insurance system and the relationships between them are all evolving, and that: (a) atmospheric greenhouse gas concentrations consistent with Earth system stability will vary over time; and (b) understanding of system elements and interactions is necessarily incomplete. The thesis also proposes an insurance basis for carbon pricing as a theoretically viable role for the insurance system consistent with the reflexive mitigation concept.

Finally, the thesis reflects on the application of the complex adaptive systems approach to social-ecological systems and proposes a new conceptual framework linking resilience (as applied to social-ecological systems) and hegemony (as used in neo-Gramscian international political economy approaches to global environmental governance) to provide better understanding of the role of politics in social-ecological systems. This approach reveals anthropogenic climate change as a globally coherent environmental injustice, originating in hegemonic dominance of the global economy by actors with interests aligned with economic dependency on fossil fuel use. The new framework suggests possibilities for establishing alternative and sustainable hegemony in social-ecological systems in crisis by highlighting feedbacks between politics and Earth system stability.

Preface

> [O]nce you have glimpsed the world as it might be, as it ought to be, as it's going to be… it is impossible to live compliant and complacent anymore in the world as it is.*

Since undergraduate days I have worked as an activist on human rights, social and environmental justice issues. Mostly this has been in relation to international finance and development institutions: the World Bank, the Asian Development Bank and bilateral export credit agencies. In the course of that work I became aware of the facilitative power of finance generally, and insurance in particular. Insurance makes so many things possible, including seemingly mundane things, such as driving a car knowing that any financial losses resulting from an accident will be manageable. However, 'mundane' doesn't mean unimportant. Applied comprehensively, insurance can have important civilizing effects: the sense of protection or security that comes with the 'safety net' of universal health care or social security is an example.

Insurance can be problematic too, including in the way it is used to facilitate destructive activities. Examples from my work on international finance issues include multi-million dollar large-scale infrastructure developments in low income countries. Proposed hydropower dams in Laos, gold mines in Papua New Guinea and pulp mills in Indonesia are all examples of such projects that I have campaigned against. As well as being extremely risky financially, developments such as these are usually highly destructive socially, ecologically and economically. Insurance can breathe life into infrastructure investments that would otherwise be wholly unviable because of the *financial* risks they entail to the project proponents. Yet in the process of overcoming some financial risks, insurance enables the creation of other risks: social, environmental and economic risks.

There are parallels between the role of insurance in the creation of directly attributable project-specific risks associated with individual developments on the one hand, and more diffuse, dispersed, global-scale risks associated with anthropogenic climate change on the other. Anthropogenic climate change is by definition of our own making, and an accelerating catastrophe that will continue to impact humans and our societies. Unmitigated, anthropogenic climate change promises impacts that will be felt comprehensively, if unevenly, across all populations. The system that provides insurance, along with the rest of human activities, is vulnerable.

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* Victoria Safford. (2004). The small work in the great work. In Paul Rogat Loeb (Ed.) *The Impossible Will Take A Little While.* Basic Books, New York. pp.183-190.

A privilege of being engaged in campaigning for social change is the daily exposure to cutting edge thinking about relationships between environments and peoples, and important ideals such as justice and sustainability. However, that privilege comes with a less welcome twin: the frustrating lack of opportunity to engage with such thinking beyond the strategic needs of specific campaigns and movements.

I began this PhD seeking a space in which to explore more deeply the relationship between insurance and anthropogenic climate change. In the past three and half years this research project has abundantly provided that opportunity. Over the same relatively short period, societal calls for action on anthropogenic climate change have multiplied and intensified. Even so, at the same time, not only have global greenhouse gas emissions continued to increase, so too have rates of emissions. Atmospheric concentrations of greenhouse gases are accumulating, and so too are climate risks. Clearly we're in trouble.

In *Hope In The Dark*, Rebecca Solnit[*] cautions against use of the word 'save' in framing campaign goals, as in 'save the whales'. Solnit argues that things are never saved: either they are lost, or they remain to be defended. Thinking this way, planet Earth as a viable habitat for humans is not for the saving. Either it is lost to us, or it remains to be defended. Similarly, important ideals such as justice and sustainability are either lost to us, or they remain to be defended. This phrasing neatly sums up one paradox of campaigning on social justice, environmental justice and human rights. Even as we achieve victories (and when we do we must be sure to celebrate!), the things we value, the things we hold dear, require continual defence. By the same token, even as we suffer setbacks, when we lose things we treasure – for example by crossing climate thresholds – there is still reason to keep on defending all that remains, all that we still have.

I like Solnit's book very much. It's about hope – and it's full of hope. This thesis is altogether a different beast: it's about the relationship between insurance and anthropogenic climate change! Even so, my wish is that readers of these pages will also find some hope within.

Lastly, a note about form. In writing this thesis (by publication), I have noted there are substantial commonalities between the PhD presented in this manner and the traditional PhD manuscript. Both comprise introductory sections introducing the research project and outlining the research design and methodology. Both have bodies comprising discrete chapters, a discussion and a conclusion. This thesis document includes some chapters presented in the form of papers. Unavoidably there is some overlap across these papers: unavoidable because, whilst the research was conducted to contribute towards individual chapters for this PhD, the papers

[*] Rebecca Solnit. (2004). *Hope In The Dark: Untold Histories, Wild Possibilities*. New York, Nation Books.

were written with the additional intention that each may stand-alone, publishable as journal articles and a book chapter.

Stand-alone papers included as chapters are presented in the form in which they were published, or submitted for publication. References for each paper are therefore presented as part of each paper. References for parts of the thesis not created in paper format (*i.e.* predominantly the introductory section comprising Chapters One, Two and Three, and the discussion and conclusion in Chapters Eight and Nine) are included at the end of the thesis document.

This thesis is a record of a dynamic research process. Papers written and published in the course of the research process and included in this PhD reflect my thinking at the time of their writing. A consequence of publishing as my thinking has continued to evolve is the reality of conceptual evolution and consequent discrepancies in terminology, and inevitable minor inconsistency across papers. Two key terminology inconsistencies merit mention here pre-emptively to encourage clarity and avoid confusion.

Firstly, in some papers, the terms 'anthropogenic climate change' and 'climate change' are used interchangeably. Climate change is 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods' (United Nations 1992, article one, paragraph two). The Intergovernmental Panel on Climate Change (IPCC) notes the 'distinction between climate *change* attributable to human activities altering the atmospheric composition, and climate *variability* attributable to natural causes' (IPCC 2007b, p.943 [emphasis added]). Generally I use the term 'anthropogenic climate change' to highlight it as a social-ecological system phenomenon, *i.e.* a phenomenon of a social-ecological system –the Earth system – which comprises linked, co-evolving human-social and ecological elements.

Secondly, at the conclusion of the writing process, I have come to settle on the term 'insurance system' in the singular. Yet in some instances the plural 'insurance systems' (*e.g.* in Chapter Six, paper D) appears. Conceptualising insurance as a system is part of the novel analysis generated in this thesis. The term is introduced in Chapter Two and articulated in detail in Chapter Five. I note here only that the term is used inclusively and broadly, to refer to commercial and social forms of insurance, institutions, legislative and market frameworks, *i.e.* all elements and relationships between elements, which together provide for formalised transfer and pooling of financial risk.

Acknowledgements

> [S]kill in making acknowledgments is the hallmark of a thoroughbred scholar. It can happen that a scholar, his [sic] task completed, discovers that he has no one to thank. Never mind. He will invent some debts. Research without indebtedness is suspect, and somebody must always, somehow, be thanked.*

Thanks folks!

The PhD thesis is an odd thing. There is only ever one author's name down the spine, and yet like so many things in life, it turns out the way it does because of many folks' contributions along the way.

Ros Taplin and Ann Henderson-Sellers shared the Principal, Associate and Adjunct Supervisor roles for this project as they departed from and came to Macquarie. Ann and Ros provided insightful, dedicated and sophisticated supervision for this project, and I count myself fortunate indeed to have had the privilege to work with them both. Putting your hand up to do a PhD is an unusual way to meet people. As well as learning a great deal I've enjoyed immensely the time working together on this project, and I hope Ros and Ann have too.

Glenn Albrecht has been a source of inspiration for me since we met. Our ongoing conversations about all sorts of things have been thought-provoking and fun. I'm looking forward to continuing the connection.

Colleagues at the Graduate School of the Environment (GSE) and the Department of Environment and Geography at Macquarie University, and in the Discipline of Geography and Environmental Studies at the University of Newcastle have been helpful and supportive over the course of this research by talking about things, reading things, scribbling on things and drawing things: thank you to Jeff McGee, Geoff Evans, Bonnie McBain, Olivier Rey-Lescure, Supriya Matthew and Martin Rice. Research projects do not happen by magic: the project needs administrative support and funding, and the researcher hones a variety of skills along the way. I am indebted to Gunnella Murphy, Trish Fanning, Peter Nelson, Judy Recher, Richard Cardew, Marco Amati and Ken Cussen at the GSE.

* Umberto Eco. (1995 [1987]). How to write an introduction. In *How To Travel With A Salmon*. London, UK, Minerva. Translated by William Weaver. pp.172-175.

I've some good friends that have been helping me keep things in perspective, whether they realise it or not. Thanks especially to Ellise Barkley, and to Bill and Vick Robertson too. It's funny how things turn out.

All of this would not have happened without the love of my Mum, my brothers Bren and Dan, and my Granddad. Granddad who was always there passed before this project ran its course, and we miss him very much.

Lastly, thank you to my gorgeous Al, and our glorious little boys Oliver and Fergus. They've been on the inside and they know what it takes. I'm the luckiest fella in the world.

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Contributions to papers

This PhD is presented in thesis by papers form. Some chapters include stand-alone papers (journal articles and a book chapter). These papers are published, in press, or under review for publication, as indicated.

The papers included in this thesis were co-authored by the PhD candidate and supervisors. In one instance (paper B) another co-author's contribution is also recognised. The table below summarises the respective contributions of authors to each of the papers.

Summary of authors' contributions to papers contained in this thesis

Paper	Conceptualisation	Data collection & research	Writing
Paper A (Chapter 3)	100% Phelan	100% Phelan	100% Phelan
Paper B (Chapter 4)	90% Phelan 5% Taplin 5% Albrecht	100% Phelan	90% Phelan 5% Taplin 5% Henderson-Sellers
Paper C (Chapter 5)	90% Phelan 5% Henderson-Sellers 5% Taplin	100% Phelan	90% Phelan 5% Henderson-Sellers 5% Taplin
Paper D (Chapter 6)	100% Phelan	100% Phelan	90% Phelan 5% Henderson-Sellers 5% Taplin
Paper E (Chapter 7)	100% Phelan	100% Phelan	90% Phelan 5% Henderson-Sellers 5% Taplin

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Abbreviations & definitions

This listing includes abbreviated forms and defines some specific terms that appear in the PhD. Italicised terms in definitions indicate the term is also listed.

ABI	Association of British Insurers
ABRCC	Australian Business Roundtable on Climate Change
AMO	Atlantic Multidecadal Oscillation
ARC	Australian Research Council
AR4	The *IPCC*'s Fourth Assessment Report, published in 2007.
BAU	business-as-usual
billion	1,000 million (1,000,000,000)
CAS	complex adaptive system Complex adaptive systems have capacity for emergence (also referred to as spontaneous self-organisation, adaptation or learning). Elements with CASs co-evolve as they respond to each other, to changes in each other, and to other system changes.
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CCWG	*UNEP FI*'s Climate Change Working Group
CDM	Clean Development Mechanism
CDP	Carbon Disclosure Project
COP 15	15th Conference of the Parties to the *UNFCCC* (or 15th Conference of the Parties to the UNFCCC and 5th Conference of the Parties to the Kyoto Protocol) The COP process is the main international process for engaging with anthropogenic climate change mitigation and adaptation. The COP process comprises a set of meetings of parties to the UNFCCC, as well as meetings of parties to the Kyoto Protocol, an instrument of the UNFCCC. The parties to the Convention have met annually since 1995.
CO_2	carbon dioxide The main greenhouse gas by volume, CO_2 is produced by burning fossil fuels including oil, coal and gas, and is key in the creation of anthropogenic climate change given the increasing fossil fuel-dependency of the global economy since the Industrial Revolution.
CO_2e	carbon dioxide equivalent A measure of equivalency across all greenhouse gases, expressed in terms of *CO_2*,

	which attempts to account for varying greenhouse potentials and atmospheric longevities of individual gases.
DG ECFIN	Directorate General for Economic and Financial Affairs of the European Commission
ENSO	El Niño-Southern Oscillation
ETS	Emissions trading scheme
EU	European Union
EU25	The following *EU* states: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom.
EU27	All the *EU25* states as well as Bulgaria and Romania.
FAR	Fraction attributable risk A technique adopted from epidemiology and applied in climate science to explore the change in probabilities attributable to anthropogenic climate change for the occurrence of extreme weather and climate events.
FCHLPM	Florida Commission on Hurricane Loss Projection Methodology
FOE	Friends of the Earth
GDP	Gross domestic product
GSE	Graduate School of the Environment, Department of Environment and Geography, Macquarie University
IAIS	International Association of Insurance Supervisors
IISD	International Institute for Sustainable Development
ILSs	Insurance-Linked Securities
INCR	Investor Network on Climate Risk
IPCC	Intergovernmental Panel on Climate Change. The IPCC has three Working Groups to address anthropogenic climate change science, adaptation and mitigation. See *WG1*, *WG2* and *WG3*.
IPE	international political economy
JI	Joint Implementation
MCII	Munich Climate Insurance Initiative
NAO	North Atlantic Oscillation
OECD	Organisation for Economic Cooperation and Development
PDO	Pacific Decadal Oscillation

Pg	1 petagram, *i.e.* 1 *billion* tonnes
PgC	*Pg*(s) of carbon
PhD	Doctor of Philosophy
ppm	parts per million
RMS	Risk Management Solutions Inc.
SES	social-ecological system SESs are *CAS*s comprising human-social and ecological elements. Any ecosystem – including the Earth system overall – in which human influence is discernible can be understood as an SES.
SPM	Summary for Policy Makers, and the name given to the executive summary of the IPCC's Assessment Reports (ARs), *e.g. AR4*, published in 2007.
SWF	Sovereign wealth fund
TERI	The Energy and Resources Institute
trillion	1,000 *billion* (1,000,000,000,000)
UK	United Kingdom
UL	Underwriters Laboratories
UNEP	United Nations Environment Programme
UNEP FI	*UNEP*'s Finance Initiative
UNFCCC	United Nations Framework Convention on Climate Change
UNSW	University of New South Wales
US	United States of America
WG1	The *IPCC*'s Working Group One, which addresses the physical science basis of anthropogenic climate change.
WG2	The *IPCC*'s Working Group Two, which addresses impacts, adaptation and vulnerability to anthropogenic climate change.
WG3	The *IPCC*'s Working Group Three, which addresses mitigation of anthropogenic climate change.
WHO	World Health Organisation