Shifting liabilities and logics of decision-making: the political economy of disaster risk financing

Olivia Grace Taylor

Doctor of Philosophy in Geography

University of Sussex

January 2022

Declarations

I hereby declare that this thesis has not been and will not be submitted in whole or in part to another university for the award of any other degree.

Name: Olivia Grace Taylor

Signature:.....

Abstract

The objective of this research is to analyse the political economy of disaster risk financing (DRF). DRF is an umbrella term for a set of policy mechanisms which enable response agencies to respond earlier to disasters, based on a measure of disaster risk, pre-arranged finance and plans, and a mechanism to trigger response. DRF is a varied policy landscape and in this thesis, I address mechanisms which allow agencies to act in advance of disasters occurring, as well as those which aim to respond earlier to disasters which have already occurred. What they have in common is linking a measure of risk – whether that is a forecast or a proxy measurement for a hazard - to a trigger which enacts a response.

Proponents argue that DRF will result in more efficient and effective response and is therefore one way to 'square the circle' of shortfalls in humanitarian financing. DRF has been gaining traction and momentum for some time, and 2021 was a watershed year when key donors significantly scaled up their commitments to DRF.

Critically though, because these mechanisms are designed to enact a response based on measures of risk, rather than existing humanitarian need, they pose a challenge for policymakers and practitioners because of the potential for acting erroneously or for missing events. DRF therefore opens up important questions about decision-making, mandates and liability. However, there is currently a dearth of critical literature about DRF, and almost no social science-based literature which analyses these mechanisms as part of a wider policy landscape.

As key donors and response agencies are significantly scaling up funding through DRF, it is imperative that we understand the implications of this move towards enacting a response based on measures of risk, rather than existing need, which poses a potentially momentous shift in the liabilities and logics of disaster response agencies.

Based on expert interviews, participant observation and desk-based document analysis, this thesis makes an original contribution to understanding the political economy of DRF. It explores how politics, mandates and questions of liability are shaping DRF mechanisms, and analyses the politics enacted by DRF, outlining how risk is operationalised as a calculative logic which is taking shape as a novel form of biopolitics within the humanitarian sector.

Acknowledgements

This research was funded by the Science for Humanitarian Emergencies and Resilience (SHEAR) Studentship Cohort, Grant number: NE/P000673/1, and I am very grateful to the funders who supported this work.

I would like to thank the professionals working across disaster risk financing who gave up their time to speak with me for this research, and who contributed their expertise, reflections and insights. I would also like to thank the wider community working in this area, who I have met along the way at conferences, events and webinars. People have invariably been open, self-critical and engaged, and all of these interactions enriched this work. I would like to thank Sîan McArthur, whom I worked with to design the illustration used in Chapter 4. Seeing the policy landscape of DRF come to life in colour was a real highlight of the process of writing up.

I would like to thank my colleagues from 'ForPAc', one of the SHEAR research projects, which gave me a much greater insight into forecast-based approaches to DRF. I am particularly grateful to Martin Todd who supported me to conduct this PhD research while working on 'ForPAc', and who has been a valued academic and professional mentor.

I would like to extend enormous thanks to my three supervisors. Thank you to Dom Kniveton, who encouraged me to consider working within SHEAR and doing a PhD in the first place, and to Lars Otto Naess for his continued support and critical engagement. I would particularly like to thank Pete Newell for his generous academic mentorship over the years I have been at Sussex. I am also very grateful to my examiners for carefully considering this thesis.

Thank you to my colleagues at the University of Sussex, in particular to Melissa Lazenby and Emmah Mwangi for their friendship and support. I would also like to thank my Zoom writing group 'PhDers' for their virtual company and support throughout 2020 and 2021!

I am enormously grateful to my family for all their encouragement. Thanks especially go to my Mum, Christine, whose support in everything I do is unwavering, and who helped me particularly in the final stages of writing up and proofreading. Finally, I would like to thank my partner, Jamie. Neither of us could have predicted spending the best part of 2 years working from home together during the pandemic. You have been by my side both literally and metaphorically throughout this PhD and I am so grateful for all your support.

Table of Contents

Contents

List of Figures and Tables

Glossary

AT - Assemblage Theory

ACMAD - African Centre for Meteorological Applications for Development

ARC - African Risk Capacity

Cat DDO – Catastrophe Deferred Drawdown Option

CBA – Cost-benefit analysis

CCRIF - Caribbean Catastrophe Insurance Facility

CERF – Central Emergency Reserve Fund (UN OCHA)

DFID – Department for International Development

DREF – Disaster Relief Emergency Fund (IFRC)

DRFIP - Disaster Risk Financing and Insurance Programme (World Bank)

DRM – Disaster risk management

DRR - Disaster risk reduction

EAP - Early action protocol (IFRC)

ECMWF - European Centre for Medium-Range Weather Forecasts

EP curve – Exceedance probability curve

EWEA - Early Warning Early Action (IFRC)

EWS - Early warning system(s)

FAO - Food and Agriculture Organization

FbA - Forecast-based Action (IFRC)

FbF - Forecast-based Financing (IFRC)

FCDO – Foreign, Commonwealth and Development Office

FCO – Foreign and Commonwealth Office

FEWSNET - Famine Early Warning Systems Network

FOREWARN Group - The Forecast-based, Warning, Analysis, and Response Network (START Network)

G7 - The Group of Seven

GDPR - General Data Protection Regulation

GDP – Gross Domestic Product

GFDRR - Global Facility for Disaster Reduction and Recovery

GNI – Gross National Income

GloFAS - Global Flood Awareness System

GRC – German Red Cross

GRiF - Global Risk Financing Facility

HERR - Humanitarian Emergency Response Review

IDA – International Development Association (World Bank)

ICRC – International Committee of the Red Cross

IFRC – International Federation of the Red Cross

IRI - International Research Institute for Climate and Society, Columbia University

NGO – Non-governmental organisation

ODA - Official development assistance

ODI – Overseas Development Institute

PCRAFI - Pacific Catastrophe Risk Assessment and Financing Initiative

RCRC-CC - Red Cross Red Crescent Climate Centre

REAP - Risk-informed Early Action Partnership

RMS – Risk Management Solutions

ROI – Return on Investment

SDGs - Sustainable Development Goals

SEADRIF - Southeast Asia Disaster Risk Insurance Facility

SFF – START Financing Facility (START Network)

SHEAR - Science for Humanitarian Emergencies and Resilience

STS – Science and Technology Studies

UNFCCC – United Nations Framework Convention on Climate Change

UNICEF - United Nations Children's Fund

UNISDR - United Nations Office for Disaster Risk Reduction

UN OCHA - United Nations Office for the Coordination of Humanitarian Affairs

USAID – United States Agency for International Development

WCAZ - West and Central Africa Zone

WFP – World Food Programme

WMO – World Meteorological Agency

1. Introduction

1.1 Preface: Connecting the threads of disaster risk financing

1.1.1 Overcoming the liquidity gap: The World Bank and the Caribbean Catastrophe Risk Insurance Facility (CCRIF)

In early September 2004, a Category 5 Hurricane named Ivan swept through the Caribbean, causing damage in Jamaica and hitting the island of Grenada square on. The hurricane had a particularly devastating impact on Grenada, causing an estimated $2.4 billion USD in damages, equivalent to more than twice the country's Gross Domestic Product (GDP) at the time (ECLAC, 2005). In the immediate aftermath of the hurricane critical infrastructure was re-established, but in the following weeks and months the government ran into cash flow problems due to a halt in income generating activities (Scherer, 2020). Despite re-negotiations with their creditors and tax increases, this lack of liquidity impeded recovery plans such as rebuilding public infrastructure (World Bank, 2009). In November 2004, the government of Grenada along with other Caribbean nations convened an emergency meeting and mandated the World Bank to develop a solution for regional insurance that would provide a governmental equivalent of 'business interruption insurance' to avoid potential future liquidity problems in the aftermath of disasters such as hurricanes (Scherer, 2020).

In response, Caribbean governments and the World Bank developed the 'Caribbean Catastrophe Risk Insurance Facility' (CCRIF), based on a regional risk pooling approach combined with parametric insurance (a mechanism that pays out based on measured parameters rather than actual losses, such as windspeed measurements for a hurricane policy, sometimes known as index-based insurance). At the time, the Caribbean region was

not well covered by insurance because of the high risk of hurricanes and relatively small profit potential for insurance companies (Lalor, 1994, cited in Grove, 2012). CCRIF was a solution based on the premise that pooling risk across the region could help to overcome some of these challenges, simultaneously providing an incentive to insurers through the potential to expand their portfolios into the Caribbean, while bringing governments into the arrangement by asking them to provide initial start-up reserves (Grove, 2012).

CCRIF became operational in 2007 and is the oldest sovereign insurance scheme to pool risk between governments[1]. It was soon followed by the establishment of the African Risk Capacity (ARC) in 2012, the Pacific Catastrophe Risk Insurance pilot as part of the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) in 2013 and most recently by the Southeast Asia Disaster Risk Insurance Facility (SEADRIF) in 2020. The instruments vary, for example they have different management structures and focus on different hazards. ARC in particular stands out because it operates through the African Union and adopts a framing that focusses more on climate adaptation than the other mechanisms (Scherer, 2020). However, taken in combination they have pioneered the use of insurance, especially the use of risk pools for sharing risks between sovereign governments, and for providing rapid post-disaster liquidity.

[1] Here I refer to risk pooling through an insurance scheme between governments, but risk pooling as a term used generically refers to the practice of sharing and spreading different risks. Other risk pools exist, such as The Norwegian Natural Perils Pool, an insurance scheme managed by the Norwegian government. In Chapter 6 I will further explore risk pooling as applied within humanitarian funds.

1.1.2 Translating climate information into early action: The Red Cross West African Experiment

In 2007, the same year that the CCRIF was being established in the Caribbean, heavy flooding during seasonal rains in West and Central Africa caused significant damage and affected more than 800,000 people. The floods destroyed homes, infrastructure and crops, and killed over 300 people (IFRC, 2008). The International Federation of the Red Cross (IFRC) West and Central Africa Zone (WCAZ) Disaster Management office was the Red Cross agency responsible for disaster management in the region and formed a partnership in 2008 to provide forecasts and improve preparedness, in collaboration with the Red Cross Red Crescent Climate Centre (RCRC-CC), the African Centre for Meteorological Applications for Development (ACMAD) and the International Research Institute for Climate and Society (IRI) at Columbia University. From 2008, seasonal forecasts produced by ACMAD and the IRI were issued to the IFRC WCAZ Disaster Management office, and in early May 2008, the IRI issued a forecast indicating an increased likelihood of above-normal rainfall for the forthcoming July-August-September rainy season (ibid).

As a result of the new partnership, the WCAZ held a 'Flood Preparedness Meeting for West and Central Africa' in mid-May 2008. The meeting was a first step towards more effective use of forecasts, and participants agreed an action plan that included contingency plans, risk maps, and coordination for preparedness and mitigation (IFRC, 2008). However, at this time there was no clear mechanism to access funding for anticipatory response based on forecasts, meaning that any contingency actions they could take were very limited.

However, in July 2008 there was a major breakthrough on financing. Based on the IRI and ACMAD forecast for above-normal rainfall in the region, the IFRC Disaster Relief Emergency

Fund (DREF) issued its first-ever 'Preliminary Emergency Appeal' to carry out pre-emptive actions in advance of flooding, including pre-positioning supplies and volunteer training (IFRC, 2009). The 'Preliminary Emergency Appeal' of 750,000 CHF (approximately $800,000 USD) was unprecedented within the IFRC at the time, and was made possible by an unrelated procedural change in the DREF allocation process, making it technically possible to disburse funds in advance of a disaster (IFRC, 2008). At this stage, financing early actions was not part of a larger strategy across the IFRC, but was an opportunistic move to take advantage of procedural changes. This was described to me by a research participant as: '*an opportunity, kind of an ad-hoc opportunity, to use a seasonal forecast in West Africa to do early action… the DREF for the first time ever they actually accepted to release funding based on the seasonal forecast, which was quite revolutionary because it had never happened before…'* (Interview 2, Humanitarian practitioner).

In a later review of the 2008 flood response, the IFRC concluded that although not all pre-emptive actions took place in time, the response was more cost-effective per beneficiary in comparison with the previous year, and fewer lives were lost as a result of the floods (Braman et al., 2013; IFRC, 2008). Moreover, this approach, referred to as 'Early Warning Early Action', provided a framework for translating climate information into anticipatory action. In the technical review of the intervention, the IFRC proposed that these innovations could have far reaching implications for the future of disaster management within the Red Cross movement (IFRC, 2008). The 2008 Early Warning Early Action case proved to be the spark for the evolution of Forecast-based Financing (FbF) – the name for which was later coined by the Red Cross Red Crescent Climate Centre during a series of participatory 'serious games' conducted with donors and other agencies (Coughlan De Perez et al., 2015). Subsequently, FbF became

a key example of anticipatory action within the disaster risk financing (DRF) landscape, linking pre-arranged financing to contingency plans for action.

1.1.3 The emergence of DRF: A story of gradual hybridisation

Picking up on the evolution of sovereign disaster financing following the launch of the CCRIF demonstrates the gradual process of hybridisation and learning that has taken place across what I refer to as the wider DRF sector. A number of initiatives were funded in the years after CCRIF, in addition to the other sovereign disaster risk pools noted above, which sought to mainstream and scale up more timely disaster financing. For example, in 2017 the InsuResilience Global Partnership for Climate and Disaster Risk Finance and Insurance Solutions was launched by the G7 as a platform to provide climate risk insurance for 400 million people in developing countries by 2020 (InsuResilience, 2018). Then, in 2018, the Global Risk Financing Facility (GRiF) was launched in partnership with InsuResilience to pilot further disaster risk financing tools, implemented by the World Bank and Global Facility for Disaster Reduction and Recovery (GFDRR) (World Bank & GFDRR, 2018). There are calls to go further, such as encouraging the World Bank's concessional lending arm, the International Development Association (IDA), to play a much larger role in pre-arranged or 'ex-ante' disaster risk finance (Martinez-Diaz et al., 2019), and in financing premiums for insurance and participation in sovereign risk pools such as CCRIF (World Bank, 2017). In 2017, the UK Government launched the Centre for Disaster Protection, to provide technical advisory for a range of risk financing initiatives, spanning sovereign disaster financing mechanisms to advising humanitarian agencies on risk financing (DFID, 2017)[2], which highlights some of the

[2] It was announced in June 2020 that the UK's Department for International Development (DFID) would merge into a new department, the Foreign, Commonwealth and Development Office (FCDO), which launched in September 2020. In this thesis I refer to and reference 'DFID' when the issue at-hand pre-dates this change, or when the document I am citing was published by DFID prior to the merger. More information about the merger is available here: https://publications.parliament.uk/pa/cm5801/cmselect/cmfaff/809/80902.htm

increasing interconnections between sovereign and humanitarian disaster financing through DRF.

Picking up the thread of the Red Cross, 10 years after the first ad-hoc anticipatory financing in West and Central Africa, the IFRC launched a global funding system for anticipatory disaster response through the 'Forecast based Action (FbA) window to the DREF'[3], designed to fund contingency plans prepared by Red Cross National Societies (IFRC, 2018b). The FbA by the DREF now provides guaranteed allocation of funds once a Red Cross National Society has an 'Early Action Protocol' (EAP) that has been approved by the validation committee and met pre-agreed forecast triggers (IFRC, 2018b). The FbA by the DREF was launched in 2018, and in its first year of operation there were 8 active EAPs, which has since grown to 12, with another 21 under review[4]. In 2020, FbA by the DREF allocated 3.5 million CHF, equivalent to roughly $3.8 million USD (IFRC, 2021: 9) to Red Cross National Societies when EAPs triggered.

Most significantly, in the past year the IFRC have begun exploring a 'risk pooling' approach for financing approved EAPs. Here, cross-fertilisation within the DRF policy landscape has proved essential, as the IFRC commissioned a report from the UK Government Actuary's Department to guide their work, convened by the Centre for Disaster Protection (UK Government Actuary's Department (GAD), 2021). It is important to understand that the approach of risk pooling proposed by the IFRC is not an extension of insurance or the private sector into humanitarian financing *per se*. Instead, guided by advice from actuaries and catastrophe

[3] While the initial IFRC anticipatory financing mechanism was called 'Forecast-based Financing', the later integration of FbF into the DREF fund in 2018 through a new anticipatory window was called Forecast-based Action. The terms are often used interchangeably by practitioners, but the change in official terminology in 2018 when FbF was integrated into the DREF is clearly an intentional change in the language used.
[4] These are the latest figures from the FbA by the DREF dashboard as of January 2022, although this is likely to change quite quickly as new EAPs are validated: https://www.anticipation-hub.org/experience/financing/fba-by-the-dref

modellers working within the DRF space, the IFRC are implementing concepts used in insurance mechanisms such as CCRIF and applying them to a humanitarian fund. The approach of risk pooling in this context means to over-commit the FbA by the DREF fund to some degree, based on an assessment of an acceptably small risk of exhausting the fund, and determined by calculations of the return periods of the hazard events within the EAPs they have committed to finance. This approach is also being picked up by the 'START Network' – an organisation founded as the Consortium of British Humanitarian Agencies in 2010 with the goal of re-thinking humanitarian aid. The START Network is now a membership organisation whose members include international agencies, such as Oxfam and the IFRC, and small national NGOs and community organisations such as Yuganter, India and the Health & Nutrition Development Society, Pakistan[5]. The START Network are funded by bilateral donors including Irish Aid, the UK Government, the German Federal Foreign Office and philanthropic donors such as the Ikea Foundation and the Rockefeller Foundation[6]. Membership provides access to additional funding and technical advisory through their programmes, with a particular focus on more anticipatory and localised funding[7]. Most recently, the START Network announced their new financing structure called 'START Ready' at CoP 26 in November 2021 (START Network, 2021), which was also guided by work from the UK Government Actuary's Department and the Centre for Disaster Protection (UK Government Actuary's Department (GAD), 2020), and which intends to employ a risk pooling structure.

Thus, while the variety of DRF mechanisms has grown significantly since 2007/2008, one of the most distinctive features of this policy landscape has been the hybridisation of risk

[5] https://startnetwork.org/network-directory
[6] https://startnetwork.org/donors-and-partners
[7] Note that 'START' is not an acronym. For more information about the background of the START Network: https://startnetwork.org/10-year-anniversary

financing mechanisms. What started in the Caribbean as a sovereign financing solution through insurance, and in West and Central Africa as a way to make climate information actionable and improve preparedness, have increasingly hybridised. The mechanisms are still different: the proposal to pool 'risk' within humanitarian funds such as the IFRC's FbA by the DREF is not the same as an insurance pool. However, there has been significant learning between agencies and approaches within risk financing, led by inter-disciplinary teams bringing together principles and processes from the insurance industry and sovereign disaster financing and applying them to humanitarian funds.

The DRF landscape is complex, and the terminology evolves and shifts rapidly. As a result, the definitions used within the sector varies, from DRF to 'crisis financing', 'anticipatory action' and 'anticipatory humanitarian action'. This complexity is not surprising considering the genesis of these approaches, which evolved from very different original objectives and contexts. The diversity and proliferation of different terminologies is also influenced by the different institutions and agencies involved, which spans humanitarian agencies and development financing actors such as the World Bank. In the following, in particular Chapter 4, I will more fully explore the definitions of DRF. In this thesis I will argue that it is accurate, and more useful, to understand mechanisms ranging from sovereign insurance such as CCRIF to Forecast-based Action as different tools within a shared landscape of disaster risk financing, although they operate in slightly different ways and have a different temporality. Specifically, where CCRIF seeks to provide rapid liquidity after a disaster, humanitarian mechanisms such as FbA by the DREF target anticipatory action. However, what these mechanisms have in common is linking a measure of disaster risk – whether that is a forecast or a measure that provides a proxy for a hazard - to pre-arranged financing and a mechanism to trigger a response.

This commonality is critical, because it is the use of information about risk to trigger response which opens decision-making processes up to interpretation - an ironic outcome of the push towards triggers, thresholds and the logic of quantification and objectivity that characterises DRF – and which has been understood as a deeply embedded trend in the history of science more generally (Porter, 2020). This challenge is as relevant to anticipatory mechanisms such as FbA by the DREF as it is to a sovereign insurance mechanism. Indeed, controversies such as the well-publicised failure of the African Risk Capacity insurance mechanism to pay out in Malawi in 2015/2016 (Reeves, 2017) - later resulting in an 'ex-gratia'[8] payout which I will discuss further in Chapter 5 - demonstrate that such mechanisms are no less subject to questions of interpretation and liability than mechanisms which are 'ex-ante' and anticipate disasters, such as FbA. Thus, DRF heightens the importance of decision-making processes, and poses questions about mandates, liability, and the politics of risk and uncertainty: questions which are the central thread running throughout this thesis.

1.2 The research gap and the need to better understand DRF

Such questions about risk financing are of great importance, but as yet there is a dearth of critical literature examining this policy area. Existing literature around DRF tends to be either focussed on very specific mechanisms, or integrated but very policy-oriented with little analytical insight. For example, there are a variety of papers which discuss the potential for using climate forecasts for humanitarian action, in particular Forecast-based Financing (Coughlan De Perez et al., 2017, 2016, 2015), as well as those which review humanitarian

[8] Ex-gratia refers to a payment that is made outside of the normal clauses of a contract, in this case, despite the fact that the insurance pay-out had not been triggered by the drought model in use at the time.

actions taken based on forecasts such as the use of El Niño early warnings for humanitarian action (Tozier de la Poterie et al., 2018).

There is a body of literature including contributions from the critical social sciences that analyses disaster and catastrophe insurance, in particular sovereign schemes such as the CCRIF mechanism (Grove, 2021; Grove, 2012) and the African Risk Capacity (Johnson, 2020; Reeves, 2017). There is also critical literature that considers climate insurance as a mechanism of biopolitical governance (Grove, 2014; Grove, 2010; Lobo-Guerrero, 2010) and literature that analyses index-based insurance schemes in particular contexts, such as agricultural or livestock index-based insurance (Isakson, 2015; Johnson, 2013b; Taylor, 2016). Whilst these literatures provide important theoretical and analytical insights in particular relating to financialisation, power and governance, they tend to have a narrow empirical focus on individual financing mechanisms.

In contrast, literature to understand different mechanisms and catalogue the wider landscape of risk financing, outlining typologies for understanding different mechanisms and cataloguing the risk financing tools in operation, tends to be strongly policy-oriented and is often commissioned by donors. This literature is useful in providing broader context and typologies for the sector (Weingärtner, Pforr & Wilkinson, 2020; Wilkinson, Pforr & Weingärtner, 2020; Wilkinson et al., 2018; Willitts-King, Weingärtner, Pichon & Spencer, 2020). However, as a result of the donor audience, the framing of these reports tends to be narrow, for example reviewing the evidence-base for these approaches or focussing on questions of implementation and scaling up. The one exception to this is a report undertaken by Sara De Wit, conducted through the SHEAR research programme, to analyse the use of language in the emerging sector, entitled the '*Thesaurus for Anticipatory Humanitarian*

Action' (De Wit, 2019). The thesaurus was based on interviews with practitioners and reflected much of the fragmentation in the emerging sector, as well as raising questions about the temporal shift posed by the shift towards anticipatory approaches (ibid). However, because this report was also conducted for donors and practitioners there was relatively limited scope for deeper questioning and reflection about these findings, which was limited to the conclusions. As a whole, therefore, there remains a significant need for a critical social science-based study that considers disaster risk financing broadly as an integrated policy landscape, but which also has the scope for analysis and theorisation.

What makes this particularly timely is the growing emphasis on DRF as a set of policy approaches. In some senses DRF has been a niche area, and the 'community of practice' working on these mechanisms over the course of my research has been quite small. Historically, disaster risk reduction and preparedness have made up a small proportion of overall spend on disaster response (Kellett & Caravani, 2013). In 2017, one estimate of the total amount of money dispersed through DRF mechanisms was $100 million USD (Montier et al., 2019), although for a number of reasons including the slipperiness of definitions of DRF, it is difficult to accurately measure this.

In recent years, however, there has been increasing momentum for DRF from key agencies such as the UN Office for Coordination of Humanitarian Affairs (UN OCHA) – who are a key coordinating actor and who also manage the UN Central Emergency Reserve Fund (CERF). Mark Lowcock, who served as the UN Under-Secretary General for Humanitarian Affairs and Emergency Relief Coordinator from March 2017 – June 2021[9] has been a major advocate of

[9] Mark Lowcock was succeeded in the role by Martin Griffiths in July 2021. Both have been significant advocates for more anticipatory financing. For example, Martin Griffiths gave the opening remarks to the 2021 High-Level Event on Anticipatory Action, which was a key advocacy event in 2021:

DRF. For example, he argued in a 2019 speech on anticipatory financing that the ongoing problem of humanitarian needs outstripping finance could no longer be solved by raising more money:

> 'We are now seeking almost US$27 billion for 2019, for the appeals from the UN, NGOs and others that I coordinate. We have raised almost $16 billion so far. That's a record, and about $2 billion more than we had at the same time last year. But it leaves a large gap. It would be nice to think we can fill the gap just by raising more money. But we can't. We also have to make the money we have go further. The best way to do that is to change our current system from one that reacts, to one that anticipates' (Lowcock, 2019: 2).

By 2021, the sense of growing momentum behind DRF had reached its apotheosis. Global humanitarian needs were the highest they have been in decades (UN OCHA, 2020b), a situation which has been further exacerbated by the Covid-19 pandemic. The total value of unmet humanitarian appeals has increased year on year, from $8.9 billion USD in 2016 to $13.1 billion in 2020, excluding the total value of Covid-19 relevant appeals, of which a further $5.7 billion USD was unmet (Development Initiatives, 2021: 33). This sits against the backdrop of a long-term trend of increasing global humanitarian funding over the last decade, but despite this, the percentage of humanitarian appeal requirements that is met by funding has declined from 63% in 2011 to 52% in 2020 (ibid: 33).

Moreover, 2021 has brought a series of key advocacy moments, including the G7 meeting hosted by the UK, at which new commitments for risk financing were made as part of broader

https://reliefweb.int/sites/reliefweb.int/files/resources/OCHA%20USG%20remarks%20AA%20event%209%20September.pdf

commitments to the COP26 Presidency goals around climate and adaptation (G7 Statements and Communiqués, 2021). Specifically, the United Kingdom and Germany committed £120 million and €125 million of new financing (approximately $160 million USD and $140 million USD, respectively) to deliver pre-arranged disaster risk finance for vulnerable communities through regional risk pools (ibid). Subsequently, in September 2021 UN OCHA convened a High-Level event on Anticipatory Action with the Governments of Germany and the United Kingdom, at which a number of countries and agencies further escalated their commitments to risk financing (United Nations and the Governments of Germany and the United Kingdom, 2021). For example, the German government committed to double its contribution to anticipatory action by 2022, while the government of Ireland committed to directing approximately 25% of its humanitarian funding to mechanisms that support anticipatory action (ibid). Individual agencies also made significant commitments, such as the UN's Food and Agriculture Organisation (FAO) which committed to dedicate at least 20% of their emergency financing to anticipatory action by 2025 (ibid).

In 2020, UN OCHA committed to making $140 million USD available for anticipatory risk financing through their own forthcoming mechanisms, the Anticipatory Action Frameworks (UN OCHA, 2020c). When their target is met through this one mechanism alone it will exceed more than the total amount of funding dispersed through DRF in 2017, as noted previously. It is also not surprising that in 2021, the Development Initiatives Global Humanitarian Assessment Report dedicated a section to monitoring 'anticipatory crisis financing' for the first time (Development Initiatives, 2021b). What is also significant about the growing emphasis on risk financing, however, is the aspiration to mainstream this approach across disaster management and response: as the FAO put it in an online statement following the

2021 UN High Level event on Anticipatory Action: 'Acting ahead of crises should become the new normal' (FAO, 2021).

1.3 Research Questions and Chapter Outline

This thesis analyses how politics, mandates and issues of liability shape the approach of disaster response agencies to risk and uncertainty, and how the resultant mechanisms enact a new and particular form of politics. These questions are rooted in a broad-based political economy analysis which begins with an understanding of the key moments, actors, institutions and power that shapes DRF as a nascent policy landscape. My three research questions are described in Table 1, and map loosely onto the empirical chapters of this thesis, which I briefly outline below.

Of course, there are many different 'political economies' and approaches to analysis. In this thesis my overarching approach follows a heterodox political economy analysis, sometimes referred to as 'policy processes' analysis, which focusses on the role of politics / interests, actors / networks and discourses / narratives, and has been applied to numerous questions relating to environment and development (Wolmer et al., 2006). A similar approach has been employed in analysis of the political economy of climate and development, such as REDD+ (Quan et al., 2014), fisheries (Tanner et al., 2014) and comparing across different national policy contexts (Naess et al., 2015). I further discuss the different political economy approaches and theorisations that I draw from throughout this thesis in the Literature Review, in Section 2.3.

Research Questions
1) How can we critically understand the policy landscape of DRF? 1a) What were the key actors, moments and policy narratives which shaped the emergence of DRF? 1b) How is DRF defined, and why do the definitions commonly used differ? 1c) What are the main tensions in DRF as a policy landscape?
2) How does the politics of risk and uncertainty influence DRF? 2a) How are concerns about liability and justifying decisions made based on risk information expressed in DRF? 2b) How are DRF mechanisms and the policy landscape shaped by such concerns? 2c) How can we understand the role of risk and uncertainty in DRF in a more nuanced way?
3) How is risk operationalised as a particular logic for decision-making, and what are the implications of this? 3a) How will humanitarian risk pools operate and how are they linked to existing mechanisms developed under DRF? 3b) How does risk operate as a calculative logic within risk pooling? 3c) What are the implications of 'acting based on risk' for decision-making in humanitarian funds?

Table 1 - Table of Research Questions

Chapter 4 *'Understanding the policy landscape of disaster risk financing (DRF)'* addresses Research Question 1, whereby I trace the emergence of DRF as a policy landscape and the timeline of key moments and policy drivers for DRF. I discuss the definitions of DRF, proposing a typology that allows us to understand DRF mechanisms in a more coherent way, and point to some of the institutional and organisational politics shaping the lack of clear definitions for DRF thus far. I then unpack three main areas of contestation across DRF: first, the need for individual agencies to attract funding clashes with their need to work together to create coherence, resulting in a tension between competition and collaboration. Secondly, and relatedly, agencies involved in DRF adopt different decision-making processes, specifically using different risk information and acting upon this in different ways, which leads to diversity, but which further undermines coherence. Finally, I argue that what underlies many of these tensions is the fact that many of the individuals and organisations working on DRF conceptualise and approach risk and uncertainty differently, as a result of the inter-disciplinarity of DRF.

In Chapter 5, *'Think like insurance companies'? The politics of risk and uncertainty in disaster risk financing'*, I further explore the politics of risk and uncertainty in DRF, addressing Research Question 2. I discuss the liability implications of acting based on risk information, instead of acting in response to existing humanitarian need. I argue this has produced a need for systems which make decision-making 'defensible', which pushes DRF mechanisms towards an excessive focus on automation and 'hard-triggers' at the expense of fully acknowledging uncertainties. Drawing from literature in science and technology studies, and critical disaster studies, combined with expert interviews, the chapter provides an alternative account of a more nuanced way to understand risk and uncertainty in DRF. I apply the concept of the 'political economy of liability', a term coined by Leigh Johnson (2020), to argue that concerns about liability have materially and discursively influenced DRF through both the design of mechanisms and policy narratives which have influenced the wider policy landscape.

Finally, in Chapter 6, *'Risk, Speculation and Contingency: The case of humanitarian risk pooling and disaster risk finance'*, I focus on Research Question 3 about how risk in DRF is operationalised as a particular logic for decision-making and explore the implications of this. I consider the politics enacted by DRF in terms of decision-making within humanitarian funds, focussing on the newest and most hybrid forms of DRF mechanisms referred to in this Introduction - humanitarian risk pools. I argue that the way in which risk is operationalised within these mechanisms operates as a calculative logic and decision-making paradigm that is taking shape as a novel form of biopolitical governance within the humanitarian and development sector. Taking as a departure point the idea that risk provides a metric to make diverse hazards and crises amenable to the probability-based decision-making logic required by risk pooling, I argue that this represents an extension of a more insurance-like, or

'transactional' logic into the humanitarian system. I then explore the implications of over-committing humanitarian funds in this way as a form of speculative risk-taking and a new articulation of biopolitical contingency within humanitarian governance.

2. Literature Review and Conceptual Framework

In this thesis I understand DRF as a set of policy mechanisms that enable more timely response to disasters, based on a measure of disaster risk, pre-arranged financing and plans and a mechanism to trigger response. By triggering action based on information that provides a measure of risk, DRF is intended to enable action despite uncertainty - and is often described in the policy literature as acting 'based on risk' (De Wit, 2019). By acting based on risk, however, DRF opens up a series of questions around knowledge, hazard prediction, decision-making and how response agencies understand and manage risk and uncertainty. DRF also poses a novel example of extending approaches and methodologies used in the insurance sector into development and humanitarian financing. As noted in the Introduction in Chapter 1, however, there is currently almost no critical social science-based literature which analyses what I term here as DRF. There is, however, a great deal of literature about different aspects of DRF, such as hazard prediction and early-warning systems, insurance in the context of climate change and governing risk and uncertainty.

In this literature review I introduce and discuss the three groups of literature that I draw from in this thesis, and which together form the framework through which I understand DRF. These are grouped broadly into three sections in the following categories: i) Science and Technology Studies and Sociology, ii) Risk Governance and iii) Political Ecology and Critical Disaster Studies. I acknowledge this requires grouping different bodies of work into sections where I discuss them together, and that each of these literatures are a significant and diverse field in their own right. Although there are inter-connections between them, the theoretical and epistemological grounding of these different literatures varies. In the following I discuss each

literature body in turn, identifying connections between them throughout. In the final section of this chapter, I further develop the discussion about interconnections and explain the benefits of reading across these literatures in order to theorise and understand DRF. In particular, each category of literature has different analytical strengths for understanding DRF, but also some aspects which are not as well addressed. The discussion of the inter-connections between these literatures therefore forms the basis of the conceptual framework of the thesis, which I explain in the final section of this chapter in Section 2.4.1.

2.1 Knowledge and power, risk and uncertainty: Perspectives from Science and Technology Studies and Sociology

Firstly, in this section I discuss literatures from the broad field of Science and Technology Studies (STS) and Sociology to understand the relationship between knowledge and power, risk and uncertainty. STS is a diverse discipline drawing from sociology, politics, law, economics and anthropology, which seeks to better understand the role of knowledge, specifically scientific knowledge, in society. As many authors in STS have argued, scientific knowledge plays a key role in governance and policymaking because of the way it has permeated the culture and politics of modern society (Jasanoff, 2004), which defines itself as 'the knowledge society' in one popular slogan (Stirling, 2009).

Knowledge is complex, and its interaction and uptake into policy is even more so. Western culture may refer to itself as the 'knowledge society' (ibid), but as Jasanoff (2011) has shown in a comparative study of the knowledge politics of climate change in the United States, United Kingdom and Germany, knowledge landscapes can diverge hugely, even within countries which share years of history and have similar scientific institutions. This 'spatiality of knowledge' is but one important aspect of the complexity of knowledge, and in this thesis,

I will go on to explore and differentiate subtly different types of expertise and epistemology across the ostensibly similar field of DRF.

Moreover, knowledge is intimately tied up with definitions of risk and uncertainty, determining the boundaries of what we know and what we do not know, and shaping our perceptions of risk and uncertainty (Lash et al., 1998; Wynne, 1992). In the following, I first discuss risk and uncertainty and how domains of knowledge and non-knowledge have been conceived by different scholars. I then briefly highlight some considerations about the role of expertise, and different types of expertise, in understanding hazards and decision making in disaster contexts.

To begin, it is helpful to trace back common definitions of risk and uncertainty used in policy and practice today. A key early definition came from the economist Frank Knight, who distinguished risk as anything to which we can assign numerical probabilities, whereas uncertainty is anything that cannot be constrained statistically (Knight, 2006/1921). He tied this distinction up with his theory of profit, where he argued that: '...profit arises out of the inherent absolute unpredictability of things, out of the sheer, brute fact that the results of human activity cannot be anticipated, and then only in so far as even a probability calculation in regard to them is impossible and meaningless' (ibid: 311). As a result, he argued that profit can only be made by acting in the face of uncertainty, because one can insure against potential losses from decisions made in the face of risk. This distinction between risk and uncertainty has remained influential in policy and academia to this day, but perhaps more importantly, it resonates because it recognises that what we do not know and cannot quantify is important and should not be overlooked.

Knight's distinction between risk and uncertainty determined by whether or not we can assign numerical probabilities can be found reflected in later sociological theories about risk and uncertainty, most notably Ulrich Beck's 'risk society' thesis (Beck, 1992). Beck argued that the shift from an industrial society to a risk society is defined by risks becoming increasingly 'incalculable' and therefore non-insurable. According to this view, novel 'modernity' risks include events such as nuclear fallouts or pandemics which are not statistically predictable and cannot be constrained through risk methodologies based on calculating likelihoods and probabilities. As a result, they are non-insurable risks, and define our 'modern times' as a 'risk society'. Such events, which are unforeseeable based on knowledge at the time, are sometimes referred to as 'black swan' events in public discourse (Taleb, 2007), although in Knight's and Beck's work they have a clearer definition relating to 'insurability'. Beck wrote '*Risk Society: Towards a New Modernity*' in the aftermath of the Chernobyl disaster, and perhaps as a result the work drew attention to such characteristics of 'modernity risks' that follow nuclear fallouts but are relevant to other catastrophes. These characteristics are that modernity risks i) emerge as unintended consequences of modernity; ii) decouple cause and effect in ways that result in risks becoming spread across time and space; and iii) require scientific knowledge to detect and understand (ibid). As a result, he argued that such risks surpass the ability of conventional institutions within industrial society to address, which requires rethinking the role of institutions and ushers in new perspectives about sustainability and the environment (Lash et al., 1998), with implications for other 'modernity risks' such as for climate change (Bulkeley, 2001).

Beck's concept has proved to be a major provocation around risk, uncertainty and politics. However, scholars such as Leach, Scoones and Thompson (2002) have critiqued his work for its eurocentrism, and Beck has since expanded his arguments to the 'world risk society' (Beck,

2009). One of the other key aspects of Beck's argument that has provoked debate, and which is relevant to this thesis, was his use of 'insurability' as a key distinguishing feature between risk and uncertainty. As I discuss in the next section, this has been questioned by scholars working in economics and risk governance who queried the binary distinction between risk and uncertainty based on the 'calculability' of insurance techniques. Such arguments make the case that modern insurance techniques blur the distinctions between calculative and non-calculative techniques because they include aspects of 'intuition' and non-quantitative approaches (Bougen, 2003; O'Malley, 2003; O'Malley 2004), an argument I further explore in later in Section 2.2. Beck then later refined his arguments in his work '*World at Risk'* (Beck, 2009) in which he used the example of governments providing a 'public backstop' to terrorism insurance in the wake of the September 11th attacks in the United States in 2001 to argue that private insurance may still be extended to 'black swan' events. Following his previous arguments in '*Risk Society'* (Beck, 1992) such events would have been seen as non-insurable catastrophes, but he conceded in '*World at Risk'* (Beck, 2009) that such events would now be insurable with governmental support – however, this would be in ways which are selective and fragile, as they are subject to political considerations and shifts. This point is particularly relevant to understanding new assemblages of insurance in the context of contemporary climate change, which as Collier et al. argue, are now particularly interconnected, because catastrophe insurance involves the public sector either: '…as regulator, as the provider of backstops or re-insurance, or in many cases as the consumer of private insurance products' (Collier, Elliott & Lehtonen, 2021: 165).

While other theorists that I draw from understand risk in quite different ways, Beck provides a key touchstone across a range of disciplines for thinking about risk and uncertainty. For example, in Baldwin and Stanley's (2013) special issue editorial where they connect risk

governance literature with political ecology, they recognise the importance of Beck's refusal to objectify or neutralise risk in any way, understanding risk instead as an artefact of modernity, and of social and political relations. Beck's theories provide a starting point for thinking about the implications of risk, and indeed his provocation about contemporary governance seeking 'to feign control over the uncontrollable' (Beck, 2002: 4) is a common theme of interest between both sociological approaches and risk governance literature discussed in the next section, 2.2.

A return to the tradition of STS scholarship offers further perspectives on nuancing our understanding of risk and uncertainty beyond the binary approach first suggested by Beck. For example, one of the key contributions to the literature is Andy Stirling's framework for thinking about risk and uncertainty as part of a broader condition of 'incertitude' (Stirling, 2007, 2009, 2010). According to this framework, which spans four dimensions of risk, ambiguity, ignorance and uncertainty, different domains of incertitude are distinguished degrees of knowledge relating to two parameters: first, the extent of knowledge about possible outcomes, and second, the extent of knowledge about the likelihoods of such outcomes.

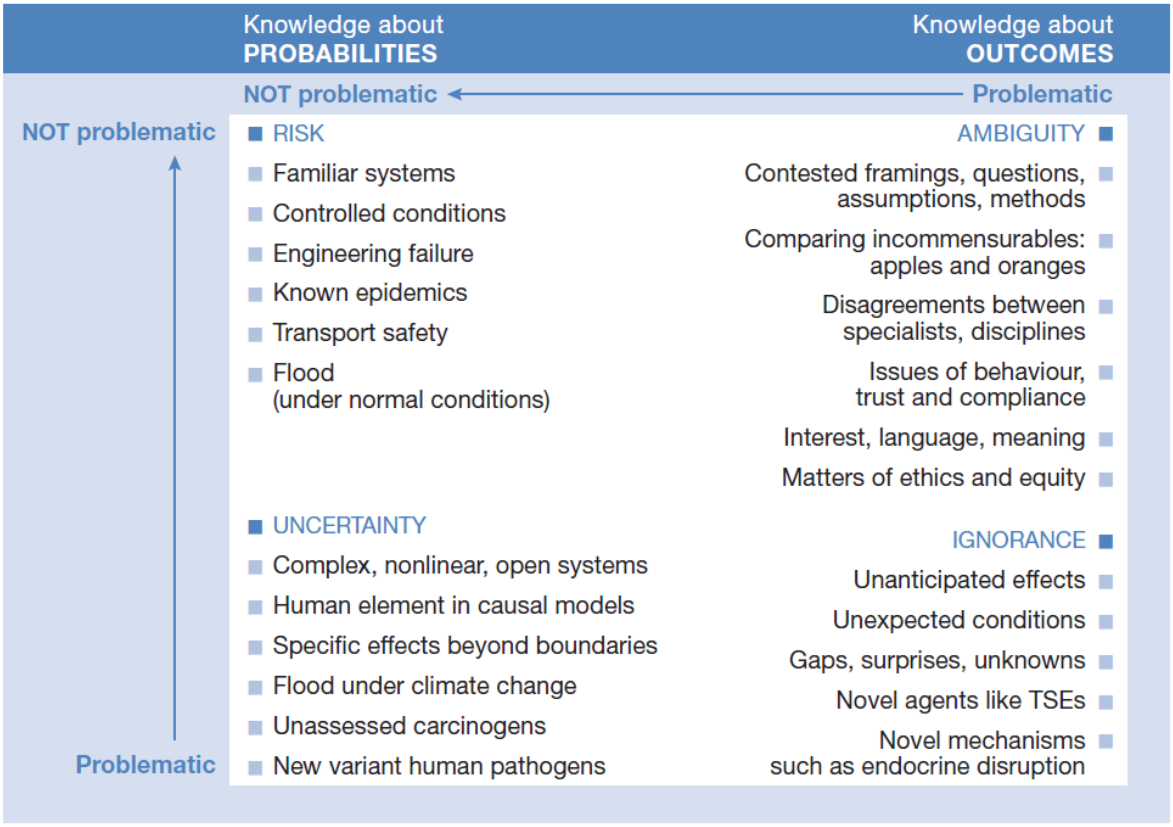

Figure 1 - Image of Stirling's four-part typology of incertitude, including risk, ambiguity, ignorance and uncertainty. Reproduced from Stirling (2007), this graphic gives some examples of scenarios that would fall under different conditions of incertitude.

To give an example, Stirling argues that where there is very incomplete or problematic knowledge about both the possible outcomes of a particular threat, and the potential likelihood of such outcomes, we should recognise a state of ignorance. Practical examples of such cases are challenging given this category includes 'black swan' events or events we could call 'unknown unknowns' (after Donald Rumsfeld's infamous phraseology)[10]. However, Stirling does give some examples of potential situations of ignorance to include novel disease

[10] Quote from a press conference in 2002: 'As we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know': https://www.youtube.com/watch?v=GiPe1OiKQuk

families such as TSEs (Transmissible spongiform encephalopathy)[11] or endocrine disruption (Stirling, 2007). On the other end of the spectrum, he suggests that states of 'risk' should include situations such as engineering failures, transport safety, known epidemics or flooding under 'normal conditions' – all examples of situations where there is a high degree of knowledge about possible outcomes, and the likelihoods of such outcomes (ibid). Notably, in this example, flooding under climate change is included within the category of 'uncertainty' not 'risk', which he explains is due to a lower degree of knowledge about the probability of the event occurring (ibid). There is a dearth of literature that applies the Stirling typology to different types of climatic or physical hazards and modelling, and this is arguably a demonstration of the need for greater interdisciplinarity between social scientific theorisations about risk and in particular uncertainty and the physical sciences, as has been noted in critical geographical literature about disasters (Donovan, 2017).

In hazard and environmental modelling literature there are other frameworks for understanding uncertainty, such as Walker et al.'s framework for three dimensions of uncertainty, namely, location (where uncertainty manifests), level (amount of knowledge) and nature (epistemic or aleatory) (Walker et al., 2010). Here, epistemic uncertainty refers to uncertainty arising from incomplete knowledge, whereas aleatory uncertainty is irreducible and arises from probabilistic variability, meaning it should be treated as stochastic. However, the approach taken in the STS literature typified by Stirling's framework for understanding risk and uncertainty is particularly useful because it is predicated on recognising the underlying complexity and politics of knowledge in shaping perceptions and policy

[11] TSEs are the family of diseases that include bovine spongiform encephalopathy (BSE). BSE was a major cause for public health concern in the 1980s and 1990s, after an outbreak led to cases of a human variant of BSE, Creutzfeldt–Jakob disease (vCJD), and caused a number of fatalities.

approaches around risk and uncertainty. There are two key points that this highlights: first, the recognition of the tendency for policymakers to narrow policy approaches down towards 'risk' for reasons of justification and political expediency, and secondly, the role of complexity and non-linearity of knowledge.

On the first point, analysis and critique of the predominance of risk-based approaches has been a key theme throughout the genesis of STS literature. Scholars in STS have long critiqued what they perceive as an over-reliance on 'risk-based' methodologies for managing hazards in response to incomplete knowledge and uncertainty. For example, Brian Wynne gives an account of the evolution of risk assessment as a way of analysing risk and safety problems, originally developed for mechanical problems such as in chemical or nuclear plants (Wynne, 1992). He argues that subsequently risk assessment was being applied to 'badly structured extensive problems' (ibid: 113) such as to environmental systems on a systemic scale. The point about the misapplication of risk-based approaches to the latter category of problems, which could include disasters, is that despite huge scientific work, modelling such systems requires simplifications and extrapolations that impose an artificial intellectual closure around entities which are more open-ended, complex and fluid than the models suggest. Of course, environmental modelling such as the types of hydrological or meteorological forecasting used in DRF mechanisms are ever more complex and sophisticated, and much effort has been invested in assessing predictability and model skill for early action and decision-making in the humanitarian context (Coughlan De Perez et al., 2017; Macleod et al., 2021). Nonetheless, the adage that 'All models are wrong, but some models are useful'[12] remains an important cautionary note.

[12] The phrase is linked to the field of statistics and is commonly attributed to George Box, a statistician.

On the point about political expediency and justification, Brian Wynne attributed the need for legitimation of particular approaches to the predominance of narrow, risk-based methodologies, arguing that 'prevailing risk and environmental discourses can be seen to act by default as covers, and thus legitimators, of existing privileged forces driving technological innovation trajectories' (Wynne, 1992: 459). Similarly, Andy Stirling argues that the perception that 'risk-based' approaches allow decisions to be conceived, asserted and defended is the key driver towards framing problems as 'risk-based', with the result that 'trust' and 'blame' can be effectively managed to achieve the 'vital political resource of justification' (Stirling, 2009: 38). This phenomenon was also identified by the anthropologist Mary Douglas in her early work on risk, culture and blame, where she argues that allocation of responsibility and blame is one of the primary reasons why risk becomes so dominant in science-policy interactions – because 'risk-based' approaches allow decisions to be conceived, asserted and defended. As a result, she argues that: 'A great deal of risk analysis is concerned with trying to turn uncertainties into probabilities' (Douglas, 2013/1986: 42). The point that both of these scholars are highlighting is that through a risk-based approach, responsibilities and blame can be much more neatly allocated to a model or a risk-assessment which turns out to be 'wrong'. This is much more straightforward than acknowledging uncertainties, unknowns and ambiguities, which results in a much more complex and partial picture – although arguably more useful - when trying to attribute responsibility.

On the point about the complexity and indeterminacy of knowledge, scholars in STS such as Sheila Jasanoff have long called attention to the complex relationship between social life and knowledge and the co-production of science and society (S. Jasanoff, 2004). STS literature provides an effective critique of common misconceptions that scientific knowledge is linear and additive and reminds us of the importance of indeterminacy and the inter-dependence

of facts and values (Stirling, 2009). The field of STS can usually be described as constructivist, which means recognising that understandings of knowledge, and indeed conceptions of risk and uncertainty, are mediated through social, epistemic, and institutional lenses (amongst others). For example, in Brian Wynne's account of Cumbrian sheep farmers' perceptions of risk in the wake of the Chernobyl disaster (Wynne, 1998), he contrasts lay knowledge with expert knowledge to show how epistemology is crucial to our understanding and response to uncertainties. He demonstrated that the sheep farmers' practical knowledge of farming led them to question assumptions of predictability, instead valuing adaptability and flexibility, unlike the culture of prediction and control assumed by scientific advisors who sought to advise them (ibid). This reminds us that in addition to the role played by knowledge in bounding risk and uncertainty, epistemology is critical in shaping responses and perceptions of risk and uncertainty. Indeed, the fact that epistemology and cultural factors play a significant role in determining perceptions of risk has been widely demonstrated in disaster studies literature (Bankoff, 2003; Binder & Baker, 2017; Krüger, Bankoff & Cannon et al., 2015), although reflexive analyses of the understanding of risk and uncertainty amongst the disaster studies community itself is less common (Hewitt, 2015).

There are a number of key applications of such a debate about the role of knowledge and epistemology to early warning systems and decision-making in disasters. Reflections about knowledge in decision-making around disasters has long been important but under-recognised in mainstream Disaster Risk Management (DRM) debates[13]. For example, much of the focus in the development of early warning systems for drought-induced famine in the

[13] Following the agreement of the Sendai Framework for Disaster Risk Reduction 2015–2030, updated terminology guidelines have been issued by the United Nations Office for Disaster Risk Reduction which state that Disaster risk management is the application of disaster risk reduction policies and strategies, which I use here as the umbrella term: https://www.undrr.org/terminology

1980s and 1990s was on providing better information. However, research has extensively shown that the provision of information alone is not a sufficient condition for taking actions – as was argued in the memorably title paper '*Who can eat information?*' (Vogel and O'Brien, 2006). There are several barriers to acting on early warning information, be that due to institutional and political obstacles (Buchanan-Smith, Davies, & Petty, 1994) or issues relating to the credibility, legitimacy and scale of early warning information (Patt & Gwata, 2002). Some of the literature in the DRF domain, in particular relating to Forecast-based Financing specifically acknowledges that information does not always enable effective disaster response or early action (Tozier de la Poterie et al., 2018). Indeed, this recognition is a large part of the motivation for trigger-based systems across the emerging field of DRF. However, as yet there is limited deeper reflection about the role of information, expertise, epistemology and conceptions of uncertainty within the DRF field.

Scholars have sought to bridge the divide between the natural and social sciences in recognising and charting the role of epistemology in scientific debate relating to natural hazards (Donovan, 2019; Donovan, Oppenheimer, & Bravo, 2012b), and in recognising the social and political 'life' of scientific models used by decision-makers in disaster contexts (Donovan & Oppenheimer, 2015; Hastrup & Skrydstrup, 2013). In his working paper reviewing risk and uncertainty, Scoones (2019) calls for diverse knowledges, expertise and trans-disciplinarity between scientists, practitioners, policymakers, activists and others working on problems together in ways which recognise knowledge politics. This arguably remains a key area for disaster studies literature and DRM relevant to this analysis of DRF. I will further explore the theme of epistemology and knowledge politics in the political ecology and critical disaster studies discussion of inter-disciplinary research in Section 2.3.

2.2 Governing risk and uncertainty: Theorisations from biopolitics, security and emergency studies

In this section I discuss literatures from the field of risk governance which explore risk as a tool of modern liberal governance, and as a mechanism for managing uncertain futures. Risk governance spans a range of fields from security studies and political geography to sociology, but what they share are theoretical origins from political economy and political philosophy, in particular Foucauldian biopolitics. In the following section I explore key arguments in conceptualising risk as a tool of governance, and their application to critical analyses of humanitarianism and in particular, to finance and insurance.

It is a common trope that the introductions to books and articles about risk governance begin by stating that the world is riskier and more uncertain than ever before. As noted previously, many of these take off from Beck's (1992) '*Risk Society*' thesis, which argues that 'modernity' is characterised by catastrophe risks that can no longer be constrained by statistical technologies. This narrative of riskiness and uncertainty is important and as resonant today as ever. However, risk governance scholars pick up the question of risk and ask what this means in political terms; as the Beck quote stated previously puts it, the question in governance terms is formulated as 'How to feign control over the uncontrollable?' (Beck, 2002: 4). Thus, risk governance literatures go beyond explorations of risk as a sociological condition as Beck first framed it and focus instead on risk as 'a way in which we govern and are governed' (O'Malley, 2000: 458).

The relationship between risk, security and politics in contemporary liberal governance has particularly drawn the interest of risk governance scholars, who argue that what we see today in 'risk-based' governance is distinct from older 'threat-based' logics in security studies and

international relations (Aradau, Lobo-Guerrero & Van Munster, 2008). Specifically, they argue that while 'threat-based' approaches drew from intelligence in order to eliminate danger, risk-based approaches develop strategies to embrace it, drawing from statistical and actuarial data, modelling and speculation (ibid). Specifically, Aradau et al. (2008) focus on the management of contingency as the key characteristic of risk-based governance, in contrast to the concept of threat which in governance terms led to approaches that sought to manage and eliminate potential dangers.

It is important to note that what is meant here in the 'management of contingency' is not quite the same as 'contingency' in the lay meaning of preparing for possible future events. Instead, contingency in risk governance literature is tied up with Foucauldian theories about biopolitics. Biopolitics is one of the core concepts in Foucault's writings found in texts such as the '*Society Must be Defended*' lectures of 1976 (Foucault, 2003) , and which later took on more significant form in his 1979 lectures '*The Birth of Biopolitics*' (Foucault, 2008). As Lemke (2011) writes in his book reviewing Foucault's theories of governmentality, biopower has two basic modes – the disciplining of the individual body and the regulatory control of the population – the latter of which Foucault calls a 'technology of security', and which aims to prevent or compensate for dangers that result from the existence of populations of life-en-masse. Thus, biopolitics refers to the government of life as part of a political rationality which takes the administration of life and populations as its subject: 'to ensure, sustain, and multiply life, to put this life in order' (Foucault, 1990/1976: 138). Within this framing, 'contingency' refers to knowing and governing the uncertainty inherent to this biological life. Biopolitics scholars understand contingency as being constitutive of what it means to be a living thing, meaning that life cannot be secured against contingency. Biopolitically speaking therefore, it

can only be secured through contingency, echoing Aradau et al.'s (2008) explanation of governing through risk. Moreover, there is an element of contingency which is about recognising, knowing and governing through the uncertainty inherent to life. As Dillon puts it, 'Contingency is not arbitrary chance. It represents a complex discourse …. about the knowledge of uncertainty' (Dillon, 2007: 45).

There has been a broad application of these theorisations, although much of the literature on risk governance focusses on developed countries, political and state emergencies (Anderson, 2016; Anderson et al. 2019), national defence and terrorism (Amoore & De Goede, 2008) and border security (Amoore, 2011). Nonetheless, there is literature on risk governance from several debates relevant to this thesis including the operationalisation of risk within climate governance (Corry, 2011; Dalby, 2013; Oels, 2013) and emergency and crisis governance (Anderson, 2010, 2016). However, the two themes I will discuss further are the governance of humanitarianism (Duffield, 2010, 2012) and in the most depth, risk governance in relation to finance and insurance (Dillon, 2008; Lobo-Guerrero, 2010).

In relation to the first theme, Mark Duffield has written extensively about humanitarianism from the perspective of understanding the nexus between contemporary development and security, analysing policy in this domain as a biopolitical discourse which conceives of development and under-development in terms of how life is to be supported and maintained (Duffield, 2010). He has focussed in particular on the concept of resilience as the new *lingua franca* for disaster and risk management because of the ways in which it operationalises 'risk, preparedness, and survivability operating across the physical, natural, and social sciences' (Duffield, 2011: 763). Specifically, he argues that the purpose of resilience and 'risk management' is to offer a way of living with uncertainties rather than removing or reducing

them: 'For resilient systems and relationships, uncertainty is not necessarily negative. Because it has the potential to foster new and, by implication, more robust conditions of existence, unpredictability can be positive' (ibid: 758). Resilience in this context does not protect people from hazard but makes it possible for them to live with hazard, uncertainty and unpredictability in ways which echo Aradau et al.'s analysis of governing through risk and developing strategies to embrace it (2008). I refer in the next section to this point of connection with recent political ecology literature, which draws from Foucauldian theorisations of biopower to argue that similar discourses such as resilience (Grove, 2014), adaptation (Watts, 2015) and climate risk management (Taylor, 2016) operate as biopolitical discourses with the objective of 'living with' challenges caused by climate change.

Secondly, finance, and the world of insurance is a key theme for risk governance scholarship. Financial securitization in general is recognised as an extensive and important apparatus of biopolitical securitization (Dillon, 2008), and insurance has been a particular area of theoretical interest for risk governance scholars. The Foucauldian scholar, François Ewald, was important in first recognising the role of insurance as a governmental technology of risk, and as a rationality determined by the calculation of probabilities (Ewald, 1991). As Dillon argues, insurance captures the essence of how risk operates as an assemblage of mechanisms for measuring and commodifying exposure to contingency (Dillon, 2008). Insurance is after all the primary mechanism by which most people 'get' security on an everyday basis, rather than from the state - insurance is therefore one of the mechanisms which furthers the principle of 'making an entrepreneur of oneself' - a preoccupation in Foucault's lectures on '*The Birth of Biopolitics'* (Foucault, 2008/1979). As such, insurance provides a mechanism for the extension of the transactional economic logic – that Foucault (ibid) first identified as

essential for biopolitical governance – and extends this into this into everyday decision-making and economic relations.

In Dillon's (2008) paper '*Underwriting Security',* he argues that through insurance, risk is manufactured as an artefact. This draws from Ewald's observations and Foucauldian arguments that risk is not objective but is instead a knowledge practice. For example, Ewald argues that: 'Nothing is a risk in itself… the category of risk is a category of understanding' (Ewald, 1991: 199). Dillon furthers this argument, arguing that: '…'risk' does not exist 'out there', independent, as it were, of the computational and discursive practices that constitute specific risks as the risks that they are. Risk is a carefully crafted artefact.' (Dillon, 2008: 322) Returning to the notion of contingency, Dillon argues that through insurance, risk quantifies and commodifies exposure to liability calculated through measures of probability (ibid). Based on the argument about risk as a computational and discursive artefact, Dillon (2008) therefore argues that through insurance, risk operates as a calculative logic for making decisions about the future, and for taking bets in the hope of gain, but with the possibility of loss.

Dillon further explains his formulation of risk in the following way:

> 'Risk is simply the commodification of exposure to contingency calculated through the generalized measure of probability. Risk commodifies contingency by first making it calculable and fungible. Events and eventualities are allocated probabilities, a generalized measure of account, then correlated with their projected outcomes and given a score. People take a chance on that score. In simple terms, they 'bet' (Dillon, 2008: 320).

However, to 'take a chance' or 'to bet' is not to demean the importance of measures of risk for decision-making. Instead, in taking a chance based on risk, risk serves as the hinge point around which diverse actors make decisions about the future (Oulahen, 2021). This echoes

the points made by Aradau et al. (2008) in their outline of risk as a tool of governance, where they argue that risk arises from the construction, interpretation and management of contingency, but does not result in calls for the elimination of risk. Instead, it develops strategies to embrace it – to make decisions through risk. This is also something Dillon reflects in his argument that such risk-based security does not 'prevent things happening to people or corporations' (Dillon, 2008: 327). Instead, it compensates people for losses they might incur, giving them sufficient security to continue to be active and circulate in the economy of contingency.

The concept of risk as providing a 'calculative logic' for decision-making provides a point of connection between risk governance and literatures in political ecology. While the two emerge from different theoretical backgrounds, in a special issue series entitled '*Risky Natures, Natures of Risk'*, Baldwin and Stanley argue that 'bringing political ecology and biopolitical governmentality into generative conversation enables us to see how neoliberalism (and we might add capitalism more broadly) is not simply a set of material political economic relations, but also a deeply constructivist project' (Baldwin & Stanley, 2013: 2). In a series of essays in this special issue, the authors do not objectify risk but instead analyse practices of governing through risk. For example, Stanley (2013) analyses radiation contamination in the vicinity of a former uranium mine through an understanding of risk as a 'knowledge practice' that facilitates the unloading of the harmful effects of capital accumulation, in this case, radiation. Dempsey (2013) explores the development of models to account for the costs of biodiversity loss to make the risk of such losses legible for decision-making by market actors (Dempsey, 2013), turning geophysical and biological phenomena into 'nature that capital can see' (Robertson, 2006). Finally, in Johnson's (Johnson, 2013a) article on catastrophe bonds she analyses the assembly of catastrophe models as processes

of calculation which make diverse hazards commensurate, to be traded on capital markets, drawing from Dillon's (2008) analysis of risk as an 'artefact' produced through calculative and discursive processes.

Johnson's work is particularly relevant here in drawing parallels to processes in risk financing. As Johnson argues, the process by which measures of risk make different hazards commensurable and fungible bears 'an extraordinary resemblance to Marx's account of abstraction, commodification, and fetishization' (Johnson, 2013: 35). Regardless of whether an actual market is created, the resultant risk takes on a new ontological status, as Dillon also proposes, displaying some of the key properties of money as a new form of currency 'to enable further transactional and combinatorial exchanges between entities made fungible in terms of the measure of their exposure to contingency' (Dillon, 2008: 311). As a result, decision-making through measures of risk extends the transactional economic logic that Foucault (Foucault, 2008/1979) identifies as essential for biopolitical governance.

However, an important caveat to layer into these debates relates to the theorisation of uncertainty. Picking up on the point made in the literature previously, the original Beckian 'risk society' thesis rests on quite a binary distinction between risk and uncertainty, where risk can be constrained statistically, and thus can be insured, in contrast with the uncertainty which cannot be quantified (Beck, 1992). As discussed in the section previously, this can be traced back to Frank Knight's work distinguishing risk and uncertainty, based on the ability to assign probabilities and thus to insure (Knight, 2006/1921). However, a number of scholars have since called for greater nuance in the conceptualisations of risk and uncertainty in risk governance debates, asking what is lost when we collapse diverse technologies of risk into one un-differentiated category (O'Malley, 2004). As outlined previously, research shows that

insurance practices (stereotypically a 'risk-based' practice) are often marked by educated guesswork and hunches (Bougen, 2003). Recent analysis of the global re-insurance industry holds up this argument. For example, Jarzabkowski et al. (2015) provide an account of re-insurance as a financial market for hedging against 'unknown unknowns', based on collective practices which span technical and also contextual expertise and experience. The key point here is that determining if future hazards are 'calculable' or 'incalculable' is an overly simplistic distinction that overlooks different forms of uncertainty, knowledge and degrees of predictability. This is recognised by STS scholars pointed to previously, but it is important to note how very recent economic analysis continues to uphold the argument that distinguishing risk from uncertainty based on 'calculability' is oversimplistic. Empirical material from interview participants ranging from catastrophe modellers to hydrologists working on DRF and drawn from in this thesis further reinforces this point.

This complexity is in part recognised by Aradau et al. (2008) in their discussion of risk as a technology of governance, acknowledging that risk renders the uncertain future knowable and actionable, representing it as relatively calculable in actuarial terms, but that 'it also needs to engage with that which exceeds calculability' (Aradau et al., 2008: 150-151), or to put it more simply, scholars need to engage with uncertainty. Risk governance literature engages with the many ways in which technologies are deployed in efforts to render the future calculable, and often acknowledges the limitations to this, such as O'Malley's work on both risk and uncertainty governance (O'Malley, 2004). However, these literatures do not tend to incorporate other disciplinary perspectives to explain nuances regarding predictability or knowability of potential hazards. Risk governance theorists acknowledge that governing through risk 'mobilizes knowledge while at the same time exceeding knowability' (Aradau et al., 2008: 151), but drawing from other disciplines and perspectives would enrich explanations

of where the bounds of 'knowability' lie, in particular for hazards which demand a scientific component. Admittedly, many of the themes that risk governance work focusses on, such as political or state emergencies (Anderson, 2010; Anderson et al., 2019) or national defence and terrorism (Amoore & De Goede, 2008), might not demand such an interdisciplinary analysis of uncertainty. However, for other areas of study this would be helpful, in particular those relating to socio-environmental hazards. In fact, this is an area McGowran and Donovan (2021) note in terms of potential convergence between risk governance scholarship and critical disaster studies, where risk governance literature could better integrate knowledge from outside the social sciences to grapple with the materiality of disaster – the real and difficult to predict physical hazards - which would help with theorising the governance of uncertainty in disaster contexts.

2.3 Understanding hazards and disasters: Contributions from political ecology and critical disaster studies

In this final section I discuss literature from political ecology and critical disasters studies, which helps us to understand the interactions between environment and society in relation to hazards and disasters. I explore some of the intersections with both STS and risk governance literatures outlined previously. Analysis of environmental knowledges links with the focus on knowledges and epistemology brought to the fore in the Science and Technology Studies literature, while some of the more Foucauldian political ecology analyses share theoretical common ground with risk governance literature underpinned by biopolitical theory. Throughout the section I chart some of the shifts and changes within political ecology and argue throughout that it is an indispensable analytical toolkit from which to understand

the intersection between the social, political and natural worlds and is therefore required for any critical reading of disasters.

Human geography scholarship more broadly has long been interested in the interactions between society and the environment, and it is through this engagement that political ecology emerged as a field. This can be traced back to work in the 19th and 20th Century, though this era was often characterised by an environmental determinism that served as a tool of empire (Livingstone, 1987, 1991, 2002). However, there is also a history of critical accounts that challenged the racism and determinism of 'Imperial' scientific knowledge at the time (Kropótkin, 2008/1892). Some of the tools of Kropótkin's approach, which drew from place-based fieldwork and questioned taken-for-granted assumptions about environment and society can be seen in the later emergence of human and cultural ecology in the 1950s and 1960s, and eventually in its successor, political ecology. However, the tracing of this brief history of the emergence of political ecology also reflects an intellectual tradition that has veered between critique and more deterministic approaches. Robbins and Bishop (2008) describe this process of revision and progress in their account of political ecology as going 'there and back again', between epiphany and disillusionment. In the following sections I describe some of these shifts in more contemporary thought and highlight relevant developments for understandings of disasters, and the links with disaster studies and human geography, as political ecology has added new theoretical approaches and jettisoned others.

Analysis of the politics, economics and sociality of environmental issues has always been a key theme of political ecology, and the increasing recognition of the risks of hazards to society opened up more policy-relevant avenues of research, most notably Gilbert White's work on flooding (1945). White was critical of the prevailing way to manage floods at the time –

predominantly through hard engineering approaches - and argued instead for better land use planning and behavioural change (ibid). As Paul Robbins writes, one of the most powerful contributions of this analysis was the notion that 'A flood is a hybrid human–environmental artifact, no more an act of nature than one of planning' (Robbins, 2019: 33), thus representing a blurring of the human-nature distinction common to earlier deterministic approaches. Despite this radical start, the growing field of 'natural hazards' research that followed White's work predominantly focussed on risk reduction through the lens of hazards, typified by literature such as Burton, Kates and White's (1978) work '*The Environment as Hazard*', which perceived environmental stimuli as bringing about negative socioeconomic impacts that individuals respond to as part of a theory of 'choice and adjustment'.

The 2nd edition of '*The Environment as Hazard*' (Burton, Kates & White, 1993) made several important contributions such as drawing attention to 'novel' hazards at that time, such as climate change, nuclear waste and ozone depletion. However, the emerging field of 'natural hazards' continued to focus on theories of 'choice and adjustment' with relatively little attention paid to the factors which determine this and which therefore shape responses to hazard. This became the central concern amongst critics of the book, who argued that typologies dominated at the expense of underlying critical theory (Torry, 1979). This critique was shared by political ecologists who began to focus on the natural hazards research agenda in the 1980s, typified by Michael Watts' work, entitled '*On the poverty of theory: natural hazards research in context*', in which he argued that 'in spite of the recognition by Kates, White and others of the strategic importance of social causality, they have no social theory capable of addressing social processes, organization or change' (Watts, 1983: 240).

In contrast, early work in the field of political ecology was characterised by an approach which connected environmental issues to a broader political economy framework that could account for questions of causality in social processes and systems of organisation. For example, Blaikie and Brookfield's classic work '*Land Degradation and Society*' (1987) sought to understand soil erosion and deforestation through a lens of a 'broadly defined political economy' attending to questions such as power, class and property rights, connecting the environmental issue with socio-economic histories and dynamics including colonisation, land ownership changes and impacts of economic shifts on agrarian societies, through so-called 'chains of explanation' (ibid).

Political ecology theory in the 1980s was strongly influenced by Marxian political economy, which brought about a particular lens to understanding the connections between environment and society as a dialectic. This school of thought understands environmental risk as the result of particular circuits of capital and socio-environmental interactions, based on the dialectic relationship between nature and society (Smith, 1984). This understanding of environmental risk had a major impact on how political ecologists in this tradition understood disaster events as an outcome of the uneven distribution of socially and economically produced risk. According to this view, risk is not caused simply by inequity but through the 'continuous and dynamic process of socio-ecological production' of capital (Taylor, 2014: 60). In such cases, political economy analysis demonstrates how vulnerability and marginality was being produced and re-produced by social and economic relations 'rooted in the circuits of capital and in the operations of what passed as state policy' (Watts, 2015: 34). This is one of the reasons why scholars such as Taylor and Watts tend to be critical about climate adaptation as a discourse and normative objective. Having said that, they are joined in this by other scholars whose analysis is grounded in different concerns, such as the way adaptation as a

discourse moves away from the pro-poor orientation of vulnerability based approaches and the way that specifically focusses on inequalities and trade-offs (Cannon & Müller-Mahn, 2010). However, Marxian political economy analysis was a particular feature of 'first-wave' political ecology, although as demonstrated by thinkers such as Marcus Taylor and Michael Watts, it is still a mainstay of political ecology, even if it has been joined by other theoretical influences.

The particular framing of risk in this school of thought has implications for disaster studies, contributing to the destabilisation of the term 'natural' disaster and pointing to a focus on the political and economic processes which underlie disasters (O'Keefe, Westgate & Wisner, 1976; Hewitt, 1983; Watts, 1983). While the concept of 'no natural disasters' gained currency amongst scholars, particular events brought it to wider attention, notably Neil Smith's article '*There is no such thing as a natural disaster'*, published shortly after Hurricane Katrina (Smith, 2006) – an event which indelibly highlighted the importance of factors such as poverty, inequality and mismanagement in disaster outcomes (Davis, 2019). In Disaster Risk Management policy today, the notion that disasters result from a combination of both hazard and political and social factors is much more widely accepted, such as in the United Nations Office for Disaster Risk Reduction (UNISDR) definition of a disaster, updated in 2017[14] (UNISDR, 2009). In 2020, Mami Mizutori, the UN Special Representative of the Secretary-General for Disaster Risk Reduction wrote an article advocating that it is time to say goodbye to the term 'natural disasters'[15]. However, across the wider disasters literature, the term is still often used (Chmutina & von Meding, 2019), and some have noted that at a national policy

[14] The UNISDR terminology on disasters was published in a 2009 report, and updated online in 2017 following the Sendai Framework for Disaster Risk Reduction 2015-2030.
[15] The blog, 'TIME TO SAY GOODBYE TO "NATURAL" DISASTERS' was pubished online at PreventionWeb during a social media campaign, #NoNaturalDisasters: https://www.preventionweb.net/blog/time-say-goodbye-natural-disasters

level this is even more the case (Briceño, 2015). Moreover, even where there is convergence in the language of DRM, actors can understand risk reduction in different ways which do not always fully recognise the root causes of vulnerability (Bankoff & Hilhorst, 2009; Blaikie, Cannon, Davis & Wisner, 2004). This is particularly relevant to DRF because of the way in which the prediction component of DRF mechanisms brings the focus onto the hazard aspect of disasters – as is argued in this thesis – and whilst vulnerability and social factors are certainly considered, this often is a secondary concern to the hazard component of many DRF mechanisms.

In the 1990s the first generation of political ecology thought began to be broadened, adding to the Marxian influenced political economy of the environment Foucauldian ideas about regimes of truth and power (Watts, 2015). Watts attributes these shifts to several factors including cross-fertilization with other fields such as STS, the application of political ecology to developed country contexts and a perception that the role of power as it relates to the environment had so far been under-theorised in political ecology (ibid). Moreover, the shift towards Foucauldian ideas at this time also mirrored a wider 'cultural turn' across human geography (Barnett, 1998), which brought to the fore post-structuralist approaches which emphasised epistemology, the contingency of knowledge claims and the relationships between knowledge and power. As a result of these shifts, the idea of an 'environmental problem', unmediated by power and knowledge, became increasingly difficult to contemplate (Robbins & Bishop, 2008). Instead, socially mediated conceptions of the environment became prominent, such as Forsyth's 'politics of environmental epistemology' (Forsyth, 2008) or Agarwal's 'environmentality' (Agrawal, 2005).

This characteristic of second-generation political ecology provides a point of connection between political ecology literature and STS. For example, the focus on the political life of science and scientific work led to debates around 'environmental epistemology'. Such analyses raised important questions about the way in which academics and policymakers 'go about explaining things, and the way in which "management" and technologies of academic explanation can actually erase and reproduce, rather than address, fundamental problems' (Robbins & Bishop, 2008: 754). As Stott and Sullivan put it, this new concern for epistemology is also applied through a 'concern with tracing the genealogy of narratives concerning 'the environment', and with identifying the power relationships supported by such narratives' (Stott & Sullivan, 2000: 2).

Such reflections on the role of science also provide a point of connection with critical disaster studies, in particular those which explore the roles of expert knowledges, value systems and power in understanding disasters. For example, Foucauldian analyses have been applied to unpick how certain policy narratives operate as a means of control, such as those around 'resilience' (Grove, 2013) and 'vulnerability' (Gaillard, 2010). However, while there has been significant work about the application of knowledge within the disasters literature, much less of this has focussed on how knowledge and power structures can coalesce, especially in the context of expert advice in disaster contexts (Donovan, 2019). There is some work which critiques apolitical framings of disaster risk management, such as Hewitt's (1983) critique of the enclosure system brought about by the 'language of risk assessment' within DRM. However, this example does not draw from Foucauldian analysis and predates the wider uptake of Foucault's work within social science scholarship and political ecology. Nonetheless, there is room for further convergence here between political ecology and critical disaster studies, bringing a more power-sensitive analytical lens to knowledge in DRM.

Moreover, the Foucauldian turn in contemporary political ecology led not just to a focus on knowledge and narratives about the environment, but led to the adoption of Foucauldian ideas about governmentality, biopower and biopolitics. These arguments extend the concept of knowledge and power as a system of control and extend this to analyses of power and governmentality. Examples in the political ecology literature focus on environmental discourses, such as climate resilience and adaptation, whereby policy interventions focus on 'living with' challenges caused by climate change rather than positioning climate change as an example of the non-viability of current socio-economic systems of production (Watts, 2015). In the case of adaptation, and its cognates of resilience and risk management, biopolitics articulates the way these processes function as apparatuses of security and governance through what Michael Watts calls the 'distinctively modern theory of life as a complex adaptive system' (ibid:40). Grove, together with Watts and others such as Duffield, argue that terminologies such as risk management and resilience produce a depoliticised landscape of coping and adaptive capacities, where people 'live with vulnerability' instead of being able to reduce sources of vulnerability (Grove, 2014), and should be placed on the larger canvas of modern forms of biopower. This echoes the arguments made in the risk governance literature about governing through risk, and how such an approach does not seek to eliminate danger, but to manage it (Aradau et al., 2008).

Insurance has often been a focal point for critical analyses of climate adaptation strategies as an example of biopolitical power. For example, Grove has written about catastrophe insurance in climate adaptation programming, building on the argument that resilience is 'a technique of cultural socio-ecological engineering that often produces a thoroughly depoliticized and de-potentialized landscape of vulnerability' (Grove, 2014: 206). Johnson has also described the use of catastrophe bonds in financial markets as a new entanglement

between the commodification of nature on the one hand and on the other, the financialisation of biopolitical rule (Johnson, 2013a). Lobo-Guerrero has explored insurance in the context of climate change as a securitizing imaginary for bringing the global South into line with a 'Western financial capitalist rationality of governance' (Lobo-Guerrero, 2010: 239). Similarly, in work by Jagers, Paterson and Stripple they describe insurance as a form of governance which renders the complex process of climate change into calculable risks with political effects, differentiating subjects into those deemed 'safe' and 'risky' through a process they term 'triage' (Jagers, Paterson & Stripple, 2005).

Indeed, in the wider financial geography literature there is an emerging strand of research on risk and climate finance, where once again risk and insurance are often a common theme. Articles in this strand of research trace some of the emerging experiments with climate finance provision, such as the Green Climate Fund, green bonds, and insurance-based derivatives, and how risk is being increasingly used as a calculative common denominator (Bracking, 2019). Christophers (2016) employs value theory – the study of that which makes commodities exchangeable - in examining the political economy of nature around tools such as catastrophe bonds and index-based insurance. He similarly argues that risk is the key to creating value in climate finance and related commodities, concluding that 'value comes ineluctably into play when risk, or the uncertainty of the future, is commodified as exchangeable financial risk' (ibid: 347).

Once again, therefore, risk and insurance in the context of climate change, have proved to be a particularly generative space. They span from theorisations of political ecology that are strongly connected to Marxian analyses of the geographies of nature, environment and society, as well as financial geographies and a literature on the biopolitics of risk and security,

connected more closely to security studies and risk governance. A similar connection is made in the editorial to a special issue on risk and nature, which I reference in the section previously about risk governance, where Baldwin and Stanley (2013) sketch out some of the similarities, differences and potential for reading across different scholarly traditions to explore how risk shapes the political ecology of the environment. They argue that rethinking geographies of nature and political ecology through risk will be an important strand of research for political ecology in the 21st century (ibid), and the convergence between climate, financialization, insurance and risk seems to be a key space for such debates.

Once more, there is a sense of going 'there and back again', however, as some writers question the extent to which Foucauldian theorisations have extended into political ecology, asking if this has occurred at the expense of the ecology in political ecology. For example, Walker argues that the field risks becoming a 'social science/humanities study of environmental politics' as a result of the influence of poststructuralism, discursive politics and the focus on power and knowledge (2005: 73). There have been calls for a new field of critical physical geography which could combine the attention paid to relations of social power with a deep knowledge of physical science in the service of social and environmental progress (Lane, 2019; Lave, Biermann, & Lane, 2018; Lave et al., 2014). Others, such as Turner (2016), who revisited Walker's (2005) piece about the ecology in 'political ecology', have defended the field for its potential to engage with the biophysical world while integrating broader political-economic analysis, and cautioned that portrayals of political ecology as inhospitable to ecology could serve to weaken the scholarship in this area (Turner, 2016). Calls for more careful attention to be paid to integrated analyses seem to be more productive, such as Zimmerer and Basset who advise political ecologists to become expert weavers of analysis,

and to draw from both biological and geophysical sciences in ways which are 'well-informed rather than perfunctory' (Zimmerer & Bassett, 2003: 276).

A similar thread of argument is made in recent work in critical disaster studies, which has questioned the dominance of the social framing of disasters. This thinking argues that the focus on 'no natural disasters' discussed previously potentially replaces one form of determinism – that disasters are entirely 'natural' - with another, that disasters are entirely 'social' (Donovan, 2017; McGowran & Donovan, 2021). In so doing this potentially weakens and over-simplifies the engagement that critical disaster studies requires with the materiality of the environment, such as the very real challenge of providing scientific advice in the face an unfolding storm, flood or eruption, for example. Indeed, McGowran and Donovan identify the attention paid to the physical and material aspect of disasters as one of the important differences between a critical disaster studies lens and the security studies, emergency governance and biopolitical lens (McGowran & Donovan, 2021). As noted previously in Section 2.1, there is relatively little literature that charts the role of expert knowledge and epistemology relating to natural hazards, and Donovan calls for better acknowledgement of the importance of epistemology and diverse knowledges in DRM (Donovan, 2017). This involves a recognition of the social and political contexts of disasters, as well as an understanding of the science and its social aspects, which taken together would represent a more rigorously interdisciplinary approach. This would be productive for better engagement with the ecological in political ecology, the science in science and technology studies, and perhaps for the risk in risk governance, all of which are highly relevant for a productive analysis of DRF.

2.4 Theorising disaster risk financing: Generative potential for reading across literatures?

Finally, in this section I highlight and develop some of the connections between these three literatures and explain why reading them in combination with each other is necessary for this analysis of disaster risk financing. Although each of these literatures is diverse and draws on slightly different theoretical approaches, as I noted throughout each of the sections previously there are inter-connections between these literatures, which have also been recognised by other scholars.

For example, in the editorial referred to throughout the sections previously, '*Risky Natures, Natures of Risk'*, Baldwin and Stanley draw together sociological theories of risk with both Marxian and Foucauldian political ecology in order to make sense of how risk shapes the political ecology of the environment (Baldwin & Stanley, 2013). What they describe, as they put it, '…sits somewhere in between, on the one hand, a Marxist-inspired literature on the geography of nature... and, on the other, a burgeoning literature on the biopolitics of risk and security' (ibid:2). It is important to note that they do not claim to bridge the gap between these literatures, but instead draw out key points for the themes of risk and nature. In the series of essays in the special issue, the common theme running throughout the papers – many of which are referred to previously - was analysis of the entanglements between nature, risk and governance in ways that did not objectify or neutralise risk, but instead considered various practices of risk governance. In so doing, the authors sought to 'open up questions about risky nature and the nature of risk' (ibid: 3) into a range of themes: climate governance (Oels, 2013), catastrophe bonds and the financialization of disaster events (Johnson, 2013a), and biodiversity loss and ecosystems (Dempsey, 2013).

Another example which demonstrates the potential for such an interweaving is McGowran and Donovan's work introducing assemblage theory into disaster studies (2021). They note the potential for convergence between critical disaster studies, with its origin in studies of humanitarian practice and political ecology, and geographies of emergency and crisis governance, with its roots in political philosophy. Specifically, the former developed from Marxian political economy of the environment (although as explored previously, more recent political ecology has diversified theoretically), and the latter has its roots in Foucauldian theory. In this case, McGowran and Donovan note the differences between the two include the types of disaster events which tend to be studied, whereby disaster studies predominantly considers meteorological and geological hazards, whereas the latter tends to focus on political, state and security relevant debates. They also point to the difference in the temporal focus of analysis, specifically that political ecology-based studies analyse how political economy and environmental factors have shaped disasters that have already occurred, whereas studies of emergency and crisis governance focus instead on the governance of future emergencies (ibid).

To develop this further, other differences between these two bodies of literature also relate to how risk is conceptualised. For example, literatures grounded in political ecology tend to focus on the production of risk, drawing from the Marxian political economic framework of the dialectic between environment and society, whereby environmental risk is seen as the result of particular circuits of capital and socio-environmental interactions (Smith, 1984). On the other hand, risk governance literatures draw more often from a Foucauldian framing of risk as a knowledge practice through which governance decisions about the future are made and justified. For example, as noted previously, Dillon (2008) understands risk as an artefact, and an outcome of particular computational and discursive practices, around which people

make decisions. McGowran and Donovan (2021) see potential in bridging these literatures together through Assemblage Theory (AT). AT is a concept that has emerged within the 'relational turn' of human geography which concerns itself with processes of composition in socio-spatial studies, and which approaches issues such as agency and causality in a non-linear way (Anderson et al., 2012). AT has so far perhaps been most widely used in urban political ecology literature but has been usefully applied in analyses of urban disasters. One such example is an analysis of flooding in industrial areas of Thailand, where Marks demonstrates the embedded nature of both the socio-political and physical geographies, and shows how both elements contribute to the causality and governance of flooding (Marks, 2019). Theoretically, in McGowran and Donovan's work, they suggest that the 'flat ontology' of AT can bring together two epistemologically different fields, such as the root-cause analysis that is a strength of the political ecology literature, without resorting to determinism about disaster causality (McGowran & Donovan, 2021).

Other recent work takes a different approach, such as Oulahen's (2021) account of flood hazards in Toronto, which presents three different imaginaries of risk – including a Marxian account of the production of risk and a more Foucauldian take on governing through risk. Rather than reconciling these literatures, he uses the different imaginaries to weave together an account of flood risk as a socially reproduced artefact, which serves as an 'organizing point around which lopsided bets are made within the capitalist political economy' (ibid: 43). In a similar way as I set out to write this account, Oulahen acknowledges that the three imaginaries of risk are disparate, with different epistemologies, but that the lenses overlap, and reading the different accounts together is useful 'to interrogate the role of risk in society and the context that shapes the processes working in concert to reproduce risk' (ibid: 46).

2.4.1 Conceptual framework for understanding DRF

In this thesis I follow an approach similar to that of Oulahen (2021), noted previously, by drawing from different accounts of risk, specifically, the three different bodies of literature discussed here. I do not seek to integrate these literatures, which vary in their epistemologies, although they also have a lot in common, as discussed previously. Instead, I will bring different aspects of these literatures to different parts of the thesis, recognising that each body of literature has particular strengths analytically. They offer slightly different perspectives and accounts of risk and uncertainty, which allow me to theorise particular aspects of DRF. A summary of the different theorisations of risk and uncertainty as I have discussed them in this Literature Review is included in Figure 2 below, which taken together, forms my conceptual framework for understanding DRF.

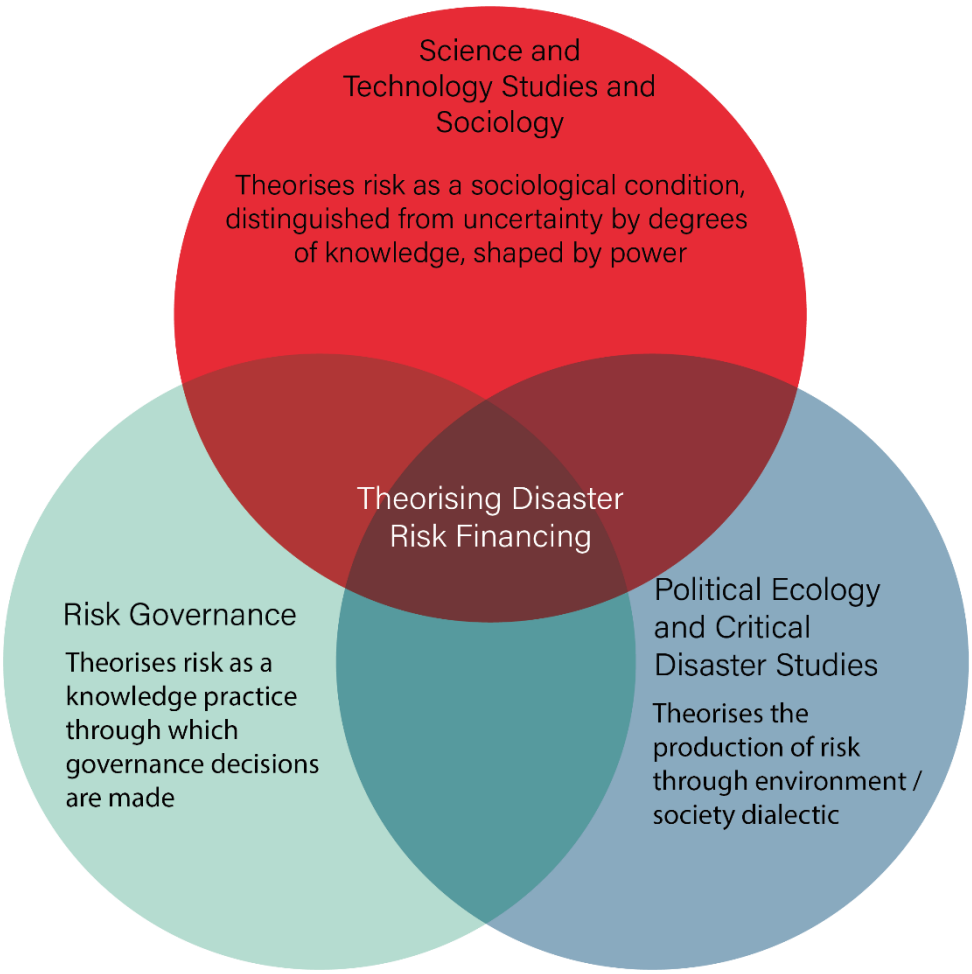

Figure 2- summarises the contribution of each of the three main groups of literature as presented in this chapter. Theorising DRF sits in the middle as requiring contributions from each.

In terms of how I use these perspectives throughout the thesis, literature from STS and Sociology is useful to position risk not as objective or as a state of danger, but as a sociological condition – which is to say it positions risk as a particular trait of modern society. What also sets STS literature apart is the theorisation of risk and uncertainty as determined by degrees of knowledge, but ultimately constrained and conditioned by power. This is particularly useful for discussions in Chapters 4 and 5, where I complicate and nuance the different conceptualisations of risk and uncertainty at play in DRF, question the dominant language of risk in DRF and the reasons for this association with the need for 'defensible' and 'credible' decision making through the 'political economy of liability' (Johnson, 2020).

Risk governance literature is essential for conceptualising how risk operates as a knowledge practice through which decisions are made and justified, and for understanding how this operates on the broader canvas of risk as a tool of modern biopolitical governance. I draw from this literature in particular in Chapter 6 '*Risk, Speculation and Contingency: The case of humanitarian risk pooling and disaster risk finance*'. The chapter takes off from the idea that risk provides a metric to make diverse hazards and crises amenable to the probability-based decision-making process required by risk pooling. I argue that this represents an extension of a more insurance-like, or 'transactional' logic into the humanitarian system.

Finally, political ecology and critical disaster studies is essential for understanding disaster events because of the way political ecology literature theorises the uneven production of risk through the environment and society dialectic. This puts the focus on understanding how hazards arise and how they interact with vulnerability and exposure to become socio-natural phenomena of disasters. Furthermore, emphasis on the importance of integrated analysis, and not jettisoning physical sciences also makes this body of literature invaluable for analysis of modelling and forecasting techniques as used within DRF, which is a focus of discussion in Chapter 5 '*Think like insurance companies'? The politics of risk and uncertainty in disaster risk financing'.* Finally, Foucauldian inspired political ecology critiques of adaptation thought which argue that discourses such as risk management and resilience should be understood as modern forms of biopower are highly relevant to Chapter 6, where I make a similar case that through risk pooling, DRF is extending a form of biopolitical decision-making into the humanitarian sector.

In summary, the new financial mechanisms being developed in the context of climate change and financial pressures on the humanitarian system seem to operate as a convergence zone

for analyses about the nature of risk. Insurance has long been a site of academic interest that brings together, on the one hand, Foucauldian analyses of governing the future (Ewald, 1991; Grove, 2014; Jagers et al., 2005; Lobo-Guerrero, 2010a, 2010b), with Marxian accounts of financialization on the other (Grove, 2012; Johnson, 2013a). In terms of the literature drawn upon in this thesis, STS and sociology literature are indispensable for reminding us about the complexity and indeterminacy of scientific knowledges as they are applied in modelling and research within DRF, and of the importance and inescapability of uncertainty. Moreover, political ecology and critical disaster studies literature is needed to ground the discussion in a recognition that risk in the environment is not random, and that disasters are phenomena that result from hazards coming together with vulnerable and exposed populations. As such, the analysis of DRF in this thesis requires engagement with a diverse group of literatures that can span these issues to make sense of the nature of risk and uncertainty, hazard and disaster in a context of humanitarian and development policy and decision-making.

3. Methodology

3. 1 Summary of methods

I conducted this research between May 2018 and Summer 2021, with a period of more intense data collection between May 2018 and December 2019, based on a qualitative mixed-methods approach which included the following components:

- 27 semi-structured interviews with experts and elites in the DRF sector, identified by a purposive sampling strategy during pilot interviews, through a snowball sampling strategy during the middle phase, and then finally a short purposive sampling period at the end to ensure coverage of key actors. Interviews were fully transcribed and then analysed using NVivo-QSR, a qualitative data analysis package. I further reflect on the rationale for this approach in Section 3.2, and the interview process in Section 3.3.1. I discuss ethics, positionality and anonymity issues in Section 3.4. Details of interviews conducted, and the organisations represented in the interview sample are included in Table 3.
- Participant observation at 5 key multi-day conference events. These included:
  - The Red Cross Global Dialogue Platform for Forecast-based Financing, and later Anticipatory Humanitarian Action in Berlin in 2018, 2019 and virtually in 2020[16]
  - GFDRR Understanding Risk conference in Mexico City, in May 2018
  - UN Global Platform for Disaster Risk Reduction in Geneva, in May 2019
  - UNFCCC Conference of the parties in Madrid, in December 2019

[16] I also attended the Red Cross Global Dialogue Platform for Forecast-based Financing in October 2017, in a professional capacity, prior to commencing this PhD. Given this was prior to starting my PhD I do not include it within the conference events attended for data collection, but it did provide useful background information and context.

I participated in 2 further multi-day virtual conferences held during 2020 and 2021, the Red Cross Virtual Global Dialogue Platform for Anticipatory Humanitarian Action and the Insurance Development Forum Virtual Summit in June 2021. I also attended numerous relevant webinars and stand-alone sessions throughout the period of data collection. I further reflect on the contribution of participant observation as a component of my methodology in Section 3.3.3. A full list of conference events attended for participant observation, and a list of individual sessions and activities included is detailed in Annex 1.

- Close reading and textual analysis of key policy documents, such as board papers and speeches in the area of DRF. I cite many policy documents throughout this thesis, but I conducted more focussed analysis on a small number of documents, which are particularly significant for analysis, using NVivo-QSR where relevant. The rationale for selecting these documents is discussed in Section 3.3.3. A full list of documents analysed is included in Annex 2.

In the following, Section 3.2, I explain the overall research design and rationale for the approach I took, and then discuss each component of my methodology in turn in Section 3.3, followed by reflections on ethics and positionality in Section 3.4.

3.2 Research design and methodological approach

The methodology was designed to enable me to answer my research questions. Throughout, my research has been characterised by an iterative approach, and each component of the methodology is applicable for each of my Research Questions. However, in Table 1 below, I map my research questions to the components which were most pertinent to answering specific questions and sub-questions, which are numbered by order of relevance.

Research Questions	Relevant methodology (in order)
1) How can we critically understand the policy landscape of DRF? 1a) What were the key moments, policy narratives and actors which drove the emergence of DRF? 1b) How is DRF defined, and why do the definitions commonly used differ? 1c) What are the main tensions in DRF as a policy landscape?	1. Semi-structured interviews 2. Participant observation at key conferences 3. Close reading and textual analysis of key policy documents
2) How does the politics of risk and uncertainty influence DRF? 2a) How are concerns about liability and justifying decisions made based on risk information expressed in DRF? 2b) How are DRF mechanisms and the policy landscape shaped by such concerns? 2c) How can we understand the role of risk and uncertainty in DRF in a more nuanced way?	1. Semi-structured interviews 2. Close reading and textual analysis of key policy documents 3. Participant observation at key conferences
3) How is risk operationalised as a particular logic for decision-making, and what are the implications of this? 3a) How will humanitarian risk pools operate and how are they linked to existing mechanisms developed under DRF? 3b) How does risk operate as a calculative logic within risk pooling? 3c) What are the implications of 'acting based on risk' for decision-making in humanitarian funds?	1. Close reading and textual analysis of key policy documents 2. Semi-structured interviews 3. Participant observation at key conferences

Table 2 - Table of research questions and the most relevant methodologies for answering these questions.

Given the nature of these objectives, a qualitative approach was highly appropriate. I chose to conduct interviews as the principal methodology because of the richness provided by interview data and because of the level of complexity of interview topics would have ruled out other qualitative methods like surveys. I then supplemented this with participant observation at conferences and analysis of policy documents. Attending conferences also enabled me to approach more potential interview participants and to network, so this was a mutually supporting approach. Finally, I chose to use desk-based analysis of policy literature as a third supporting methodology because early research showed there was a huge variety of briefs, speeches, conference reports and other policy literature relating to the emerging

sector of DRF which would be particularly useful to make sense of Research Question 1 about the emerging policy landscape and to triangulate interview findings and observations from my participation at conferences and events.

Ontologically, this research adopts a critical realist stance, an approach which does not subscribe to the truth claims of positivist approaches, whilst also recognising that not everything is a construct. Critical realism, developed in particular by Bhaskar (2008), has been applied in many fields of the social sciences and in particular has been drawn from by political ecologists who seek to marry both environmental and physical sciences with critical perspectives (Forsyth, 2001; Forsyth, 2008). Critical realism is particularly relevant to the study of disasters, which are 'natural' events, but which are also socially, culturally and politically mediated. As McGowran and Donovan (2021) explain, disasters are neither entirely natural nor entirely social, and as such, a critical realist ontology is particularly useful in this context.

In terms of positionality, a significant part of my research design was also influenced by my job as a project manager of a research consortium conducting research relevant to FbF throughout the period of this research. I worked part time alongside my PhD as the project manager of 'ForPAc: Towards Forecast-based Preparedness Action' between March 2017 and December 2020. 'ForPAc' was one of the four research consortia funded by the DFID-NERC-ESRC 'Science for Humanitarian Emergencies and Resilience' (SHEAR) programme, who also funded this doctoral research through the SHEAR Studentship Cohort. This role gave me particular insights into the sector and allowed me to take a 'semi-embedded' approach to my research.

Specifically, the SHEAR research programme, alongside a range of other research and consultancy initiatives was one of the ways the UK supported scoping and research of the wider risk financing landscape. The SHEAR Business Case report, written by DFID at the outset of the SHEAR programme, targets 'greater and more effective investment in disaster resilience and earlier action to respond to imminent natural hazards', and makes the case for leveraging UK research expertise to do this (DFID, 2016). The SHEAR programme as a whole included four main research consortia, two of which worked broadly on Forecast-based Action and included partnerships with humanitarian agencies including the Red Cross Red Crescent Climate Centre – who were a project partner involved in 'ForPAc' - along with other links to the private sector including insurance and catastrophe modelling organisations. Thus, although my role was based within one particular research consortia, I was also part of a wider programme which included many sub-projects and partner organisations with links across the DRF sector, including risk financing specific projects and those working with the private sector.

As a result, I had some unique insights into the evolution of the risk financing landscape, and my positionality had a significant bearing on being able to access key participants for interviews as well as insights into some conference proceedings, such as involvement facilitating some conference events and sessions. This also particularly strengthened the case for using interviews as a primary methodology, because although this role had an impact on my positionality, I felt I was a strong position to access key individuals for interviews, as well as events and conferences that might have been more difficult to access otherwise.

Of course, such embedded research moves away from traditional understandings of fieldwork, as objective observation, towards a messier but perhaps more interesting reality of: 'embedded, collaborative and collectively reflexive research' (Lewis & Russell, 2011: 411).

This posed a number of challenges and opportunities which I will discuss further in the following sections, where I consider all aspects of my research as a process, including the practical, strategic, ethical and personal considerations - which are all integral to my research and not apart from doing the 'research itself' (Katz, 1994).

In part as a result of my embedded approach, my research process as a whole was gradual, and this was inspired by a grounded theory approach (Glaser & Strauss, 1967). Grounded theory is a systematic yet flexible methodology, characterised by an iterative approach where the researcher is involved in a continuous process of data collection and analysis, and seeks to pull out themes, codes and analysis from the data itself rather than pre-existing hypotheses (ibid). There are various debates about quality control and how best to achieve a grounded theory approach (Charmaz, 2006), however the characteristics around an iterative, data-driven approach are largely seen as defining and were certainly important to shaping my research process, as the methodological approach of grounded theory combined and supported with my 'embedded' approach and the particular analytical tools I adopted.

Figure 3 further lays out how the methodological design and research process unfolded, defined by different phases of conducting interviews, data analysis, the identification of key themes and eventually, the formulation of my conceptual framework and the main chapters of the thesis. Figure 3, which I have adapted from Hutchison, Johnston & Breckon's paper discussing the use of NVivo-QSR for qualitative research based on grounded theory, captures the phased but iterative process of my research (Hutchison, Johnston & Breckon, 2009).

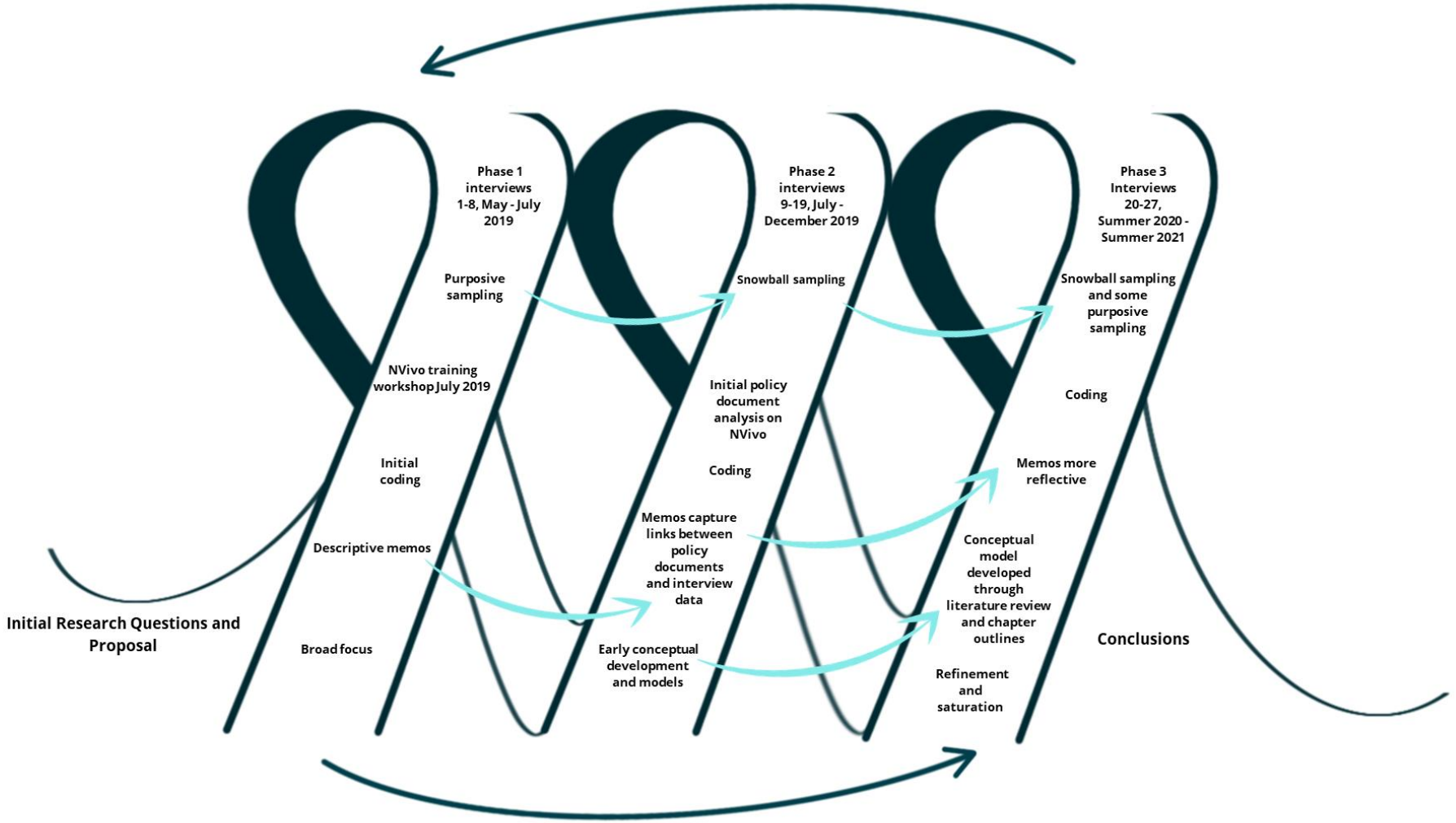

Figure 3 - Illustration of my research process through stages of research design, data collection & analysis, adapted from Hutchinson et al. (2009), who demonstrate the iterative process of grounded theory research design.

3.3 Embedded research and defining 'the field'

The anthropologist Clifford Geertz wrote in his work on ethnography that when we do field research, we enter an imaginary space of the field as somewhere separate, distinct and marked off from our everyday life (1979). As such, many argue that conducting fieldwork relies to some degree on displacing ourselves to distinguish and differentiate what we are studying (Katz, 1994). This research does not make any claims as to being an ethnography, but it is useful to reflect on 'fieldwork' as a space and a process. In my case, this research was conducted in an embedded way from a role within a wider research network relevant to DRF, through interviews with experts and elites, attending key events and conferences and analysing key documents over the course of a 2 ½ year period. In the case of an embedded piece of critical policy analysis such as this, the boundaries of what constitutes 'the field' were always blurry: I was always working and researching in an 'in-between' space (Rowley, 2014), between a role within the wider SHEAR research programme and my individual PhD project. In this section I discuss 'the field' as I conceptualised it during this research and discuss in particular how I decided upon the boundaries and scope of the data collection methods I used.

3.3.1 Interviews

Semi-structured interviews provided the backbone of my data collection process. As noted previously, my approach combined purposive with snowball sampling as a strategy. This maximised the opportunities I had from within the SHEAR programme to use my network to conduct initial interviews with individuals who were particularly involved in anticipatory action and risk financing, and to snowball from there, while purposive sampling in the latter stages of data collection helped me to ensure representation of key agencies. The people I

interviewed most were middle to senior managers in various organisations, with around 5-15 years of experience in the field. They were all what would be regarded as experts in their relevant fields, spanning humanitarian practitioners to actuaries and climate scientists, all working within the DRF space. As Littig argues, interviewing experts and elites presents very similar challenges to the interviewer, both in terms of access as well as the preparation required on the part of the interviewer (Littig, 2009). I therefore use both the term expert and elite when referring to such interviews interchangeably. I used the conferences I attended as a platform to meet potential interviewees face to face, and I conducted a number of interviews in person during these events. I also found having met in person first resulted in a much higher response rate to requests for interviews, even where I was being introduced by a 'gatekeeper'. In such cases I then conducted interviews over the phone or online shortly after the conference, initially using web-based platforms such as Skype and then moving to Microsoft Teams from 2020 onwards.

I had originally envisioned doing more interviews in my research proposal. However, a number of factors influenced the resulting interview sample size. Firstly, the DRF 'policy landscape' is complex but relatively small in terms of the numbers of people with relevant expertise. For anonymity reasons I further explain in Section 3.4 I chose not to give job titles for individual interviewees, but I have given non-identifiable examples of the job titles held by participants at the time of interview for each category of interviewee in Table 3, below. My interview sample included people in roles such as Senior Desk Officers, Technical Leads and Senior Consultants, and also included some more senior individuals including the directors of relevant organisations. As such, my interviews were intentionally conducted with people who had some strategic overview across the field as a whole but who were still involved in operational work to some extent. This necessarily results in a relatively small pool

of potential interviewees across the area as a whole, and I would estimate I spoke to between ¼ and ½ of the key individuals present at DRF conferences between 2017 and 2020.

My participants were also busy professionals, who were often quite difficult to access without 'gatekeepers' or networking at conferences, and even then, I noted that certain organisations would ration their time so that small teams would nominate only one person to speak with me. In such cases I ensured those agencies were represented in the interview sample but it was unfortunate I couldn't speak to more than one person to triangulate their responses. Finally, the Covid-19 pandemic did have an impact in curtailing conference events where I would have had an opportunity to further snowball. However, in other ways I was fortunate to be trying to access a community well versed in online conferencing and calls and I was able to conduct some final interviews during this time. I discuss this further in Section 3.5.

In order to determine that I had done sufficient interviews to answer my research questions, I applied the grounded theory concept of 'saturation', which means finding the same themes again and again in analysed data (Glaser & Strauss, 1967). It can be difficult to ascertain when saturation has been reached, especially for researchers who collect data in one intensive period for later analysis. However, a strength of my embedded and iterative approach was that I did not have one defined 'fieldwork' phase, so that I was able to analyse my data gradually, while transcribing and coding interviews throughout the main data collection period. I found I reached saturation on the key themes of my research questions when interviewing the 'core group' of DRF practitioners: in particular relating to Research Questions 1 and 2, which both relied most heavily on interview data. Setting the scope and boundaries of the interviews conducted for this research was never straight-forward. However, analysis of the resultant data, combined with the quality of interviews I conducted and reflection

about the pool of potential participants enables me to conclude that the interview sample here has sufficient depth to answer my research questions.

In terms of analysis of interview and other data, I used NVivo-QSR as a platform, because it is well-suited to a grounded theory approach, enabling connections to be made between 'thick' description in qualitative data and the development of explanatory models and theory, as well as providing tools for iterative study such as through coding (Bringer et al. 2016; Hutchison et al. 2009). Throughout my research, interviews were transcribed following an 'intelligent' or 'smooth' verbatim, which means capturing the words spoken by participants with no re-phrasing, including corrections, repetitions and some, but not all, filler words. In interview quotes included throughout this thesis I use the original phraseology of my participants, maintaining small grammatical errors of natural speech. I uploaded transcripts along with notes taken from conferences and the documents selected for close analysis onto NVivo, which I began thematically coding as my research developed, writing memos as I did this. This allowed me to begin to develop themes and links between key policy documents and interview data, for example. By the time I was conducting the final phase of interviews from Summer of 2020 into Summer 2021 I was developing the chapter outline and literature review structure, which helped lead to the development of my conceptual framework, and eventually enabled me to conclude that I had reached saturation from my interview data. This process is sketched out in more detail in the iterative research process diagram above, included in Figure 3.

Repeats	Interview #	Gender	Description in data	Organisations represented in sample	Example Job Titles
N	1	F	Humanitarian practitioner	FAO; WFP; IFRC; The START Network; Red Cross Red Crescent Climate Centre	Crisis Anticipation Adviser Senior Officer Global Coordinator FbF
Y	2	F	Humanitarian practitioner		
N	3	F	Humanitarian practitioner		
N	5	F	Humanitarian practitioner		
N	9	M	Humanitarian practitioner		
N	11	F	Humanitarian practitioner		
Y	17	F	Humanitarian practitioner		
N	21	F	Humanitarian practitioner		
Y	23	F	Humanitarian practitioner		
Y	26	F	Humanitarian practitioner		
N	10	F	Catastrophe /risk modeller	World Bank; Private Consultants; Oasis Loss Modelling Framework	Financial Sector Specialist
N	12	M	Catastrophe /risk modeller		
N	13	F	Catastrophe /risk modeller		
N	20	M	Catastrophe /risk modeller		
N	6	F	Donor	FCDO; German Federal Foreign Office; UN OCHA	Humanitarian Affairs Officer Senior Desk Officer
N	16	M	Donor		
N	18	M	Donor		
N	4	M	Donor		
N	14	M	DRF Expert	World Bank; Centre for Disaster Protection; START Network	Technical Lead on Crisis Anticipation and Risk Financing Consultant
N	15	F	DRF Expert		
N	22	F	DRF Expert		
N	7	M	DRF Expert		
N	8	F	DRF Expert		
N	19	M	Researcher	IFRC; German Red Cross; University of Reading	Manager Adviser for Policy and Advocacy
N	24	F	Researcher		
N	25	F	Researcher		
N	27	F	Researcher		

Table 3 - Table of interviews, ordered by descriptor of interview type, with examples of organisations included in sample and job titles. Note that all other materials relevant to the methodology, such as the Table of conferences and events I attended, as well as consent and participant information sheets, are included in the Annexes (1, 4 and 5 respectively).

3.3.2 Participant observation

Attending and conducting participant observation at key forums and conferences was the second pillar of my methodology. Participant observation at events is a methodology that has been used across anthropology, international relations and environmental politics to study themes ranging from biodiversity and conservation (Campbell et al. 2014) to sustainable development and climate governance (Death, 2011). Although the outcomes of such meetings are often intangible, the processes through which such outcomes are achieved is of interest. As Campbell et al. write, conferences events represent moments when diverse actors come together to produce policy: 'through decisions, interpersonal relationships, information exchange' (2014: 13). It is these processes and dynamics which I sought to study in the case of DRF. In this section I describe how I selected which conferences to attend, how different events and conferences contributed to my understanding of DRF and my research questions, and how I understood and employed participant observation techniques within my broader methodological approach.

I identified what I thought would be the most relevant events based on a combination of my experience, desk-based research and understanding gained from the interviews I was conducting. For example, I had attended one of the 'Dialogue Platform' events on Forecast based Financing in 2017 prior to beginning my PhD research through my project management role, and so I knew that it would be a key event to attend in the future. However, assessing this with other conference events was less straight-forward, in part because side-events and sessions are not usually made public before I had to register for attendance. Instead, I opted for attending a range of events that would allow me to understand how DRF was being seen from different perspectives: for example, the Global Platform for Disaster Risk Reduction

conference is an event that includes all of the traditional 'Disaster Risk Reduction' actors. It was useful to understand how DRF was understood by this constituency, or more notably, to see how the characters I was familiar with in the DRF world explained the concept to a more traditional audience of donors and disaster management agencies. In contrast, I was surprised at how DRF featured during the UNFCCC CoP 25 in Madrid in 2019. I had expected there to be a number of relevant side-events hosted by the key advocates of DRF. Instead, I was initially disappointed to see that DRF did not seem to feature during side event and similar forum sessions at all, but I found a completely unexpected source of discussion about DRF, as insurance and risk transfer mechanisms became a 'hot' topic during the Warsaw International Mechanism negotiations for Loss and Damage at COP 25[17]. During these negotiations, several countries sought to use the example of funding provided through channels such as the InsuResilience Programme as evidence for not needing 'new and additional finance' and instead argued for scaling up existing pathways for financing. I wrote in my diary at the time:

> *The article published this week in the New Humanitarian by Action Aid's Harjeet Singh argues that this CoP in particular should be relevant for humanitarians - "What we call loss and damage in climate parlance is nothing but humanitarian situations that are being created by climate change… In fact, this particular COP is largely for the humanitarian community."*
>
> *Hurricane Dorian also shows this – although this is not effectively pushed back on during negotiations: CCRIF paid out very quickly to the Bahamas after Hurricane Dorian, but the amount was pitiful in comparison to the estimated costs of damages.*
>
> *In the negotiations the links between development, humanitarian, DRR and climate is shifting all the time – where are DRF measures falling?*

Figure 4 - Extract from my research diary at COP 25 in Madrid, December 2019.

[17] The situation was very different during CoP 26 in Glasgow, in November 2021. The UK Pavilion hosted several side-events about risk financing, anticipation and insurance, which I attended virtually, and for which session recordings are still publicly available. These events are listed in Annex 1.

Finally, in terms of my approach to participant observation as a research methodology, I adopted a 'semi-covert' approach, whereby I disclosed my role as a PhD researcher working on DRF to other conference attendees but did not ask attendees to sign consent sheets or gain explicit informed consent. This was for several reasons. Firstly, the sessions were public events, and secondly, it was rarely practical to ask for consent from attendees at live events and meetings. As Lewis and Russell write in their reflections on ethnographic embedded research, it is not usually practical to gain consent (2011) at fast-paced events, especially when they vary in terms of numbers of participants. I was also not taking audio recordings of side events and Q&As because the quality would be too poor to transcribe. Instead, I took notes of general discussions, interactions, references to projects or developments I should look up and took photographs of presentations, and used these insights to guide my research, to develop analytical themes and to follow up in interviews. I did record key-note speeches at the events I attended, and I used post-conference reports to collect information, quotes and conclusions that are available in the public domain, and which I could then cite. Where I quote from participant observation at conferences in this thesis, this is from these sources, or from when online events and webinars have been recorded by the event organisers and are therefore in the public domain – they are referenced as such in these circumstances[18].

I also benefited from being able to actively participate in presentations and 'serious games' during my in-person attendance at several conferences. For example, during the 2018 Understanding Risk conference I participated in a Red Cross side-event where they organised

[18] It was interesting to note that in the latter parts of 2021 when I attended virtual events, recordings and copies of presentation slides were made publicly available after the events had finished. This seemed to be a feature of the move to online events, and although I missed the human interaction and discussion after formalities had ended that is typical of in-person events, this formalisation of events actually puts information more firmly in the public domain than was the norm in this sector prior to the pandemic. Some particular events where this was done were very useful, and quotes are cited from such recordings in particular in Chapter 6. Where I do this I provide a link to the public recording and a timestamp for particular quotes.

a collaborative game, called ‘Early Warning for Early Action: Forewarned and Forearmed’, where participants had to implement FbF actions for an imaginary village (further details about this event and resources are provided in Annexe 1). Later in 2018 I co-led a SHEAR research session at the 2018 ‘Global Dialogue Platform for FbF’ where we asked participants to construct a ‘living timeline’ of the moments they thought were most important in encouraging the humanitarian community to shift towards a more anticipatory approach. Once again, I took notes and photographs of my interactions in these activities, and they all fed into the wider picture of risk financing that I was assembling. As Lewis and Russell write, even when ‘hard data’ cannot be collected: ‘interactions in a meeting or other research encounters cannot be expunged from the research imagination and go on to inform all future research encounters’ (Lewis & Russel, 2011: 409).

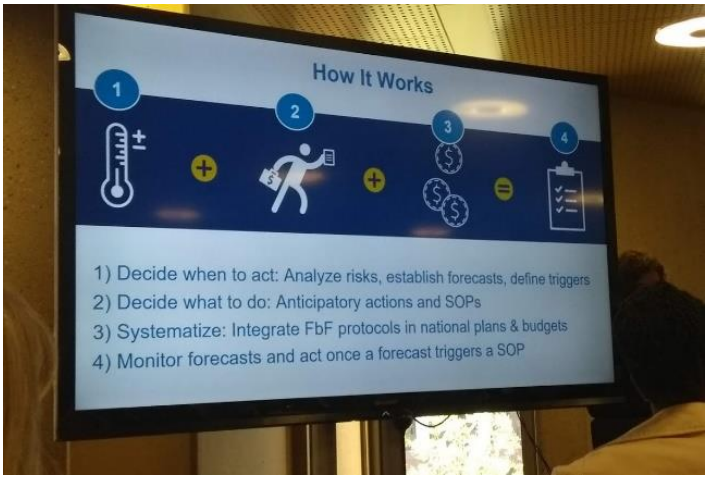

Figure 5 (Clockwise from top left to bottom right) A) Playing the 'Early Warning for Early Action: Forewarned and Forearmed' serious game at Understanding Risk, May 2018. Participants were asked to wear party hats to create a more 'informal' atmosphere; B) Facilitating a SHEAR live 'timelining' session at the Dialogue Platform event October 2018, I am in the background speaking with participants (©German Red Cross); C) The closing session image provided by an illustrator at the Global Dialogue Platform for Anticipatory Humanitarian Action, in Berlin, December 2019; D) A photograph of a DRF presentation at the 2019 Global Platform for DRR conference 'Cracking the Nut' session, in Geneva, May 2019.

3.3.3 Policy Document Analysis

Throughout this thesis I draw from a wide range of policy material, but I also focussed analysis on a smaller sub-section of policy documents, in particular in support of Research Question 3. It is fortunate that DRF is a well-documented policy area, and there was a wide array of policy documents, reports, books and speeches from which I could draw. I analysed four documents using NVivo to code thematically, including two speeches from Mark Lowcock – the Under Secretary General for Humanitarian Affairs - along with the two main quantitative analysis reports into risk pooling for the START Network and the IFRC, which I draw from closely in Chapter 6.

Document	Document Type	Analysis
Mark Lowcock Casement Lecture 'A Casement Lecture: Towards a Better System for Humanitarian Financing' – March 2018	UN OCHA policy speech	Nvivo textual analysis
Mark Lowcock LSE Speech 'Anticipation saves lives: How data and innovative financing can help improve the world's response to humanitarian crises' - December 2019	UN OCHA policy speech	Nvivo textual analysis
Clarke, D. J., & Dercon, S. (2016). Dull Disasters? How planning ahead will make a difference. Oxford University Press.	Book, published with financial support from DFID's Humanitarian Innovation and Evidence Programme and the GFDRR	Close reading
START Network (2019) START Financing Facility Board Paper	Organisational policy paper	Nvivo textual analysis
UK Government Actuaries Department (2020) START Network Quantitative Report	Quantitative report commissioned by START Network	Nvivo textual analysis
Meenan et al. (2019) DRF Toolkit Report	GIZ/ RMS Policy paper	Close reading
UK Government Actuaries Department (2021) Financing the Forecast-based Financing Early Action Protocols	IFRC commissioned policy paper	Nvivo textual analysis

Table 4 - Table of policy documents analysed in this research, and the type of analysis conducted.

These particular documents were selected for a number of reasons. Firstly, the speeches lend themselves well to textual analysis, and variations of discourse analysis of speeches have long been practiced as a research method in political science and policy studies. This is because speeches are: 'carefully-planned, 'communications events' whose contents will have been analysed to ensure that the 'right words' are used the 'right' number of times and 'resonate' (appeal) to the target audiences' (Pierce, 2008: 5) and as such they can be particularly useful for analysis. The speeches I analysed symbolise the direction of travel and policy objectives for the UN Office for Coordination of Humanitarian Affairs, and they are very significant actors within both the UN and the humanitarian sector as a whole, as they are one of the biggest single sources of humanitarian financing. Therefore, I felt that these two documents were particularly symbolic and important for understanding the framing of particular issues within DRF, for example relating to assertion of the need to make 'the money we have go further' (Lowcock, 2019: 2), which reflects a key logic for the sector and much of the tone of the policy narratives relating to efficiency. Finally, I also took care to notice what was not said, using simple methods such as word searches to identify key phrases, words and topics from interviews and in-person conferences events and to see if language is used within these policy documents.

The latter two documents selected for in-depth textual analysis were both quantitative reports outlining proposals and practicalities for risk pooling arrangements and were selected because they were the most detailed source of information for Research Question 3 regarding risk pooling. There are other policy documents relating to risk pooling, for example START Network also published a board paper outlining their proposals, which was interesting in showing how they framed their proposals to donor audiences. However, the quantitative reports were particularly useful in showing how exactly the agencies were being advised in

terms of managing over-commitment levels and deciding upon back-stop options. They were also of interest because the two reports were authored by the same agency – the UK Government Actuary's Department – and therefore there was potential to directly compare and contrast how issues were framed and explained.

The final two documents I looked at were not coded on NVivo, but I did conduct a close reading of these and used them extensively in the empirical chapters. The book '*Dull Disasters'* (Clarke & Dercon, 2016) was particularly significant in framing the definition of DRF, and in the development of the wider landscape of DRF. I was asked by several participants if I had read the book, or it was referred to as evidence of the current financing system being too slow and fragmented, signalling its importance to participants in their understanding of the policy objectives of DRF. However, due to its length, it was not practical to conduct a full textual analysis including coding. The final document included for textual analysis was a policy report commissioned by German development assistance and titled the '*DRF toolkit'* (Meenan et al. 2019). This was included because it was used as a reference in the START Network Board Paper to explain the steps taken in a 'risk audit' process when establishing a DRF mechanism and I refer to this further in Chapters 5 and 6.

3.4 Ethical and positionality considerations

I applied for and gained ethical approval via the University of Sussex ethical review process, through the Social Sciences & Arts Research Ethics Committee for a qualitative study based around semi-structured expert and elite interviews, application number ER/OT52/3.

My ethical review application spanned a number of considerations including the number of participants, recruitment and the format and location of the main data-collection method, in

my case semi-structured interviews. I had planned from the outset to use key conference events for networking and snowballing interview participants, and then to conduct interviews either on the margins of these meetings or online in follow up. Because of this, I almost always had email correspondence with interview participants, and it was quite easy to share with them in advance of interviews a consent form (Annex 4) and a participant information sheet (Annexe 5), which I asked them to sign and scan / photograph, or sign in person. Given the style of interviews I was conducting which were friendly but professional, I was confident that I was gaining informed consent from participants. Indeed, my sample included a handful of researchers who questioned me about my research process. I followed a similar approach when attending conferences virtually post-Covid-19, approaching participants via email and sending participant and consent forms in advance.

In terms of confidentiality and anonymity, once transcribed I anonymised and de-identified transcripts, removing names and identifying terms from transcripts. This included references to fund names and organisations, and there are some places in interview quotes in the thesis where these details have been redacted. I numbered interview transcripts and kept a separate, password-protected spreadsheet with the identities, job titles and other relevant information for each interview. I followed research and data protection guidelines issued by the University of Sussex advising how to store and manage my data in line with General Data Protection Regulation (GDPR) guidelines[19]. My dataset only included names in the separate, password-protected spreadsheet, and all other data collected was adequate, relevant, limited and did not include information that GDPR guidelines identify as 'special category' data.

[19] University of Sussex research and data protection information and guidelines can be found here: https://www.sussex.ac.uk/ogs/policies/information/dpa/research-and-gdpr

Deciding how best to categorise and refer to interview participants in the thesis itself was more of a challenge. There were conflicting pressures here: on the one hand, the identity of interview participants is an indicator of their ability to speak knowledgably to the issues raised in interviews and of the quality and significance of my data sample. At the same time, anonymity and to go further, non-identifiability, of interview participants is an essential part of my research ethics. I therefore tried to find a balance by disclosing some of the expertise of research participants by giving broad categorisations of their field of knowledge, and some exemplar job titles for participants included in the interview list (Table 3), which have been separated from organisational affiliations in order to ensure the identity of participants is not identified by this information. This is necessary because DRF is a relatively small field, so even giving job titles and organisations would lead to interviewees being identifiable to those with knowledge of the field. Although this is a trade-off, it is the most acceptable way to communicate this information.

Selecting broad categories to describe participants was also a challenge because simply stating job titles and organisational affiliations would not necessarily be useful for explaining the background of participants. This is because DRF is bringing together such different sets of expertise. For example, a 'Technical officer' working for the IFRC is just as likely to be a climate scientist or qualitative researcher as they are to have a more traditional humanitarian background. Instead, I adopted the following terms to describe participants based on a broad determinant of their expertise and approach to the field: humanitarian practitioner, donor, DRF expert, researcher and catastrophe modeller. In practice these groupings are not neatly or easily defined. When it was not clear how to categorise participants, I asked them which of the categories they felt best described their expertise during the interview.

3.4.1 Reflections on research ethics and positionality

Beyond consent, confidentiality and ethical review processes there is a deeper discussion about positionality and my research process. Coming to this project from a doctoral position within a wider research programme in the DRF space, whilst working part time within this too, I had a hybrid position similar to embedded researcher or 'socially situated' researcher because of my knowledge about the subject material. As I describe previously in the discussion about my interviewing process, this approach both created opportunities and challenges, and certainly had a bearing on my positionality. In this section I discuss this, acknowledging the practical, strategic, ethical and personal considerations which are all integral to and not apart from doing the 'research itself' (Katz, 1994).

Firstly, in terms of my personal positionality as a young, female, white researcher, there were some interesting dynamics at play throughout this research. Some might assume that the policy context and high-level conferences I attended would lead to a bias towards male, senior interview participants and that this would impact on my sample and interactions during interviews. However, the opposite was in fact true, and my interview sample was dominated by women (circa 1/3 men, 2/3 women), in particular the category for 'humanitarian practitioners'. This may be associated with my own biases in terms of who I found it easier to approach and who was more likely to agree to be interviewed. However, the DRF sector as a whole is very unusual in the number of women in senior positions, in particular within some key agencies such as the IFRC and the Red Cross Red Crescent Climate Centre – whose senior staff are almost all women. It is also strongly international with many of the offices for major agencies based in large cities around the world. This internationalism further contributes to the diversity of those working in the sector.

Some of the more nuanced aspects of positionality relate to my role as a project manager within the research programme that funded my PhD, which had a significant bearing on my research. I started my PhD with a good network of contacts, and an awareness about the wider context within which disaster risk financing was developing. As Jensen and Glasmeier (2010) argue, socially situated knowledge can improve the rigour of research and improve policy relevance, and I believe this is the case here. However, inevitably these insights came with some biases, in my case leaning towards the UK funding context, and of the research contribution towards risk financing. This certainly had an impact on my sampling strategy – for example a snowballing strategy allowed me to interview people that may have been difficult to access, but it can make it difficult to get a diverse sample. In these cases the variety and diversity of a researcher's network is one of the determining factors in building a diverse sample when conducting a snowballing approach (Kirchherr & Charles, 2018). My own positionality within the research context becomes key again here, and many of my first interviews were conducted with practitioners working on Forecast-based Financing and UK-funded projects. However, over time I was able to diversify my interview sample by snowballing outwards from my initial pilot interviews, and using a purposive sampling strategy to fill any gaps and ensure representation of key agencies and perspectives. I must also recognise the privileged position from which I was able to gain access to high-level conferences, and the funding to attend.

There were further challenges in terms of how I interviewed colleagues and professional acquaintances that arose because of the 'in-betweenness' of the semi-embedded space I was in during my research (Rowley, 2014). While I was always open about my doctoral research, my interview questions required interrogating some of the assumptions and conventions held to in my professional role and highlighted the difference between this and my research

interests. Specifically, my professional role involved managing a climate-science based research project designed to support response planning within risk management agencies in Kenya (Mwangi et al., 2021; Taylor et al., 2020). In my PhD, however, I was questioning some of the assumed facts about anticipatory approaches and trying to draw out disciplinary and organisational differences, shortcomings and simplifications in how risk and uncertainty are understood across the DRF policy landscape. This did lead to some misconceptions and confusion on the part of participants about what my research was really about, and why it was so different to my professional role. While challenging, these epistemological and professional differences opened up opportunities to understand the sector more deeply – in particular in relation to my understanding of the scientific work on predictability that is the foundation for forecast-based approaches in humanitarian action, specifically FbF/A.

3.5 Covid-19 impacts and researching during a pandemic

The Covid-19 pandemic unfolded during the latter part of my period of data collection and in this section I comment briefly on how it impacted my research process.

In Spring 2020 I was due to attend the conference 'Understanding Risk' in Singapore, which I had attended in 2018, and I expected the conference would be an opportunity to fill the remaining gaps in my interview sample. As it became clear that the conference would no longer go ahead, and was initially re-scheduled to October 2020, I decided to postpone further data collection until later in the year. This made sense as the impacts of the pandemic were felt closer to home. As a result, I spent Spring 2020 working from home, focusing on data analysis and drafting a paper which later became the second empirical chapter of my

thesis. However, as time went on, it became obvious that the final conference I had expected to attend would no longer be going ahead in-person – and nor would any others.

I was fortunate that from the beginning of my research I had expected to do some interviews online. As such, this was factored into my ethical review application, and also avoided disrupting my interview sample as I had conducted some online interviews throughout. I was also fortunate that the community I was trying to access for interviews were very used to conference calls and online platforms. Moreover, as noted in Footnote 18 above, I noticed in the latter stages of 2021 that policy events which would previously have been held in-person were held online, and agencies have increasingly been releasing video recordings of such sessions, which is very useful for putting this material on the public record. I have cited quotes from such presentations in particular in Chapter 6. Where I have done so, I have added a footnote with a timestamp to the publicly available recording and all such events are listed in Annex 1 with links to further resources.

However, after the necessary pause to in-person data collection in 2020, I found it more difficult to access participants when this resumed, due to the reduction in other conferences and networking that I have previously relied on I collected a final series of interviews in early 2021, including a small number of repeat interviews where I had outstanding questions, and where it was particularly useful to follow up on the latest developments in key agencies such as the IFRC. This also allowed me to ask about the impacts of Covid-19 on the sector. Although the impacts of the pandemic on the sector had been wide-ranging, I did not explore this line of enquiry much further because it became clear that it had served to strengthen the existing desire for pre-arranged disaster finance and acting in a more anticipatory way but had not otherwise had impacts that would have a bearing on my particular research questions. While

it is certain that the pandemic had an impact on my data collection, by mid-2021 I was confident that my data collected so far was sufficient to draw conclusions.

4. Understanding the policy landscape of disaster risk financing (DRF)

4.1. Introduction

DRF brings together a range of actors as part of a nascent and rapidly developing set of policy approaches. In this chapter, the first of three empirical chapters, I outline how we can critically understand DRF as an integrated but complex policy landscape. I unpack and explain DRF through a political economy rooted account of the key moments, policy narratives and actors that shape the policy landscape, providing an account of the emergence of the sector, definitions of DRF, key policy drivers and tensions and challenges. The chapter is summarised in an illustration in Figure 11, which provides a visual guide to this chapter and to the policy landscape of DRF.

In Section 4.2.1, I sketch out a timeline of the emergence and key watershed moments in the development of DRF as a distinctive policy landscape. I then discuss the definitions used for DRF in Section 4.2.2. The parallel stories of the Red Cross Early Warning Early Action intervention and the CCRIF recounted in the preface to Chapter 1 give some indication of how interventions which are now understood as DRF emerged long before this policy landscape begun to cohere. In this sense DRF is almost a retrospective framing for a diverse set of approaches, and this is further reflected in the fact that practitioners still use a range of terminologies for risk financing, such as 'anticipatory humanitarian action', 'anticipatory action' and 'crisis financing'. In this section, however, I argue that these approaches should be understood as part of a common policy landscape, and that disaster risk financing is the most accurate and useful term to understand them. I also provide a working definition for DRF and a typology for understanding different mechanisms.

In Section 4.3 I go on to explore the policy drivers and narratives which provide much of the underpinning logic for DRF, based around intertwined narratives of efficiency and effectiveness, which propose that DRF is a solution to 'squaring the circle' of increasing humanitarian needs outstripping available financing.

This leads to a discussion in Section 4.4 of the tensions and complexities in managing DRF, which I understand as three areas of contestation. The first relates to the ability of actors within DRF to collaborate. Here, practitioners acknowledge that coordination is vital for the credibility of DRF, but there is a tension between this and organisational needs to define projects according to their own mandates and humanitarian 'symbolic capital' (Krause, 2014a). The second tension relates to the way information is used for decision-making, and the significant variations in the way in which DRF mechanisms trigger action. Even within the same categories of mechanisms, following the typology laid out in Figure 8, mechanisms are designed in very different ways. This is in part a natural consequence of the diversity in the sector, the different hazards being addressed, and the different agencies involved. However, coherence is recognised as key to the credibility of DRF approaches, but there is little in the way of common standards and methodologies for the use of information and decision-making, which is a further cause of tension in the sector. Finally, understandings of risk and uncertainty vary between practitioners in DRF. I argue that these framings and understandings of risk and uncertainty shape the policy landscape of DRF and underlie many of the tensions explained in this section. In Section 4.3 therefore I compare and contrast the different ways in which risk and uncertainty are understood by DRF practitioners, drawing out the differences between people from different academic disciplines, organisations and perspectives on DRF. In so doing I situate risk and uncertainty as the central underlying challenge of disaster risk financing, which is a key theme for the rest of the thesis.

4.2. The emergence and definitions of DRF

4.2.1 Emergence stories and timeline of DRF

The first approaches that we now understand as disaster financing began to emerge around 2007/2008 with early examples of the IFRC's Early Warning Early Action intervention, but there were other watershed moments following this which changed the policy landscape significantly. Chief amongst these was the 2011-2012 Horn of Africa drought, which was perceived as a major failure in timely humanitarian response (Hillbruner & Moloney, 2012; Hillier & Dempsey, 2012; Lautze et al. 2012; Levine et al. 2011; Maxwell et al. 2012; Sida & Darcy, 2012). At this time, the UK Government published a major humanitarian policy review, the Humanitarian Emergency Response Review (HERR), which emphasised the need for humanitarian responses to move away from responsive approaches and try to get 'ahead of the curve' (DFID, 2011: 7). Although the review was published just prior to the impacts associated with the Horn of Africa crisis, the conclusions were very timely, and many practitioners perceived this period of time as representing a significant shift in momentum, laying the groundwork for DRF. I discuss this further in Section 4.3.2.

At this time UK development funding was experiencing a period of increasing budgets - between 2010 and 2015 the UK was building up its commitment to the Monterrey Consensus of 2002 to contribute 0.7 % of Gross National Income (GNI) to Official Development Assistance (ODA) (United Nations, 2003), meeting this target in 2015 and committing it to law (National Audit Office, 2017). As a result, the gross ODA budget for the UK had increased from £7.3 billion in 2009 to £13.3 billion by 2016 (National Audit Office, 2017: 50). Throughout this period, UK ODA was funding DRF-related research initiatives. These included the 'Forecast-based Humanitarian Decisions' project through which the name for FbF was coined (Coughlan

De Perez et al., 2015); research into the cost-benefit of preparedness and resilience and anticipatory action (Cabot Venton et al., 2012), and programmes such as the Science for Humanitarian Emergencies and Resilience (SHEAR) programme – through which this PhD research was funded and for which two of the four major research consortia conducted research about seasonal weather forecasting for humanitarian action.

Beyond the UK picture, between 2014 and 2019 the German government was also significantly increasing their humanitarian assistance budget, quadrupling funding made available between these years - and with it shifting Germany's role in the humanitarian landscape (Südhoff & Hövelmann, 2019). In 2015, the German Federal Foreign Office for Humanitarian Assistance published the '*Action Plan of the Federal Foreign Office for Humanitarian Adaptation to Climate Change*', which was critical to furthering the approach of FbF (German Red Cross & Federal Foreign Office, 2015). The plan formalised their support for Forecast-based Financing pilot projects and financed the first Global Dialogue Platform conference for FbF in 2015, which brought together many of the key actors on the humanitarian side of DRF, including the World Food Programme (WFP) and the UN Office for Coordination of Humanitarian Affairs (UN OCHA) (ibid). Thus, 2015 and the beginning of the Global Dialogue Platform conferences was a key watershed moment which pushed the sector from the early stages of development into a period of consolidation.

From 2015 onwards, there was a clearer coalition of actors around DRF, which by then included the START Network. In 2013, they had already launched the START Fund, a global response fund that committed to making payouts in 72 hours to its members and became involved in the Red Cross Dialogue Platform events (Turnbull et al., 2020). In 2016 they then launched 'Anticipation Window', an anticipatory window to the existing START Fund, based

on an expert judgement approach to predicting disasters (START Network, 2017). In 2018, they took out the first replica insurance policy of a sovereign insurance scheme, based on a replica of the Senegalese drought risk policy arranged through the African Risk Capacity sovereign insurance pool (START Network, 2020b). Most recently, START are scoping the START Financing Facility (SFF) as a layered financing infrastructure that will include pooled financing (START Network, 2019, 2021; UK Government Actuary's Department (GAD), 2020) – a hybrid mechanism which is one of the latest features in the development of DRF and which I will explore in further detail in Chapter 6.

Throughout this period a number of key actors have emerged in DRF as unofficial 'knowledge brokers', contributing to the cross-fertilisation of ideas and approaches. A key example of organisations playing a convening role has been the Centre for Disaster Protection, which was funded by the UK Government in 2017, 'to provide neutral advice and training to governments, as well as humanitarian agencies, and invest in research, data, innovation and learning', drawing on its expertise in risk analytics, finance, insurance and risk management (DFID, 2017: 1). The Centre has since played a critical convening role between the development finance actors such as the World Bank and the humanitarian actors. For example, when the IFRC commissioned a scoping review of potential re-structuring of the funding structure of the FbA by the DREF into a risk pool, the review was published by the Centre and authored by actuaries from the UK Government Actuarial Department (2021).

It is important to note, however, that this example of collaboration between humanitarian actors and the world of finance such as convening work of the Centre for Disaster Protection has not happened in a vacuum. Development scholars and geographers have increasingly been exploring the current moment as the 'beyond aid' era, characterised by leveraging

expertise and investment from finance through venture capital, sovereign wealth funds and other non-state sources (Mawdsley, 2018). Gabor (2021) has documented this re-organising of global development around partnerships with global finance and dubbed it as the 'Wall Street Consensus' (the successor to the 'Washington Consensus' of old). She argues that this shift makes development 'investible' by enlisting the state into risk-proofing development assets and incorporating market-based finance more widely (ibid). While DRF has its own logics and narratives, it also reflects some of the particular geographies of this desire to enrol global finance into development, as demonstrated by the DFID business case for the Centre for Disaster Protection noted above (DFID, 2017). It is no surprise therefore that the Centre for Disaster Protection is located in the financial heart of the City of London – rather than in the bureaucratic heart of London in Westminster.

Throughout 2018 and 2019, UN OCHA became increasingly active in DRF. Whilst they were relative newcomers to implementing DRF, UN OCHA plays a critical role in the humanitarian landscape because they manage the UN's main global emergency response fund, the Central Emergency Response Fund (CERF), which disburses circa $1billion every year. Although this varies year on year, in the 2020 OCHA annual review the CERF had distributed $676 million by 30th October that year (UN OCHA, 2020:203) – the fund is therefore one of the largest financing sources in the humanitarian system. Between 2018 and 2019 Mark Lowcock, who was the Under Secretary General for Humanitarian Affairs at the time, gave a number of key speeches including a Casement Lecture[20] in March 2018 advocating for greater use of data and innovative financing in humanitarian assistance (Lowcock, 2018). Subsequently, UN OCHA began moving towards more anticipatory, pre-arranged funding models within the

[20] Casement Lectures are part of a high-level series of lectures at Iveagh House, organised by the Irish Department of Foreign Affairs.

CERF through their ‘Anticipatory Action Framework’ – and worked with the Centre for Disaster Protection to develop the first pilot and manage monitoring, evaluation and learning (Centre for Disaster Protection, 2020).

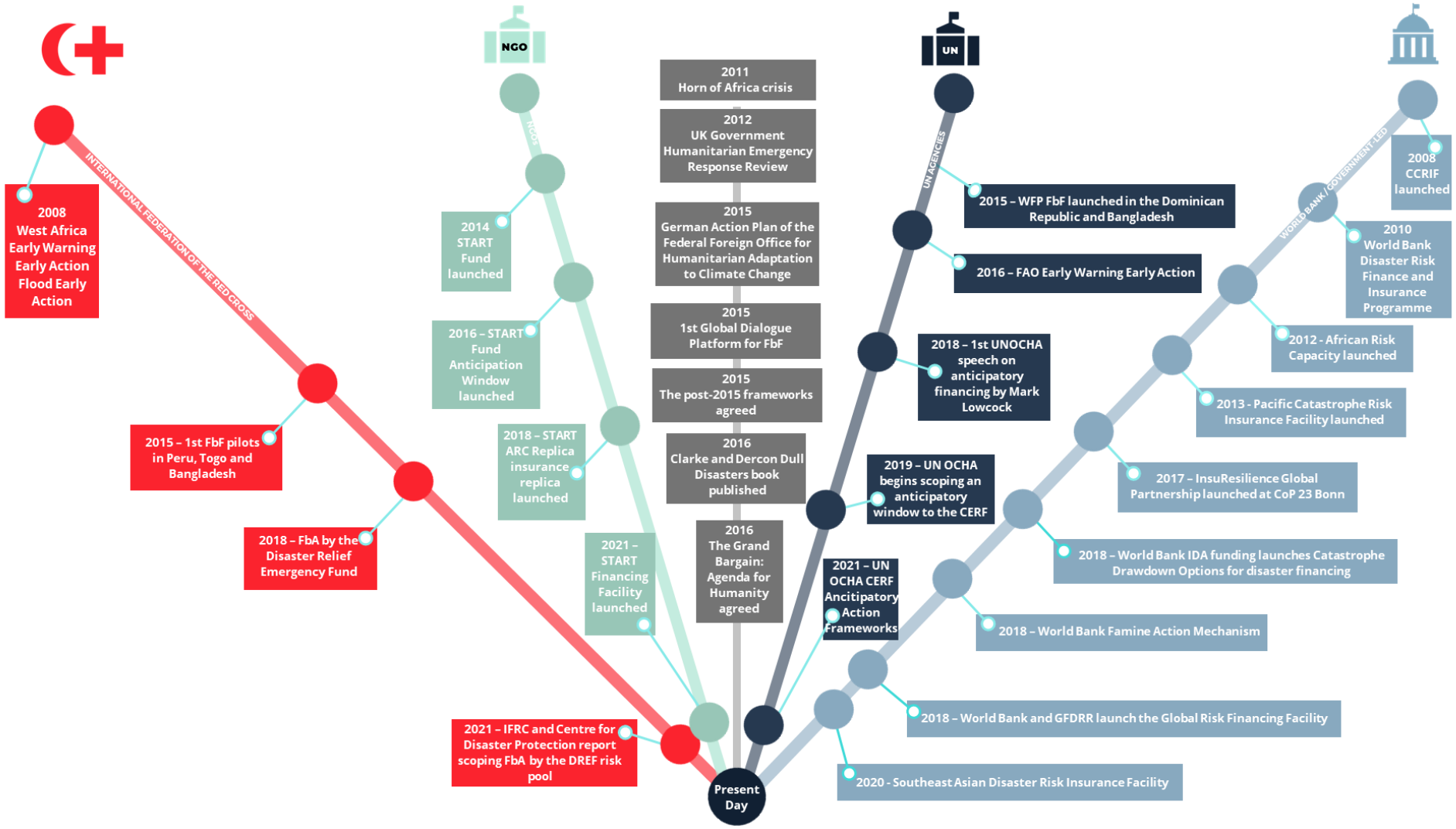

Figure 6 - Key moments mapped by organisation type (from left to right): the IFRC, NGOs, UN agencies and development and sovereign financing actors such as the World Bank and national governments. The central timeline in grey gives key international agreements, events and watershed points.

4.2.2 Defining DRF

As noted in the Introduction, DRF was not a terminology that was originally applied to mechanisms such as CCRIF or Early Warning Early Action when they were first launched, but is a terminology that has emerged since, although it is not uniformly used across the sector. Other terms, such as 'anticipatory action', 'anticipatory humanitarian action' and 'crisis financing' are frequently used by practitioners and by some of the agencies involved. In this section I discuss some of the background to the different terminologies and explain why I adopt the term DRF in this thesis.

'Disaster risk financing' was initially used by the World Bank and can be traced back to the programme name for a World Bank and Global Facility for Disaster Risk Reduction stream of work on sovereign insurance, market development and partnerships with the private sector, entitled 'Disaster Risk Financing and Insurance Programme' (DRFIP), which was launched in 2011. Subsequently, in the influential 2016 book '*Dull Disasters'*, Daniel Clarke and Stefan Dercon, who had both been affiliated with the DRFIP[21], argued for a more rules-based approach to financing disaster response, through what they defined as combining: 'A coordinated plan for post-disaster action agreed in advance; A fast, evidence-based decision-making process, and Financing on standby to ensure that the plan can be implemented' (Clarke & Dercon, 2016: 3). In so doing, they also provided one of the first overarching definitions that could be used to explain different mechanisms across the sector. This book was influential because it was central in making the link between what had been developed in the sovereign risk finance context, and some of the anticipatory mechanisms that had been

[21] It is worth noting that Daniel Clarke is now Director of the Centre for Disaster Protection and remains prominent in the sector.

developed separately in the humanitarian and climate adaptation worlds. Specifically, where the humanitarian and NGO actors had been looking at improving timeliness of response through anticipatory mechanisms, in the early stages this hadn't been well connected to the role of donors in the funding landscape. As one research participant explained, the landscape for early action prior to '*Dull Disasters'* was: '*…all about earlier action, better planning …. And it's pitched very much as part of adaptation, the early stuff… the 'Dull Disasters' message is consistent with that, but I think the added value of Dull Disasters is it recognised the link to the donors. So, what's the donor's role in this? And that disaster risk financing can be important for donors in terms of improving the ownership of risk by countries. So, that was the first time that I think the donor lens was seen*.' (Interview 15, Donor).

Over the course of this doctoral research, the most common terminologies used to describe the field have shifted and changed between early action, anticipatory action and DRF. To some extent it could be argued that DRF has become a popular definition because of more successful advocacy from those who first started using that term, and who have successfully broadened the way in which DRF was applied. This was the perspective of one humanitarian research participant who argued that they thought FbF could be seen as one tool within a broader landscape of DRF on the condition that advocates from the financing and World Bank side of the sector recognise other considerations of disaster risk management: '*The current definition of DRF from the World Bank, only focusses on the response element – a bunch of instruments to ensure liquidity for response. But this is changing, it's really… looking towards holistic perspectives on disaster risk management …. that's what I hope DRF will become in the future, and in that principle, in that definition, I will say that FbF is a tool within DRF to manage …. one of the stages in the DRM cycle. In that sense… it's not that DRF is one thing*

and FbF is one thing. The way it should be is that FbF is just one tool, along with Cat DDOs[22]*, and the DREF, and CERF...'* (Interview 2, Humanitarian practitioner).

However, this has not completely overcome the preference by agencies on the humanitarian side of the sector to prefer to use the terminology 'anticipatory humanitarian action' or 'anticipatory action'. For example, this is still the terminology used in key forums such as the Red Cross Dialogue Platform conferences – whose full name is the 'Global Dialogue Platform on Anticipatory Humanitarian Action' (German Red Cross, 2019). Despite this, many World Bank, government and DRF specialists attend the conference and take leading roles giving keynote addresses and leading side-events. The name of the conference is significant, however, in reflecting the strategy and ideology of its funders: the IFRC, WFP and especially the German Federal Foreign Office for Humanitarian Assistance. In particular, the scepticism around the term DRF seems to originate with the German Federal Foreign Office who are concerned that too close an affiliation with the World Bank might bring humanitarian impartiality into question, in particular in fragile and conflict-affected settings, because of the fact that the World Bank works with governments. This was borne out in a keynote session during the 2018 Dialogue Platform conference when Dr Thorsten Klose of the Federal Foreign Office[23] recommended that: 'different approaches of risk financing be kept separate so that all approaches are not mixed up, particularly in the light of FbF. Ultimately, humanitarian financing is obligated to human needs and not political considerations' (German Red Cross, 2018: 19).

[22] Cat DDO refers to a 'Catastrophe Deferred Drawdown Option', a type of pre-agreed contingent loan developed by the World Bank as part of their DRF mechanisms.
[23] Dr Klose had previously worked for the German Red Cross and was a key advocate for Forecast-based Financing within the Red Cross movement.

To a certain extent the difference between 'Anticipatory Action' and DRF is a semantic one – this was certainly the message given by interview participants when asked about how they defined their work. For example, one participant argued: '*…if you talk to a government or you talk to people at risk, they don't give two craps about what you call it. They care about what you're trying to do for them. And when….*' (Interview 8, DRF expert). Another contended: '*…we're all for having an open definition of it* (referring to anticipation) … *I think it's good for all of us in the sector to have something loose, why don't we just have the principles'* (Interview 1, Humanitarian practitioner).

Despite these perspectives, the terminology debate has continued, and significant resources have been invested in trying to find consensus. For example, a number of agencies including the Centre for Disaster Protection, the Red Cross Red Crescent Climate Centre and UN OCHA commissioned a joint 'thesaurus' of anticipatory action to 'enable reflection on the similarities and differences in the way organizations use language associated with the concept of anticipatory humanitarian action' and to enable mutual understanding (De Wit, 2019: 5). However, differences and distinctions continue to be discussed. On the 20th September 2021 the newly formed Anticipation Hub, which brings together the German Red Cross (GRC), the IFRC and the Red Cross Red Crescent Climate Centre hosted an event to discuss the links between anticipatory action and risk financing, making the case that the sector needed to stop siloed approaches across the disaster management and crisis response spectrum (InsuResilience Global Partnership & the Anticipation Hub, 2021)[24]. Despite the key message of moving beyond siloes, this event was still premised on distinguishing between mechanisms as either 'anticipatory action' or 'risk financing'. As I will further discuss in Section 4.4.1, there

[24] This event, the InsuResilience Sectoral Community Workshop: Linking Anticipatory Action to Risk Financing, is listed in Annexe 1 'Table of conferences and events attended'.

have been a number of initiatives funded to help the sector find consensus on key terminology and definitional issues, including, as discussed, the '*Thesaurus on Anticipatory Action*' in 2019 (De Wit, 2019). More recently there has also been a consultancy post advertised to write a new '*Glossary on Early Action*'[25] to serve a very similar purpose, funded by the Risk-Informed Early Action Partnership (REAP), a partnership organisation to bring together stakeholders across the climate, humanitarian and development communities. Partners in REAP include donor country governments, including the French Republic, the Federal Republic of Germany and the Republic of Ireland, humanitarian agencies such as the FAO, IFRC and UNOCHA, research and policy institutes such as the Overseas Development Institute (ODI) and other membership organisations in the DRF sector such as the Anticipation Hub (REAP, 2021). This complexity and the fact that there remains a dual vocabulary of 'DRF' and 'anticipatory humanitarian action' is indicative of both the fact that this is a nascent agenda, but also that there is a significant degree of discursive manoeuvring: both institutionally, but also at a more strategic level, resulting from the different ideologies of the actors in this sector.

Thus, there are different terminologies and definitions in use, and differing views about whether the mechanisms I include here are part of a common set of approaches. I would argue that understanding mechanisms which are anticipatory, alongside those which focus on more timely response, as different tools within a shared landscape of DRF is the most useful and accurate way to understand this sector, for two reasons. Firstly, I argue that the complex temporality of disasters means that terminology around 'anticipation' is slippery and potentially inaccurate. Secondly, attempts to delineate 'humanitarian' mechanisms – which

[25] The post was advertised in November 2021 online on the REAP website: https://www.early-action-reap.org/vacancy-announcement-consultant-early-action-glossary-development

are usually also anticipatory - from those used by other actors such as sovereign governments, are increasingly difficult because of the growing hybridisation between mechanisms. This means that humanitarian versus risk financing approaches can no longer be easily separated.

On the point about temporality, Figure 7 below demonstrates how many practitioners think about the DRF policy landscape, with a division between anticipatory or 'ex-ante' mechanisms triggered by forecasts, and those which aim for more timely response after an event has occurred (Harris & Jaime, 2019). It is noticeable in this paper that the authors view all mechanisms – be they 'early action / ex-ante' or 'impact response / ex-post' - as different mechanisms operating within 'Disaster Risk Financing Windows'. In practice this is the difference between a mechanism that triggers in advance based on a forecast, such as FbF, and a mechanism that triggers quickly after an event occurs, such as an index based sovereign insurance scheme like CCRIF. This can in part be understood as the view from the START Network, who operate both anticipatory and timely 'impact response' mechanisms and are less concerned by the distinctions between these, in comparison with other agencies in the sector.

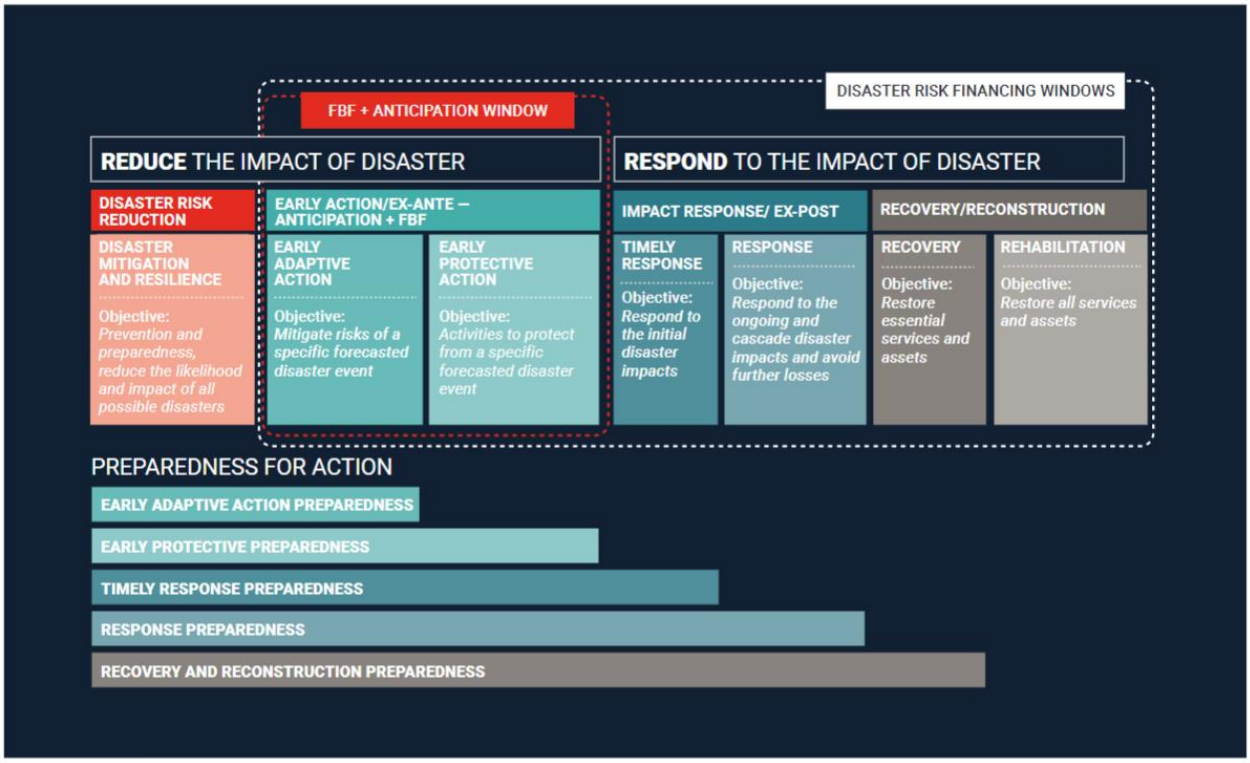

Figure 7 - Figure demonstrating timelines of response and different windows for DRF mechanisms, from early action / 'ex-ante' to impact response / 'ex-post'. Reproduced from Harris & Jaime (2019).

While these distinctions between different temporal phases of mechanisms within DRF seem clear when presented like this, in reality practitioners are aware of the issues of complex temporality, and that it is difficult to neatly distinguish between the phases of a disaster. One anonymous practitioner quoted by De Wit in the '*Thesaurus for Anticipatory Humanitarian Action*' reflects on this:

> '*Officially we say it's between the forecast and the event. But what do you call the event? You know, for certain things you could say it's before the event has an impact. For example, the cholera doesn't break out right the moment the flooding starts; it impacts a few days after so it could still be early action if you act the moment the rain starts, or even the flooding starts but before actually the impact that you are working on occurs. At what point is a flood a disaster*?' (De Wit, 2019: 29).

De Wit also recognises this in her conclusions, noting that the limits of what forecasts can and should do are complex, blurring the boundaries between humanitarian response, preparedness and vulnerability reduction. As such, she concludes that 'the fields of DRR, sustainable development and humanitarian response form part of an increasingly complex continuum' (ibid: 32).

Indeed, practitioners are also aware that although more timely response to disasters is an important objective of the sector, not all of the mechanisms in use in this sector lead to anticipatory or 'ex-ante' response. This is for a number of reasons, because the range of hazards responded to across this sector varies hugely, and many do not have clear temporal onset. For example, as has been widely documented in the literature, drought hazards play a major role in contributing to food insecurity, which can be understood as the impact resulting from droughts as a hazard – although other factors such as food prices, pests and conflict all contribute (Maxwell et al., 2014; Sandstrom & Juhola, 2017). In the context of early action, it is therefore difficult to ascertain onset for a hazard such as a drought, and this is well understood by practitioners in this area - and it is a key reason why DRF mechanisms for drought have taken longer to develop than for hazards such as floods or cyclones which are more temporally constrained (Heinrich & Bailey, 2020). However, drought is not the only example of a hazard which has a complex temporal onset, but which is included in the purview of DRF mechanisms. For example Dzud, is a combination of dry summer weather and extreme cold in winter experienced in Mongolia, and is a hazard that the IFRC have long included within FbF pilot projects (IFRC, 2019a).

Questions about the temporality of disasters are considered more carefully in the disaster studies literature. For example, it has long been pointed out that phases of mitigation and

preparedness ‘pre-disaster’, and response and recovery ‘post-disaster’ are rarely as neatly defined in practice as they seem in the graphics of ‘disaster management cycles’ in the policy literature (Contreras, 2016; Neal, 1997). More recently, the concept of a ‘disaster management cycle’ has also been critiqued for implying there is an inevitability about disasters, and some have suggested re-conceptualising this as a helix with the potential to reduce risk and negative impacts over time through risk reduction interventions (Bosher et al., 2021). These more nuanced perspectives are not yet well incorporated by DRF practitioners and policymakers in how they conceive of the temporality of DRF mechanisms.

The second point about my approach of understanding the different sets of mechanisms within a shared landscape of DRF is based on the fact that attempts to distinguish tools being used in the humanitarian sector, versus tools being used by sovereign governments or development funders such as the World Bank, are becoming increasingly difficult. Mechanisms such as replica insurance policies taken out by the START Network, or the move towards risk pooling and the use of re-insurance, as demonstrated in the typology figure below (Figure 8), are moving strongly towards hybrid mechanisms. As discussed previously, I interpret the preference for the term ‘anticipatory humanitarian action’ and ‘anticipatory action’ as, in part at least, resulting from a concern amongst some within the IFRC and the German Federal Foreign Office about blurring humanitarian neutrality and impartiality. However, examples of hybrid approaches are already emerging which make such a delineation difficult to make. It is also clear that this is the direction of travel in the sector as more and more hybrid mechanisms have begun to emerge in recent years.

For all of these reasons taken together, therefore, I choose in this thesis to define the wider sector of anticipatory and risk financing mechanisms as a whole as disaster risk financing. The

temporal differences between different mechanisms within the landscape are important, and the normative goal of moving towards timelier (or less late) response is clear and important. However, it is not always accurate or necessarily possible to distinguish between mechanisms based on temporality. As such, the definition I adopt in this thesis is a broad definition of DRF as approaches and mechanisms which apply the following three principles of:

1. a measure of disaster risk
2. pre-arranged finance and plans
3. a mechanism to trigger response

The definition I adopt is purposefully broad, and for example does not refer to 'anticipatory' use of forecasts, but rather a measure of risk, whether that is from forecasts, metrics, or other forms of data to inform and trigger response. This allows diverse mechanisms ranging from index-insurance such as CCRIF, and Forecast-based Action to be understood as different tools within the same policy landscape.

I further follow the typology proposed by Willitts-King et al. (2020) which allows us to break DRF down into different mechanisms which fall within the definition above. There are earlier typologies in the literature, for example Peters and Pichon (2017) provide a breakdown of risk financing options. However, this typology is the most recent in the literature, and I build upon the categories proposed in Figure 8, below, providing examples by type of agency for each of the following categories:

- budgetary instruments such as anticipation funds with a 'soft' trigger, such as expert judgement;
- contingent finance where there is a commitment to release finance based on a 'hard' trigger, such as a forecast;

- market-based instruments which span different types of insurance, and finally;
- hybrid mechanisms which combine and often layer different mechanisms from within this typology, such as a humanitarian risk pool that uses reinsurance as a backstop option

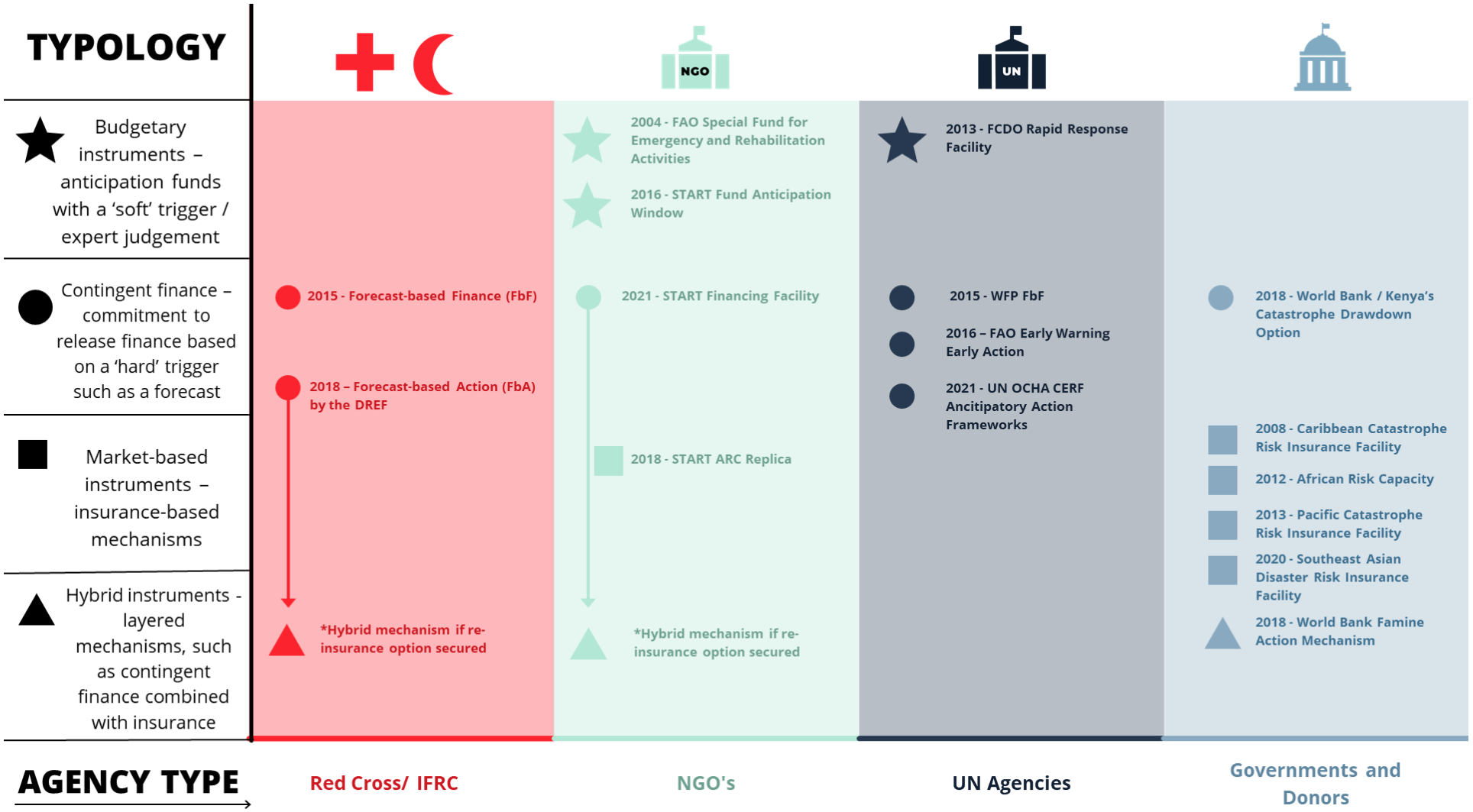

Figure 8 - Typology of DRF mechanisms, grouped by category on the left and mapped them by type of organisation. The figure is based on the categorisations proposed by Willitts-King et al. 2020, mapped by the type of agency and updated to include the newest mechanisms such as risk pools. The typology does not capture the different temporality of mechanisms, and spans both anticipatory and impact response mechanisms. Note the increasing move towards 'hybrid instruments'.

4.3. Policy narratives and the logic of DRF

The notion of acting in advance of disasters – anticipating rather than reacting - is strongly intuitive. As the saying goes, 'prevention is better than a cure', and this theme is often repeated in policy literature and by participants in my interview material. In this section I discuss the central policy narratives as the logics of DRF: the fact that humanitarian needs are outstripping available finance. Despite a long-term trend of increasing global humanitarian funding over the last decade, the percentage of humanitarian appeal requirements that is met by funding has declined from 63% in 2011 to 52% in 2020 (Development Initiatives, 2021: 33). This is linked to two mutually reinforcing policy narratives for DRF: that it leads both to more efficient and effective disaster response and is therefore one of the only ways to 'square the circle' of financing humanitarian response.

The financing gap between growing humanitarian need and available financing is often found in policy and advocacy materials as the central logic for DRF. For example, in a speech delivered at the LSE in 2019, the UN Under Secretary for Humanitarian Affairs, Mark Lowcock made the case that we can no longer simply raise more money to meet humanitarian needs: 'It would be nice to think we can fill the gap just by raising more money. But we can't. We also have to make the money we have go further. The best way to do that is to change our current system from one that reacts, to one that anticipates.' (Lowcock, 2019: 2)

The examples of DRF interventions cited by Lowcock in this speech range from drought tolerant seeds to cash transfers for families living in areas forecast to flood, which facilitated them to fortify their homes and move to higher ground (Lowcock, 2019). Similar arguments are made across the DRF policy literature, for example the Global Dialogue Platform

Conference on FbF[26], explained early action was necessary because: 'climate-related risks are rising worldwide, and many humanitarian actions could be implemented in the window between a forecast and a disaster. This would help prevent suffering, contribute to a more efficient use of humanitarian funds, and strengthen community resilience' (German Red Cross, 2017: 3). A 2021 policy paper authored by the Centre for Disaster Protection in the run up to the G7 also followed this logic: 'International funding for crises is too slow, which prolongs and ultimately increases suffering and the cost of response. This is poised to get worse as crisis risks are increasing, including risks that affect multiple countries and economies... By harnessing progress in technology, improving collaboration, and making better use of available financial instruments, we can save lives, reduce costs, and improve long-term development outcomes' (Scott & Clarke, 2021:2).

As a result, approaches which can deliver humanitarian response more efficiently and effectively have emerged as the two defining policy narratives of DRF. This was reiterated in interviews and has become taken for granted as a self-evident fact – although this did vary in some cases and there were some sceptics amongst my interview participants. Taking an example of an interview participant who reiterated the policy objectives of efficiency and effectiveness, they often did so in the context of climate change and the expectation of more severe and frequent disaster events. As one participant put it: '*there is a clear understanding that disaster risk financing instruments are super essential in the future. It is clear we are going to have more disasters, and the money that is located at this moment for humanitarian action is not going to be enough for the type of events that we will have in 10, 20 years…'* (Interview 23, Humanitarian practitioner). Another puts it more succinctly as DRF being 'the only logical'

[26] Prior to the conference being re-named to include Anticipatory Humanitarian Action, the Dialogue Platform events were nonetheless the key 'DRF' conferences across the sector.

way forward for humanitarian response: *"… we have humanitarian needs … increasing worldwide and we have a decrease of the economic finances, lack of funding. We have got climate change, we have got an increasing amount of suffering and hazards are on the rise… the only logical way for approaching this was sort of an anticipatory approach.'* (Interview 24, Researcher)

However, the link between climate change, disasters and humanitarian need is, in practice, more complex. As Swithern (2018) has written, disaster impacts do not correlate directly with the scale of humanitarian funding appeals, moreover a recent meta-review by the World Meteorological Organisation (2021) concluded that while weather-related disasters have increased over past 50 years, they have caused more damage but fewer deaths, mostly as a result of improved forecasting and disaster risk reduction activities. In the following sub-sections I discuss in turn the twin narratives that DRF leads to more efficient and effective response.

4.3.1. 'There's nothing left in the cupboard': Efficiency and DRF

Despite complexity in the underlying causes of the growing demands on humanitarian finances, the resulting sense of pressure was a key concern and theme raised by interview participants, and this has only been exacerbated by the Covid-19 pandemic.

Political shifts amongst some key donors in terms of willingness to fund humanitarian and development aid further contribute to this. The situation in the UK is a key example, as it was announced in October 2020 that the UK Government would be 'temporarily' reducing its ODA budget from 0.7% GNI to 0.5% GNI. In terms of the budget, the FCDO disbursed a total of £9.3 billion in 2020 (circa $12.6 billion USD), which was a reduction of £1.1 billion (circa $1.5 billion

USD) compared with its disbursements for 2019, a drop of 10.3% (Development Initiatives, 2021a). However, it is important to note that the financial context when DRF was emerging was one in which a number of key donors – the UK and Germany included – were significantly scaling up their development and humanitarian funding, as described in Section 4.2.1.

What resonated in research interviews - many of which were conducted in 2019 prior to the announcement of the merger of DFID with the FCO and the subsequent budget cut – was that the expectation of budget pressures was already significantly shaping logics for DRF approaches. For example, one participant commented that: '*the overall narrative which DFID sits within in the UK ... is the department being under siege. There's such a low risk tolerance for any sort of reputational risk or anything that smells like waste...*' (Interview 6, Donor). They later reiterated the sense that across the humanitarian system as a whole, ODA was under significant demand: '*…we are just realising that there is no money, no more big money coming into the system, ODA is probably flatlining for the next few years after many, many years of growth and you know the projections are that the needs are going to ever further escalate. And so, between donors and agencies we're all standing around going – "well there's nothing left in the cupboard so how do we rearrange things to be able to get more coverage*?"' (Interview 6, Donor)

Combined with this, many of the donors involved in DRF are committed to a range of political commitments to change and improve the modalities of disaster response and financing, such as 'The Grand Bargain' pledges made at the World Humanitarian Summit in 2016 on localisation and 'to improve the effectiveness and efficiency of the humanitarian action'[27].

[27] The 'Grand Bargain' was a recommendation made by the authors of the High-Level Panel on Humanitarian Financing, published in January 2016 prior to the World Humanitarian Summit in May 2016 (High-Level Panel on Humanitarian Financing & Report to the Secretary-General, 2016). Specifically the report called major donors and agencies to agree 'a Grand Bargain that does away with inefficiencies and embraces best practices

This was reflected as a key moment by one participant, recognising that available humanitarian financing was no longer meeting needs and that this led to a change of approach: '*…I think for me the Grand Bargain sort of marks the point where there was a clear statement that the humanitarian system cannot continue to operate in the way that it operates… the system is overburdened and all of this sort of humanitarian appeals go unmet every year and that we need to rethink what we're doing*.' (Interview 11, Humanitarian practitioner)

Thus, the idea of 'bang for buck', or 'doing more with less' is a key narrative in the policy literature for DRF. Indeed, policy materials in the sector often refer to the evidence basis for cost-efficiency of anticipatory financing or more preparedness, in particular studies commissioned by the UK and the US donor agencies. For example, Cabot Venton et al. (2012) were commissioned to conduct a report into '*The Economics of Early Response and Disaster Resilience*' for the UK Department for International Development, and later a similar report was commissioned by USAID (Cabot Venton, 2017). Another report on '*Return on Investment for Emergency Preparedness Study*' was written for UNICEF and WFP by Boston Consulting Group and funded by DFID in 2015 (UNICEF & WFP, 2015). Interestingly, some agencies otherwise very active in DRF are notable by their absence in funding such reports – in particular the German Federal Foreign Office who were an early funder of the Red Cross FbF programme (German Red Cross & Federal Foreign Office, 2015). Many of these reports were not written specifically with DRF-type mechanisms in mind, in particular the earlier reports from 2012, however they have been used by advocates for DRF as evidence for the cost-effectiveness of such approaches. For example, these reports are summarised in an ODI policy

in humanitarian action' (ibid: 17). More information about the 'Grand Bargain' that was subsequently agreed is available here: https://interagencystandingcommittee.org/about-the-grand-bargain

paper funded by DFID in 2018 as a summary of the evidence reviews of the cost-benefit research into forecast-based early action, even though the different studies consider diverse contexts and types of intervention (Wilkinson et al., 2018: 25).

The robustness of such 'cost-benefit' evidence has been more carefully scrutinised as the sector has evolved. The reports commissioned to investigate cost-effectiveness adopt a range of measures including cost-benefit analysis (CBA), return on investment (ROI) and value for money to assess actions taken in a range of hazard contexts. Another ODI policy paper which later reviewed the evidence base for anticipatory action raises the point that 'easily reproducible and catchy numbers that ROI and CBA studies produce can obscure the quality of and underlying assumptions behind these numbers' (Weingärtner et al. 2020: 34). Despite this, findings from such reviews were cited to me by interview participants, even if they were sceptical about them, which demonstrates how much these studies have cut through to policymakers. For example, one participant stated to me: '*I'm ... a bit sceptical about … the numbers like the data say that you can act ... what is it five or six times you say before it's worse than a late response...*' (Interview 6, Donor) This interview participant was referring here to the 'headline' figure from the Cabot-Venton et al. (2013) review, which argued that 'for every early response to a correctly forecast crisis, early responses could be made 2–6 times to crises that do not materialise, before the cost of a single late response is met' (Cabot Venton, 2013: 1).

The notion of cost-efficiency was one of the narratives of DRF that generated different responses from interview participants. Overall, participants from a humanitarian background were sceptical, arguing that '*the interesting thing about aid money is we want to give it away*' (Interview 4, Donor); '*that's just not how it works in the balance sheet – it's not like the federal*

foreign office takes a discount off something they would have spent on' (Interview 3, Researcher). Arguments about no longer being able to rely on raising more money to meet the funding gap, and instead having to make 'the money we have go further' (Lowcock, 2019: 2) reflects a key logic for the sector, indeed, they are a core argument for moving towards a risk pooling approach, as will be further discussed in Chapter 6. On the other hand, a research participant who worked at the interface between different specialisms outlined the differences in view: '*If we talk to humanitarian actors… in my experience some of them get the bang for the buck argument… They get it but they're like "no, that's not what we're here for, we're here to help people". So, you have to frame it as you could help more people with the same … amount of money*' (Interview 15, DRF expert).

Nonetheless, it is important to note that even if the different perspectives and actors within the DRF community use the efficiency narratives differently, and it has changed over time, it was a key part of the 'emergence story' for DRF, especially during the early days of the advocacy process. For example, one humanitarian practitioner reflected on how the cost-benefit argument had evolved over the course of their work on DRF: '*We used that economic argument a lot in the very beginning, back in 2011, when we were trying to explain to people why it makes sense to act on something that's uncertain. Because the economic argument is really helpful there in showing why you should act if you don't know it's going to happen*….' (Interview 3, Humanitarian practitioner)

Most recently, the confluence of the Covid-19 crisis with climate change, climate related disasters and other humanitarian crises has once again underlined calls for increasing the coherence between development and humanitarian assistance. Unsurprisingly this was reflected by interview participants as highlighting the importance of improving the way

humanitarian finance operates: '*Covid, what it does is open their eyes… we really need to adapt our financial instruments because if there comes a time when we have another pandemic or another extreme type of event, our current financial instruments are not ready to cope with that, definitely*.' (Interview 23, Humanitarian practitioner)

A widely shared cartoon, published in a blog written by Pablo Suarez, Associate Director for Research and Innovation at the Red Cross Red Crescent Climate Centre, represents the sentiment that I found to be commonly shared amongst research participants in the wider sector at this time: that disasters, conflict-related crises and the pandemic continue to outstrip the humanitarian financing system. Thus, while the tone of efficiency narratives has shifted over time, and the way these arguments are made varies between different actors across the sector, in many ways the pandemic has underlined the importance of the efficiency logics of DRF once again – regardless of the complexity of the evidence linking anticipatory financing to improved efficiency.

Figure 9 - Cartoon shared online among the DRF community typifies the efficiency argument. Available online: https://twitter.com/pablosurgames/status/1256243615761825793

4.3.2 'Never again': Effectiveness, timely response and DRF

The second of the policy narratives underpinning DRF is that by acting in advance, DRF offers a way to improve the effectiveness of response. In this section I explore this narrative, in particular the role of key crises which have highlighted failures of the humanitarian system to respond in a timely and effective way, which have been particularly important in advocacy for DRF.

Similar to the efficiency narratives, the notion that acting earlier leads to more effective response has a strong intuitive appeal and logic. Policy literature from the earlier phases of advocacy point out that DRF represents a significant advance from the status quo of 'ex-post' disaster response, which has been likened to the passing of a 'begging bowl' around donors to raise funds after a disaster happens (Clarke & Dercon, 2016). This leads to a fragmented and politicised response that is poorly matched with post-disaster needs, which are often contingent on funding cycles in donor countries with little relevance to needs on the ground (Talbot et al. 2017). Others argue that earlier response can avert harmful coping strategies and protect livelihoods, contributing to long-term development gains (Wilkinson et al., 2018).

While the notion that acting earlier can make responses more effective makes sense in principle, it is notable that this has been harder to evidence across different DRF mechanisms and projects. In particular, the usefulness of mitigation actions that can be employed in the brief window of opportunity between the warning of a hazard and disaster impacts being felt has been questioned. A working group titled '*Early Actions: Why do we always end up with chlorine tablets?*' discussed this issue during the 2018 Dialogue Platform on FbF. Chlorine tablets are regularly distributed prior to flood or cyclone hazards and are, of course, indispensable for preventing water-borne diseases. Participants in the session pointed out

however, that they are always distributed as part of agreed protocols because they are small and easy to pre-position within the time available, but as a result they are used in preference to other actions, which might be more difficult to implement during the available time window, but which could better complement longer-term preparedness planning (German Red Cross, 2018: 23).

Moreover, the potential effectiveness of early actions varies significantly between hazard, which is something that practitioners acknowledge but which isn't necessarily clear in the policy literature. Commenting on this, one humanitarian noted that while timely action will reduce human suffering: *'…it doesn't mean that the disaster will be totally prevented. Of course, it will really depend on the hazard… like for drought I'm more inclined to say that we have enough lead-time, and we have activities that we can do in a very coordinated way, we can do prevention and mitigation actions…Heatwaves might be another of those examples. But for a cyclone… I mean Idai*[28]*, we could have had the most amazing FbF in place but still the houses will be totally destroyed*.' (Interview 2, Humanitarian Practitioner)

A second key part of the effectiveness rationale, which was a particularly strong theme in interviews, was to ensure that particular events which have demonstrated the failures of the humanitarian system 'never happen again'. As one interview participant put it, they thought the humanitarian system as a whole: '*historically has only ever undertaken major structural reform in response to a very big screw up*' (Interview 6, Donor). Indeed, a number of major disaster events have historically occurred just prior to changes across the system and arguably have led to reforms – for example, the FEWSNET famine early warning system was founded

[28] Referring to the 2019 Tropical Cyclone Idai, which led to severe flooding and damage in Madagascar, Mozambique, Malawi, and Zimbabwe

in 1985 following a series of major famines in Ethiopia in the 1980s[29]. Likewise in 2005, the UNISDR Hyogo Framework for Action was agreed just weeks after the Indian Ocean Tsunami of December 2004 and had a particularly strong focus on improving and increasing the use of early warning systems (Basher, 2006).

One single key event that was highlighted by interview participants as contributing to the re-appraisal of existing humanitarian financing systems was the 2011/2012 Horn of Africa drought, which affected millions of people across Somalia, Kenya, Ethiopia and Djibouti, though the worst of its impacts were felt in Somalia. It is thought that over 100,000 people died during the course of the drought (Hillier & Dempsey, 2012). Much critical attention has been paid to systemic organisational failures of agencies involved in the response, and the so-called 'deadly delay' between early warnings and taking action (ibid). Even in Kenya and Ethiopia where the impacts of the drought were felt less harshly, the UK's Disasters Emergency Commission evaluation called the response a 'system-wide failure' (Sida & Darcy, 2012:3). In the academic literature, one of the most frequently shared images of the crisis is a diagram showing the time lag between early warnings and action and the way funding only spiked after an international declaration of famine (Hillbruner & Moloney, 2012).

[29] The Famine Early Warning Systems Network is a leading provider of early warning and analysis on food insecurity, created by USAID in 1985 https://fews.net/

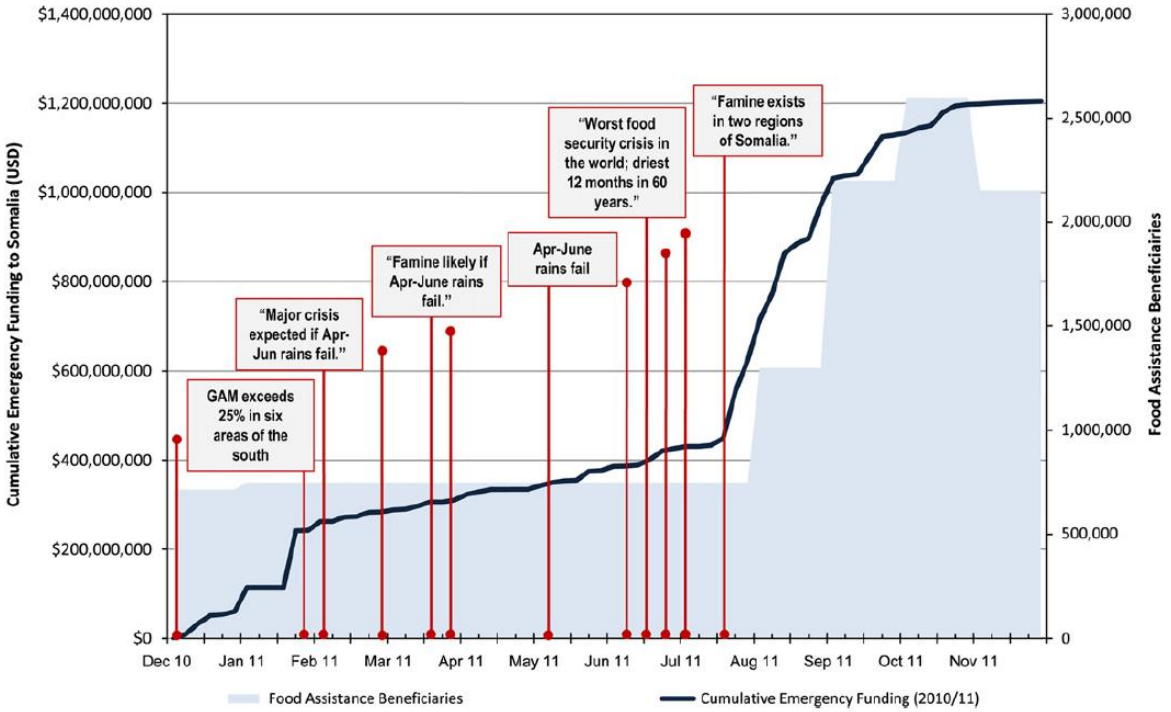

Figure 10 - Evolution of food assistance beneficiaries and cumulative appeal funding for Somalia in the context of early warning messaging, December 2010–November 2011. Reproduced from Hillbruner and Moloney (2012).

This particular diagram was highlighted in interviews about the advocacy process for early prototypes of anticipatory mechanisms. One interview participant agreed that this particular diagram and the event: '*was significant... There was only a small council of us pushing FbF around the world at that time, so I used it a lot, for sure, as an example there was some fantastic graphs showing the financial disbursements and I think it was certainly a very elegant explanation of why… if you were willing to invest as much post disaster, why aren't you willing to invest as much pre-disaster*?' (Interview 3, researcher) Similarly, another participant active in advocacy at the time agreed that the 2011 Horn of Africa event, in particular the slow funding disbursement, was a powerful advocacy tool: '*The key moment that was extremely useful for the advocacy process was the drought in 2010 / 2011 in Somalia, we used that in all*

our advocacy documents. I think everybody has used that. It was just such a clear example of the difference between the warning time and when the funds arrive, it's so visual and so clear…' (Interview 2, DRF expert)

In the wider policy arena at the time, one of the key lessons drawn from the crisis was the need for actors involved in response to become more anticipatory. As authors of a review into the 2012 event write: 'Waiting for a situation to reach crisis point before responding is the wrong way to address chronic vulnerability and recurrent drought in places like the Horn of Africa' (Hillier & Dempsey, 2012:4). Specifically, one of the key underlying issues Hillier and Dempsey highlight was an inability or unwillingness to act in the face of uncertainty, and that future early response would require 'acting on uncertainty' (ibid: 15). This particular report highlighted advances in early warning and technical capacity and a need to agree triggers for response going forwards: 'so that decision makers know exactly what they ought to be doing as the situation deteriorates, and the consequences if they fail to act on those triggers.' (ibid: 16). Indeed, 'a mechanism to trigger response' is one of the key characteristics of DRF and this aspect within DRF mechanisms was often widely seen by interview participants as a key requirement to improving response: '*What we have seen in … the history of humanitarian actions is there's a lot of early warning systems that have absolutely no consequence, because there is no obligation to take an action based on a warning. So, what we're trying to do is to force that…*' (Interview 18, Donor)

In terms of the outcomes of the 2011/2012 Horn of Africa event, the findings from reviews were picked up and used in the UK humanitarian policy context in particular, for example by the publication of the UK Government Humanitarian Emergency Response Review (HERR). Similar themes improving response timeliness were highlighted in this report, with

'anticipation' and 'resilience' amongst the key policy recommendations. As noted previously in Section 2.1, the UK Government Humanitarian Emergency Response Review was very significant in its recommendation that future humanitarian responses should try to 'be "ahead of the curve" rather than always behind; preparing for disasters, as well as reacting to them' (DFID, 2011:7), and highlights a need for improved use of science, in particular climate science, and for decision-makers to better act on this information. Coming as it did shortly after the Horn of Africa crisis, research participants identified this period of time as representing a significant shift in momentum in moving towards anticipatory action and laying the groundwork for DRF – as one participant put it, this represented: '*…a step change around 2011, 2012…as a result of the publication of the HERR Report and the East Africa drought emergency'* (Interview 8, DRF expert).

Thus, the desire to improve the timeliness of response is a key part of the logic for DRF, and accordingly for the policy narratives used to explain the benefits of these approaches. However, it is important to note that timely response is not necessarily always a more effective response – as noted previously, this will vary between hazards based on their likely impacts, the extent to which they can be mitigated, and the lead time available to responders.

Moreover, in the policy literature surrounding DRF, the efficiency and effectiveness arguments are often presented as mutually reinforcing. However, it is important to disaggregate the two logics, because effectiveness does not necessarily equate with cost-efficiency in humanitarian response. For example, evacuating a population away from a severe cyclone might not save money in terms of property or damage to livelihoods, but it would save lives. As one participant explained: '*And I think donors… they all know, you know*

if they invest in our fund[30]*, we're not going to tell them "great, please stop investing in post-disaster response" – we're just not there…I'm sure that the response is costing much less than it could have. But that's just not how it works in the balance sheet.'* (Interview 3, Researcher)

Thus, the way that arguments around efficiency and effectiveness operate as key narratives behind DRF have certainly shifted and evolved over time. There is an underlying recognition that acting in advance, based on risk information and pre-planning is no 'silver bullet' to significant efficiency savings, nor to overcoming the challenges of mitigating the impact of major hazards such as cyclones or hurricanes. However, the prevailing way these logics are expressed in the policy literature is instructive. Indeed, the future direction of travel of the sector appears to be moving towards more insurance-based approaches, in part reflecting how influential the efficiency narratives are. As one participant quoted earlier argued, '*I'm seeing a future in maybe 20 years in which there is going to be definitely a super strong role of the insurance sector in humanitarian action'* (Interview 23, Humanitarian Practitioner). Arguably, the efficiency argument is one of the reasons that insurance mechanisms have gained significant momentum within DRF, since they are seen as cost-effective because they are premised on creating an incentive for governments to accurately price the costs of responding to disasters and to invest appropriately in preparedness (Talbot et al., 2017). This was a further theme amongst participants commenting in particular on insurance-based approaches. For example, this resonates in the comments from the research participant highlighting how: *'disaster risk financing can be important for donors in terms of improving the ownership of risk by countries*' (Interview 15, Donor). Put another way, their argument is that DRF can lead to countries 'owning' more of their risk through insurance because that

[30] Fund name redacted for anonymity

requires them to assess the cost of potential disaster impacts and then pay premiums to transfer a portion of that to a different risk-holder, the insurance company.

Here then, efficiency also emerges as a theme not necessarily for 'return on investment' but as a way to better manage budgets, because insurance allows you to make a decision about how much coverage you think you need and then to pay a premium to transfer remaining risk to the insurance provider. In doing this: '*You have a fixed annual payment in return for coverage for something should the unexpected happen. So, you're trading off uncertainty for fixed cost, that's what insurance does in principle'* (Interview 14, DRF expert). Or, as another participant put it more briefly: '*donors who I've spoken … like it because it helps to smooth out their aid budget'* (Interview 10, Catastrophe Modeller)

4.4. Tensions and challenges in DRF

This chapter has thus far described and contextualised DRF through a discussion of its emergence, definitions and key policy narratives. In this final section I focus on understanding the tensions and challenges in DRF, describing three areas of contestation, and I describe how they become increasingly fundamental to DRF.

The first area of contestation spans the unresolved questions about how actors within DRF should work together - which is both a cause and symptom of some of the diversity of the DRF landscape. In so doing, this explores the roles of both competition and collaboration in creating DRF as a broadly defined, but fragmented, 'community of practice'. The second describes the use of information for decision-making by different actors within DRF, which spans different mechanisms and methodologies for DRF and different types of information

about risk used to trigger actions. The third area of contestation focusses on different understandings and conceptualisations of risk and uncertainty amongst individuals and organisations across the DRF sector.

These three issues are brought together in Figure 11, which is an illustration to demonstrate the tensions across the 'landscape' of actors in DRF. The illustration has been driven by qualitative data, bringing together quotes from interviews and policy materials. It depicts the external-facing coherence of policy and finished DRF 'projects' as the output of work across DRF, which forms part of a logic of international governance, defined by what humanitarian practitioners do on a day-to-day basis: which is to design, gain funding for and then to deliver 'projects' (Krause, 2014b). Underlying this fact however, in practice and as depicted in the 'bubbles' in my illustration are the three areas of contestation, which I discuss in turn in the next section. The three 'bubbles' map onto Sections 4.4.1, 4.4.2 and 4.4.3 and relate to each area of contestation.

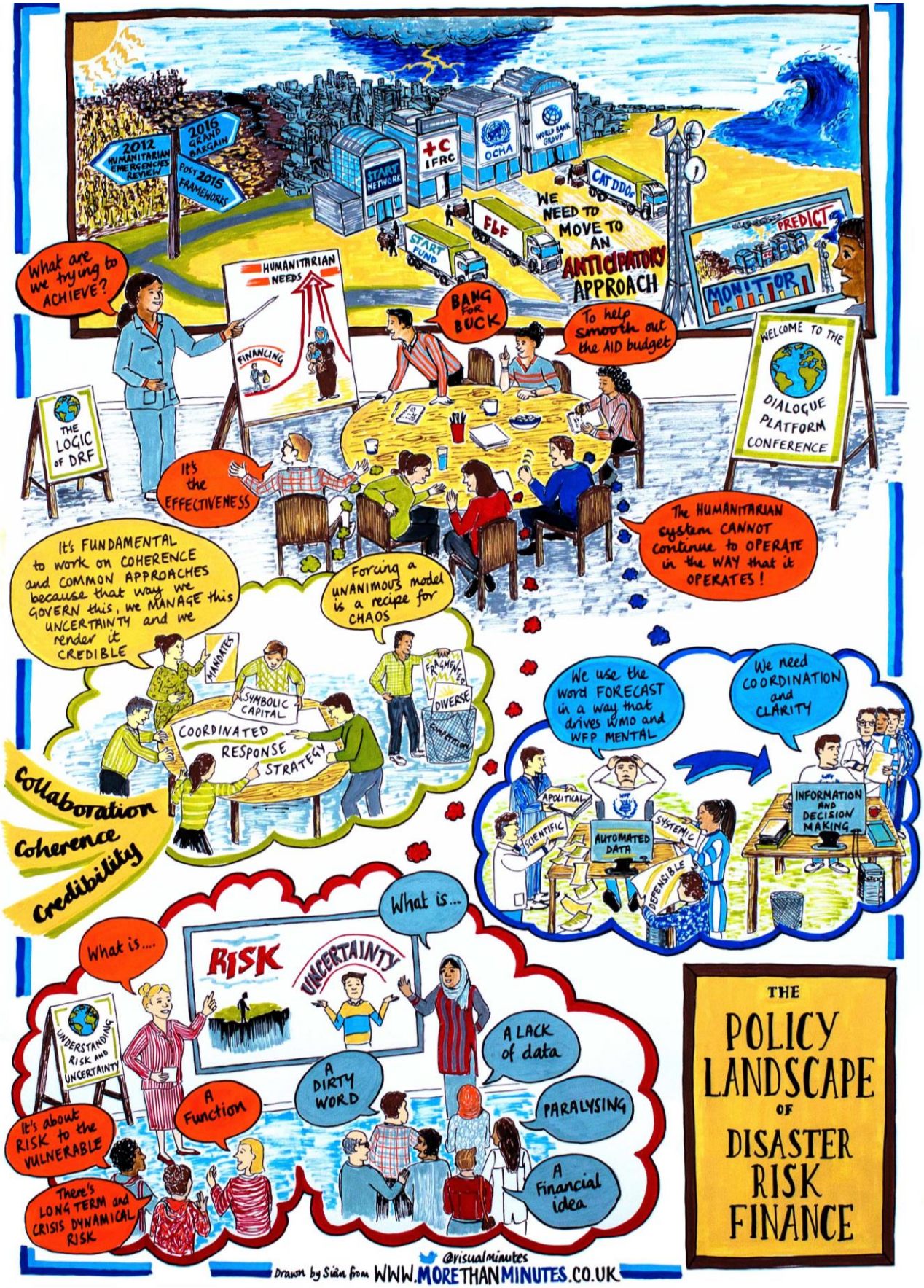

Figure 11 - A graphic illustration of the policy landscape of DRF, based on quotes from interview data, policy documents and participant observation at key conferences. Drawn by Sîan McArthur.

4.4.1 Collaboration and Fragmentation

Figure 12 - Extract from Figure 11 illustration - focussing on the tension between the need to coordinate in order to render DRF credible, and the need for agencies to develop mechanisms in line with their mandates, and that distinguish them from others. Speech bubbles are based on quotes from interviews.

In this first section I discuss the lack of clarity about how the actors involved in DRF should work together, which is expressed through the simultaneous competition and collaboration in the DRF sector and contributes to a complex and fragmented policy landscape.

In terms of the characteristics of DRF as a policy sector, it is notable how often it is described as small, friendly and collaborative. For example, one interview participant commented on

how the first Global Dialogue Platform event in 2015 transpired to be a '*who's who'* of DRF (Interview 16, Donor). The Dialogue Platform events, which I attended for this research in 2018, 2019 and (virtually) in 2020 are extremely 'informal' conferences: alongside the usual keynotes, plenaries and breakout sessions the 2019 Global Dialogue Platform in Berlin included a poetry slam, roller disco and a group shelter building exercise. However, this informality, familiarity and collaborative ambiance seems to stand in contrast with the complexity, fragmentation and duplication that is evident when you look across the sector. As one participant commented: '*I find it quite remarkable how every single dialogue platform everyone is talking about co-operation, collaboration ... The fact that this is emphasised so much makes you wonder, okay but there is probably something underlying this, perhaps not about co-operation?*' (Interview 24, Researcher)

The lack of clarity about the terminology to use for DRF as a wider set of approaches and as discussed previously in Section 4.2.2, however, is symptomatic not just of the diversity of the sector, but of more fundamental tensions. The significant emphasis and efforts put into attempts to build consensus are reflective of this, such as the joint agency 'thesaurus' of anticipatory action and risk financing (De Wit, 2019). The thesaurus is described as 'a collaborative search for a better understanding of language', but in the introduction it also notes the limits to what can be achieved by such efforts. The author of the thesaurus, Sara De Wit, highlights to readers that reflection and mutual understanding are the objectives here - rather than introducing agreed principles for terminology or common standards which may have helped to improve coherence across the sector.

There are a range of other initiatives which also recognise the need for collaboration and better principles for working together across the DRF sector. These include the Anticipatory

Action Task Force, which is a self-formed group consisting of agencies on the development and humanitarian side of DRF including the IFRC, FAO, WFP, UN OCHA and the START network (Anticipatory Action Task Force (AATF), 2021) and the Risk-Informed Early Action Partnership (REAP), which was launched by the UK Government to bring together stakeholders across the climate, humanitarian, and development sector to work on earlier action and early warning systems (REAP Secretariat, 2021). In fact, it is worth highlighting a point made previously that REAP is set to repeat a research process defining DRF terminology, with the advertisement of a consultancy post to write and research a 'Glossary of Terms for Risk-informed Early Action'[31]. Quite how the Glossary is expected to differ from, or go beyond the pre-existing 'Thesaurus for Anticipatory Humanitarian Action' (De Wit, 2019), is unclear. Finally, the German Federal Foreign Office has financed the Anticipation Hub, led by the German Red Cross, the IFRC and the Red Cross Red Crescent Climate Centre, to bring together the Red Cross Red Crescent Societies, United Nation (UN) agencies, non-governmental organizations (NGOs), governments, research institutes, and other actors in the anticipation community shaping the future of the humanitarian system in order to move from reaction to anticipation (Anticipation Hub, 2021).

While recognising the challenge of a rapidly growing and diversifying sector, these efforts towards collaboration arguably do not resolve the underlying causes of the problems found in DRF around duplication, competition and fragmentation, instead, they are arguably a symptom of those processes. The fragmentation of the sector continues to be a cause for operational concerns, however. For example, one interviewee from a donor agency reported about the DRF sector as a whole: *'What I'm seeing now ... is every agency developing their*

[31] The post was advertised in November 2021 online on the REAP website: https://www.early-action-reap.org/vacancy-announcement-consultant-early-action-glossary-development

own suite of risk anticipatory products ... there's one for volcanoes, there's one for flooding in this location ... But to me its nuts. This is really ineffective, inefficient and it's too small and really fiddly for donors as well. Because there's no way that we can fund all of these teeny tiny little contracts and make sure they're working because they're really high risk, no-one's really used them before…' (Interview 6, Donor)

However, in reflecting on the humanitarian system as a whole, the interview participant conceded that these challenges were likely an outcome of the competitive nature of funding allocation, which runs counter to collaboration: '*I think we don't have the right financing instruments in place to support the sector as a whole that would encourage that kind of collaboration ... donors are supporting it with bilateral grant funding which really doesn't ... facilitate or encourage the kind of coordination and collaboration that we need.*' (Interview 6, Donor). Specifically, the participant quoted here pointed to the competitive tender process that determines funding allocation, and the shift to donor funding practices, which are increasingly risk averse: *'Donors have been… contracting the number of the partners that they fund and so the multilaterals have really consolidated their market share. And it's a very vicious cycle ... If we do spend a lot of time talking about coordination and collaboration but the majority of our funding for humanitarian aid goes ... through a competitive tender… we have this disconnect in our policy positioning and then the behaviours that we are encouraging in agencies...'* (Interview 6, Donor)

This is not an unusual problem in the humanitarian context as a whole, where there is a need for different agencies to develop and differentiate their own projects to meet organisational mandates and priorities. For example in Monika Krause's (2014) work, '*The Good Project*', she describes the institutional culture of humanitarian agencies, defining humanitarianism not by

its ideals and objectives, but by what humanitarians do on a day-to-day basis – which is to design, gain funding for and then deliver 'projects' (Krause, 2014). In this analysis she argues that international humanitarian assistance has evolved from a system of charity or political solidarity to an instrument of international governance (ibid). As a result, diverse agencies ranging from the IFRC, to smaller and more innovative organisations, develop projects that reflect their own organisational values. She argues that this approach, where every organisation develops projects which reflect their unique organisational values and mandates, reflects a form of symbolic capital relating to having 'humanitarian authority' (ibid: 11), which requires a 'symbolic differentiation' between the different agencies (ibid: 98). As a result, Krause argues that the pursuit of a 'good project' becomes a logic of its own that drives the allocation of resources and defines the kinds of activities that can legitimately be undertaken under the rubric of "aid" (ibid).

There are strong resonances of this account of the humanitarian sector in DRF, reflected for example in the duplication and fragmentation visible in this field, for example in the individual naming of mechanisms for each different agency. Many of these instruments are in fact the same and could be more easily deciphered if they were given common names such as in the typology graphic in Figure 8. As one interview participant commented, although they wanted to approach the field in a more technical way, they understood the pressures on agencies to differentiate themselves, or as Krause puts it, to design 'a good project' (Krause, 2014). They explained that they wanted everyone to: '*Stop talking about gimmicks. Stop talking about instruments… let's talk about what's needed when. And actually, look at who can bring what to the table for those different objectives, then align it essentially. But it's very difficult, because people have internal political pressures … we need to be the next good thing on this...*' (Interview 8, DRF practitioner)

Some may argue that differences across the sector are largely semantic, such as the differing definitions of key terminologies and concepts. This was certainly the initial theme of the arguments made by interview participants, in particular those on the practitioner side of DRF, who viewed this as a practical challenge rather than a symptom of more fundamental differences, and many of whom argued strongly: '*I don't care what you call it just recognise that these are like the same things*' (Interview 15, DRF expert). Similarly, while discussing different definitions of terminology such as the use of the word 'forecast', one participant commented: '*I think it's the one thing we could get across in the coordination ... and the thesaurus*[32]*. Is to get people ... comfortable with the fact that ... what does it matter to them how I use the word forecast? What matters to all of us is that it means it's based on something – actual warnings – and that it happens before something bad happens. So that's what all of us want, that meaning.'* (Interview 1, Humanitarian practitioner)

However, the lack of closer coordination and common approaches can have significant consequences for the sector. First amongst these is a concern held by some DRF practitioners that a lack of coordination, which results in different agencies responding to different trigger methodologies and at different lead-times, poses a threat to the credibility of the sector. As one practitioner explained: *'…early action is very specific because you have analysis rather than objectively demonstrable facts that have already occurred, which makes it to a certain extent open to interpretation… This is why it's fundamental to work on coherence and common approaches, because that way we govern this, we manage this uncertainty, we manage the questions around the evidence, and we render it credible…'* (Interview 5, Humanitarian practitioner) Here, this interview participant is referring to the fact that the

[32] Referring to the thesaurus document, (De Wit, 2019), which a number of my participants had been interviewed for, or involved with, prior to speaking to me.

norm for humanitarian response is responding to actually existing humanitarian need, rather than trigger response based on 'analysis' – which I refer to as information or measures of risk – and which I view as one of the central challenges to DRF.

Indeed, this can result in occasions where some agencies trigger a response and others don't. This was the case in Mongolia in 2018 – a country where the START Network, Red Cross and the FAO all operate projects. During the winter of 2018, the START Network triggered an 'Anticipation Alert', and the other two agencies did not. This brings into contrast the different methodologies used by the START Network Anticipation Window, which at the time used a 'soft-trigger' approach of reviewing alerts raised by network members, in contrast with the Red Cross FbF mechanism which has a 'hard trigger' of a forecast. Specifically, the Red Cross trigger for early action as specified in their Mongolia Early Action Protocol is 'if three or more provinces have very high risk level for Dzud in more than 20 per cent of their provincial area, per the Dzud risk map issued by the Mongolian meteorological agency' (IFRC, 2019: 1). However, the START Network released funding through the 'Anticipation Window' based on reports of poor conditions in summer 2018 combined with there being limited winter preparedness amongst herder households (START Network, 2020a). One Red Cross staff member of the forecasting and peer review panel established by START to review Anticipation alerts, referred to as the 'FOREWARN group'[33], was reported in an external review - also borne out in this research - as advising against approving the alert from Mongolia, because the indicators of a crisis used by the Red Cross had not been reached. Other experts did not share that view and wanted to take a 'low-regrets' approach, so START proceeded to activate the

[33] The Forecast-based, Warning, Analysis, and Response Network advised on allocation decisions when the START Anticipation Window was active, but with the evolution towards the START Financing Facility they now advise the START Network more generally around challenges and solutions for Early Action work. For more information about FOREWARN: https://startnetwork.org/forewarn

alert anyway (Turnbull et al., 2020: 24). As it transpired, in the winter of 2018/2019 there was no particularly severe Dzud in Mongolia. In their post-event learning report, START Network (2020a) do not explicitly report this as an 'action in vain'. They write instead that whilst the Mongolian meteorological agency Dzud risk map gave the highest risk level for the areas targeted, three out of four of these did not report experiencing severe winter conditions, and a minimum of 50% of herders sampled in each area of their research described winter conditions as 'harsh' (ibid:7). Reflecting on this particular event, one participant in my interviews commented that: '*START network triggered anyway. It's awkward, because we have a programme in Mongolia… we thought, should we write a little explanation…? What's also interesting is that since then there haven't been any major outcomes in Mongolia this year… and I'm sure that helping these people was not bad for them, but it isn't the point …. we should have some kind of internal humanitarian coordination to document some of this stuff. It's just messy'* (Interview 3, Researcher).

Concerns about coordination also apply to donor agencies, who are concerned that the proliferation and duplication of different DRF mechanisms with limited standardisation makes it difficult to understand or determine which mechanisms to fund. This was explained by a participant from a donor agency, who argued their *'…biggest concern at the moment is that we don't have sufficient coordination and collaboration in planning between all of these different initiatives and a lot of them are working on different datasets, different timeframes, triggers ... No clarity of decision-making processes. So, for me what we're missing is that conversation about how these mechanisms operate at a systematic level rather than at an agency level ... donors are completely confused about who to fund and what the trigger was, and no one really can follow.'* (Interview 6, Donor)

While some practitioners advocate for the need for greater clarity in decision-making processes, others have pushed back very strongly from any form of enforced uniformity, especially around triggers for response. One interview participant described uniform triggers for action as: '*…a recipe for chaos*', and further argued that this also presented: '*…a huge systems risk as well because … let's say, agree that we will all work using the same trigger or set of triggers and one of those is wrong, then we will all get it wrong*.' (Interview 18, Donor) Indeed, this has been a major topic for discussion in the sector, and featured as the subject of a side-event at the 2019 Global Dialogue Platform entitled '*The FbF battle'*, which concluded that 'it is unlikely that we will agree on joint triggers' (German Red Cross, 2019: 64-65). Others, however, feel that clarity around terminology and criteria, at least, for triggers would be useful for quality control. As another participant commented: *'The issue at the moment is that the only way that you can assure quality is marking their own homework... I think a lot of the players in this space were very keen for the standards'* (Interview 7, DRF expert).

4.4.2 Use of information for decision-making

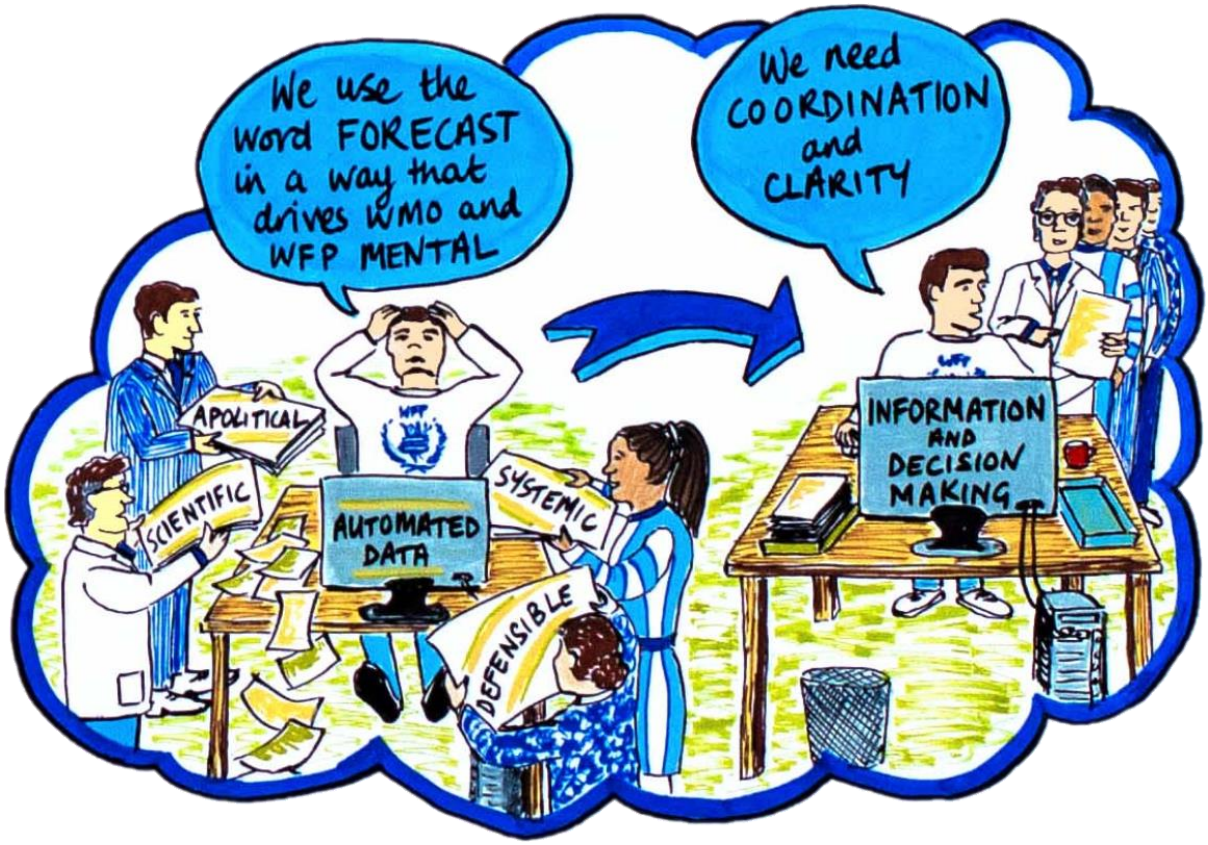

Figure 13 – Extract from Figure 11, focussing on the differences in the use of terminology, the process of using information in decision-making, and some of the pressures towards 'defensible' and 'scientific' decision-making. Speech bubbles are based on quotes from interviews.

How information is used in decision-making is a critical issue in DRF, closely related to the point outlined above about the lack of agreed terminologies and common standards and the case study of the Mongolia response in 2018/2019. The concept of DRF as 'acting based on risk' (De Wit, 2019), instead of waiting for needs to materialise, opens up significant potential for interpretation and misinterpretation. Officially, DRF policy materials clearly define how they determine processes that justify 'acting based on risk' within each distinct DRF mechanism, and the policy documents for each lay out the processes for doing this, such as the FbF Practitioners Manual (Red Cross Red Crescent Climate Centre, German Red Cross &

the IFRC, 2021). However, there is little consensus across the sector as a whole about what types of risk information are adequate, and how such information should feed into decision-making systems or triggers for action. In this section I explore the variations in how risk information is used in decision-making in DRF.

The complexity of how practitioners use information to support decision-making in DRF is well reflected in the fact that the definitions of DRF vary across the sector, where individual actors have different definitions of what makes a credible warning of disaster risk. As outlined in Section 4.2.2 on '*Defining DRF'*, in this thesis I adopt a definition of DRF as encompassing 'a measure of disaster risk'. This was chosen because there is no agreed consensus for the definition of DRF and to choose a more specific definition might have excluded some mechanisms. However, there is a variety of definitions used across the policy literature: for example, Clarke and Dercon adopt a similarly loose definition in their book '*Dull Disasters*', referring to 'A fast, evidence-based decision making process' (Clarke & Dercon, 2016: 3). Others place more emphasis on warning information that provides a quantifiable output, such as a policy document from the START network, whose definition of DRF in this particular paper requires 'quantifying risks in advance' (Montier et al., 2019). This is an interesting example because other mechanisms from the START Network, such as the START Fund Anticipation Window, have a 'soft trigger' – meaning the signal for disaster risk is not a quantifiable threshold, but is determined by a process similar to expert elicitation - whereby any START Network member can raise an alert, by submitting an 'Anticipation Alert Note' to the network for peer review (START Network, 2017). Indeed, this was the case with the Mongolia example explained previously. However, the START Financing Facility, which is the new financial architecture for the network that is currently under development, makes a new division in their funding system, separating crises that have 'predictability' such as floods, droughts and

earthquakes, from those that do not, which in contrast have a separate and flexible funding window, such as for wildfire or conflict (START Network, 2019) - this is further discussed in Chapter 6. However, these differences in definition point to deeper questions around what makes a disaster risk 'predictable', and what determines a minimum threshold for 'predictability', especially when comparing across different physical sciences, such as seismology versus meteorology.

These complexities are strongly evoked in other research into DRF. For example, the aforementioned '*Thesaurus for Anticipatory Humanitarian Action'* defines key words such as 'forecast', but also gives alternative terms that are often used interchangeably, such as 'scientific information', alongside other terms such as hazard modelling, risk analysis, exposure risk mapping, satellite data, predicted needs, observations and 'other forecasts' (De Wit, 2019). De Wit gives an example from a donor interview of how the donor defines 'scientific information': '… when I say 'scientific information', I really mean information that is scientifically defensible" (ibid:16). However, it is not clear if other examples of terminology used in the Thesaurus as synonyms are comparable. For example, information on 'predicted needs' could be derived in any number of ways, which may differ significantly from a methodology used in weather and climate forecasting, or from a methodology that the donor quoted here would deem as 'scientifically defensible'. In this research a number of participants commented on the different ways they defined information used in decision-making and the challenges they had come across when working with other institutions who defined terms differently. For example, one practitioner commented that: '…*we use the word 'forecast' in the way that drives WMO and WFP mental! I talk about everything like 'that conflict was forecasted'… for us it's basically a credible indication of impending crisis. And sometimes that's where the forecast comes in… it's a member conflict analysis or something.*'

(Interview 1, Humanitarian practitioner). This highlights how in many technical disciplines, seemingly commonplace terminology can have a very specific meaning, which can lead to confusion.

The quote above relating to a definition of 'scientific information' as being 'credible' is also instructive in reflecting the narratives through which DRF mechanisms are often described. Many of the mechanisms developed under the auspices of DRF were intended to overcome the inability or unwillingness to act in the face of uncertainty, which is perceived as having been a key part of the failure to respond in a timely way to past events. This was one of the conclusions drawn from the 2011/2012 Horn of Africa crisis, as reviews from the response concluded that future early response would require 'acting on uncertainty' (Hillier & Dempsey, 2012: 15). As such, the structure of DRF is intended to overcome this, in particular through the use of triggers. Moreover, the 'measure of disaster risk' component of DRF is intended to give credibility to decision-making processes. Commenting specifically on the example of FbF, which emerged using only hydro-meteorological forecasts, one participant stressed the rigour of this approach: '*To have a scientific approach, of course this gives FbF a lot of reliability and it's taken seriously … decisions are taken based on scientific facts. Which is of course attractive not only to implementors but also to donors to say okay, we have here a scientific concept which is behind that. So, you can trust the decision-making processes within the organisations to be based on scientific facts. So, I think this is quite attractive for this approach and especially let's say for donors…'* (Interview 16, Donor)

Other practitioners within the DRF space are more sanguine about how scientific information – whether that is forecasts or other sources of data and information – feed into a decision-making process, which in practice is complex and less automated than it might seem. One

participant commented that: '*I think it goes beyond FbF, the general appeal of this linear model is like, oh we can, we just work out the science and the decision will be there, obvious, right? … There's the appeal and the ease of presenting it as kind of this scientific, systematic approach to decision making, which compared to some other ways it might be a little bit more systematic, you know. But that doesn't make it apolitical…'* (Interview 25, Researcher)

Critical disaster studies literature also helps us to understand that 'scientific facts' are not always straight-forward when it comes to hazard prediction and disaster management decision making. The intersecting impacts of disasters, and the complex nature of disaster causality, all make modelling and anticipating disasters a significant challenge (Donovan, 2017). Regardless of the accuracy or scientific methodology of hazard forecasting, it is still only one component of what results in a disaster – as both vulnerability and exposure interact in ways which are complex and difficult to measure and predict - despite the predominance of hazard-focussed approaches within disaster risk management. This points to the difference between forecasting a hazard and predicting a disaster, and relies in practice on assumptions around path dependency, overlooking the emergent nature of disasters. These considerations are further discussed in Chapter 5.

4.4.3 Understanding risk and uncertainty

Figure 14 - Extract from Figure 11, focussing on the differences in the way research participants understand risk and uncertainty. Speech bubbles are short quotes taken from interviews of participants describing risk and uncertainty.

The final contested area of the DRF policy landscape I discuss in this Chapter relates to questions of risk and uncertainty. One senior DRF practitioner from the Centre for Disaster Protection, speaking at a recent webinar presentation explained DRF as fundamentally inviting reflection about '*What do we know? What can we predict? What can we foresee?*' (Sophie Evans, Head of Country Programmes, Centre for Disaster Protection[34]). To go further, because DRF is about acting based on risk information rather than actually existing need, it opens up questions about how sure we are about what we know. What follows from this are

[34] Speaking during a recorded public webinar, the 'InsuResilience Sectoral Community Workshop: Linking Anticipatory Action to Risk Financing', 20th September 2021. Timestamp 8.56: https://www.youtube.com/watch?v=W6ZB4p4kSgo

questions not often explicitly asked within 'formal' spaces of DRF, but which are also critical to acting based on predictions: how much do we know about the bounds of uncertainty, or, formulated in the phraseology of Donald Rumsfeld's infamous quote, what 'don't we know that we don't know[35]?

Such questions about knowledge, and the boundaries and limits to our knowledge point to debates about risk and uncertainty. Scholars in science and technology studies have long discussed how states of knowledge determine the boundaries between risk and uncertainty – for example, as Andy Stirling writes, the bounds between ignorance, uncertainty, ambiguity and risk are different states of knowledge, rather than states of being (Stirling, 2009). Similarly, Scoones and Stirling write that: 'Uncertainties therefore are conditions of knowledge itself' (2020: 4). As outlined in the literature review, there are a number of different approaches to understanding risk and uncertainty from different literatures, although one commonality amongst them is that degrees of knowledge determine the boundary between the two.

In this section I discuss the way risk and uncertainty are understood and conceptualised across DRF. This is important because, ultimately, how risk and uncertainty are understood in DRF shapes individual mechanisms and feeds through into the entire policy landscape – in other words, thinking about risk and uncertainty forms the conceptual underpinning of DRF. The framing and conceptualisation of both risk and uncertainty are therefore critical– and notably in the case of uncertainty, it is important not just in how it is understood and discussed, but often conspicuous by its absence. In this section, therefore, I introduce how risk and uncertainty are understood, in particular exploring how actors from different backgrounds

[35] See footnote 10, Chapter 2, Section 2.1 for full details. The quote is from a press conference in 2002.

and agencies differ in their approach. This lays the foundation for Chapters 5 and 6 which further explore the politics of, and the politics enacted by, risk and uncertainty through DRF.

Variations in how people perceive and understand risk and disaster has been an important topic in disasters scholarship (see for example Bankoff, 2003; Binder & Baker, 2017; Krüger et al., 2015). However, analyses of risk perception and understanding has tended to focus more on areas and peoples that scholars consider as vulnerable, or exposed to disasters, and is less often turned inwards to analyse its own cultures of risk and uncertainty (Hewitt, 2015). Instead, it is more commonly the objective of researchers in DRR to better identify risk, and to articulate or quantify uncertainty. For example, Golding et al. (2019) present a knowledge chain for flood early warning systems, intended to best address technical challenges. At each step, from observation to modelling to impact forecasting and communication of risks they note that different uncertainties are introduced into the process (ibid). While it is useful to visualise different types of knowledge and uncertainty in the process of forecasting and communicating hazards, the notion of a 'chain' over-emphasises the commonly held assumption that scientific knowledge is enacted in a linear way and under-emphasises the way in which uncertainties and even ambiguities can be buried within science-policy interactions (Pelling et al. 2020).

In the case of DRF this applies to the way in which uncertainty is often overlooked in the assumptions that frame mechanisms and is certainly evident in the formal policy literature. As noted previously, DRF is designed to support practitioners to take action based not on existing need but based on measures of 'risk'. This shift is an essential part of the logics of 'efficiency' and 'effectiveness' that define DRF, but it also poses the most significant challenges to the credibility of the approaches. Predicting future need is difficult, and there is

always a chance of predicting an event that does not occur, or of missing an event that was not predicted accurately. This creates a need to legitimate and defend decisions taken about valuable humanitarian resources. As De Wit argues in her discussion of the language used in DRF: 'questions around temporality have moral implications for finding a common understanding of when decisions are taken and actions planned, how you justify those choices, and how they can be funded' (2019: 34).

As the section previously outlines, 'credibility' and 'defensibility' have become key narratives within DRF, and this is further reflected in the emphasis on scientific approaches and the rigour of the methodologies used. Scholars in science and technology studies have, however, shown extensively that 'scientific fact' is not an objective monolith, but rather a co-produced, social process (S. Jasanoff, 2004; Stirling, 2009; Wynne, 1992). Underlying this, the claim to credibility and 'defensibility' overlooks the complexity of hazard and impact forecasting, which is characterised by inescapable uncertainty.

In interviews, when asked how participants understand and conceptualise risk in their work, responses varied significantly. At one end of the spectrum, some participants held to a very technical approach that evokes the definition of risk used in key literature, such as the well-known diagram produced by the IPCC Impacts, Adaptation and Vulnerability report in 2014, where the risk of climate-related impacts is defined as an outcome from the interaction of climate-related hazards with the vulnerability and exposure of human and natural systems (IPCC, 2014). This was a particular theme amongst those working on the sovereign financing side of DRF, typified by this response: '*risk is the synthesis of a hazard, some element of vulnerability and the synthesis of those two becomes the risk which has a monetary component in most cases.'* (Interview 6, DRF expert)

A different research participant from a development financing background highlighted risk-taking as a necessary part of economic development. They explained that while: '*I think there's definitely been a growing … awareness that risk is something that you both want to manage as well as you want to encourage ... If you don't take risks, you have very limited rewards*.' They further elaborated that '*… speaking from the financial practice here ... risk is inherent to take any investment decision'* (Interview 14, DRF expert). To some extent this evokes the definitions of risk discussed in the literature review, such as Knight's conceptualisation of risk and uncertainty, which was bound up with his theory of profit (Knight, 2006/1921). The important difference here, however, is that Knight thought that profits could only be achieved by acting in the face of uncertainty (ibid).

Some research participants drew attention to the challenges they had experienced in communicating and understanding risk with other colleagues. For example, one interview participant who had a background in disaster risk management before specialising in risk financing, explained the process of conducting a research project into drought risk over time and explained that: '*I didn't realise people didn't realise that there was (sic) two types of risk. More long-term static risk and dynamical crisis timeline risk ... (the project) was articulating this difference in long term risk reduction and resilience building and poverty being a key thing in that, and actual acute event risk. Which is a different type of risk. And this was totally lost...'* (Interview 8, DRF expert). This is not to diagnose a lack of understanding of risk across the sector, but to reflect that 'risk' is not a singular, objective metric 'out there' that can be simply measured – instead it is complex, specific to particular hazards and contexts in question, and hence difficult to convey across disciplinary boundaries.

One other facet of how risk is understood is the relative attention paid to the hazard versus the vulnerability and exposure aspects, common to definitions of risk used in disaster risk reduction practice and scholarship, such as the UNISDR definition (2009), outlined previously in Section 2.3. In the DRF policy landscape, because of the work towards identifying triggers for action which are linked to hazard thresholds, this can lead to a tendency to emphasise the hazard component at the expense of vulnerability and exposure. For example, one participant explained how they felt people from risk financing and catastrophe modelling backgrounds missed something important in their conceptions of risk: '*In a presentation someone from RMS*[36] *said "The great thing about risk is it can be mapped, it can be visualised…" Presenting these wonderful graphics… But that's not the kind of risk I'm interested in, I'm mostly interested in the poor, risk to the poor, as should (my agency*[37]*)* (Interview 4, Donor). Another participant from a 'development' background identified specifically that they thought practitioners in DRF were likely to miss vulnerability and exposure aspects of risk, because of the focus on hazard modelling for identifying triggers: '…*risk is not independent, there is a vulnerability part of risk right, the exposure part of the risk… there has been a lot more focus on the hazard in the finding a trigger, partly because … of the sector where this comes from. It comes from the finance, science sort of things… and also because it's a lot more difficult to figure out vulnerability*!' (Interview 11, Humanitarian practitioner)

I now turn to considering how uncertainty is understood by those working within the DRF policy landscape. The responses I received when interviewing participants suggested that they thought uncertainty posed a significant challenge - both conceptually and in terms of the

[36] RMS – Risk Management Solutions - is a prominent catastrophe modelling company, who develop catastrophe models for insurers, reinsurers, financial services organizations, and the public sector, and they have been involved in consulting and advising in the DRF sector. For example, their staff co-authored the 'DRF toolkit' policy paper (Meenan et al. 2019), which I refer to further in Chapters 5 and 6.
[37] Agency name redacted for anonymity reasons.

political implications of how they navigate and discuss uncertainty in their work, and the range and variety of responses from participants was greater than when discussing risk. As a starting point, it is helpful to discuss how participants distinguished risk from uncertainty in their work. For example, one participant from a technical background explained: '*there is (sic) two levels… One is the uncertainty you absolutely cannot quantify because mathematically you just can't do it …I don't know if you know Donald Rumsfeld's famous unknown known's etc…. I mean it is absolutely applicable to this field particularly when we are talking about bigger events… So, there is that box of stuff we can't quantify. And then there is stuff we can quantify because we actually do have some data and you can use mathematical approaches to quantify uncertainty around that data'* (Interview 13, Catastrophe modeller). It is important to note that this participant viewed 'quantifiable uncertainty' as a form of uncertainty, and went on to explain that the need in the financial sector to quantify uncertainty was linked to demonstrating an ability to remain solvent, and withstand unforeseen shocks. As a result, this research participant argued that '*the concept of dealing with uncertainty is pretty well ingrained in the finance sector in a way that I think it is not ingrained in the public sector*' (Interview 13, Catastrophe modeller).

However, this approach differs from many other practitioners within the DRF space, who largely view quantifiable uncertainty as a form of risk – echoing the concept of Knightian uncertainty (Knight, 2006/1921) - which is commonly held among economists, policymakers, and many social scientists. To highlight this difference, one research participant who had worked at an economic research institution, prior to moving to a risk financing role explained this: '*where I work now you know we characterise risk as basically like an EP curve*[38] *so,*

[38] (EP curve) refers to 'Exceedance Probability' curve, which is a calculation used by catastrophe modellers to tell you the likelihood that a loss of any given size or greater will occur in a given year.

probability of event times the impact… So, uncertainty would be to describe the fact that you didn't know what your probability risks are.' (Interview 15, DRF expert) Here then, the participant explains that not being able to quantify probabilities refers to uncertainty – which stands in contrast to the previous participant who views quantifiable uncertainty as a legitimate and mathematically constrained form of uncertainty. The former view, however, resonates more widely across the DRF policy literature - although the definitions used for DRF vary - as explained previously, one of the common ones is that DRF operates 'by quantifying risks in advance of disasters' (Montier et al., 2019: 3). Therefore, it is very commonly held across DRF policy materials that any hazard, when quantified as a probability, is a metric of risk – but as shown previously - this is not unanimous across participants involved in this research, especially those from a modelling and catastrophe risk background.

However, the shortcomings of an approach which views any numerical output of a model, forecast or other information as a measure of risk are made clear, when you consider the types of forecasting models widely used across DRF and the uncertainties implicated in these. This is highlighted by a research participant from a forecasting background, who described a situation in the Philippines where the tropical cyclone model used as the EAP trigger for an FbF system was contradicted by another model. Although the validated trigger was the model that the EAP was tied to, a full understanding of uncertainty requires following and taking seriously other credible forecasts – resulting in a different type of uncertainty. The research participant explained the situation: '*You've got the uncertainties that you can quantify, a sort of stochastic one, so you can say like a 50% chance of a flood… but you know that there's the uncertainty that you can't quantify or characterise … that the ensemble is not representing… like I say in the Philippines… you would have an ensemble forecast of tropical cyclones and*

you've got an ECMWF[39] *ensemble that says one thing and a Met Office ensemble that says another thing, and if they were characterising uncertainty well, then the ensembles' spread would be overlapping in both of them. But if they both say separate things, then what do you do? Because there's uncertainty that goes beyond what that ensemble is representing*…' (Interview 27, Researcher)

It is also important to highlight the challenges of talking about uncertainty in the context of DRF. As outlined previously, while DRF methodologies vary, they are characterised by systems designed to avoid 'decision paralysis', that are perceived by many to be the cause of slow and ineffective disaster response. As such, notions of credibility, rigour and scientific defensibility are key themes. For example, one participant explained that in their view: '*uncertainty is seen as "I don't know the answer" and that tends to paralyse people…'* (Interview 15, DRF expert) Indeed, while risk is distinguished from uncertainty in much of the policy literature based on the ability to quantify outcomes, in some of the higher-level policy documents, such as Mark Lowcock's speeches advocating for risk financing, there is no mention of uncertainty whatsoever. In the two extensive speeches about DRF delivered by Mark Lowcock in 2018 and 2019, the word 'risk' is used a total of 36 times - the word 'uncertainty' is not used at all. As noted previously in Chapter 3, speeches are particularly useful for analysis policy narratives, because language is chosen so carefully and intentionally (Pierce, 2008). The fact that they word 'uncertainty' is not used at all is revealing by its omission.

Not only are understandings of risk and uncertainty complex, as outlined in Chapter 2 in the Literature Review, but they are also shaped by policy perspectives, pressures, and the disciplinary backgrounds of individuals and institutions as a whole. This was reflected by some

[39] European Centre for Medium-Range Weather Forecasts

interview participants who recognised the extent to which definitions of risk and uncertainty had varied between organisations they had worked in, and how this influenced their own thinking. As one risk financing specialist commented: '*because I've been backwards and forwards. So, I went from government to (a catastrophe modelling company), where I got the much more insurance view of what risk and uncertainty are, to (a research institution) where it's the more economic view. And then to (government*[40]*) well, definitions of anything kind of go out the window... You just get on with it!'* (Interview 15, DRF expert)

Interview participants also identified differences in understanding and conceptualising uncertainty between small sub-sets of disciplines. For example, one researcher explained how they thought there was a difference between how they understood uncertainty in their work as a hydrologist, versus how climate scientists understand uncertainty, because of the difference in computational requirements between the disciplines. They explained: '*…in hydrology the models are less computationally expensive so actually, hydrology is much more advanced in how it deals with uncertainty and explores uncertainty. Because hydrologists might run many thousand versions of a model to explore the uncertainty in it, rather than climate science… they have to balance their computing resources. So, it would be a case of, do we have a high-resolution model or a massive ensemble… in hydrology you don't really have that. You can explore that full space. So, I think there's definitely a difference there depending on the background*.' (Interview 27, Researcher)

Because of the different organisations and disciplines active in DRF, the sector is effectively a convergence zone for different understandings of risk and uncertainty, emerging from different disciplinary perspectives and epistemologies, ranging from humanitarians to

[40] Names of the organisations redacted for anonymity reasons

actuaries and hydrologists to disaster risk management practitioners. These understandings of risk and uncertainty are the foundation for the policy landscape of DRF, underpinning how information is used in decision-making, and how particular approaches and conceptualisations mesh into the broader policy landscape of DRF, and feed into much of the complexity and tensions therein. Throughout this chapter we have seen a repeating theme about how DRF sets up a need for 'credible', 'defensible' knowledge, but ultimately the boundaries of our ability to know, predict and forecast hazards and disasters are constrained by knowledge - and the limits to our knowledge. However, knowledge is not linear, cumulative, singular or uniform, and we must also acknowledge the entanglements of power in knowledge (Stirling, 2009), shaping particular framings such as the call for 'credible' and 'defensible' methodologies in DRF. This points to the politics of risk and uncertainty, which is the subject of the subsequent chapter.

5. 'Think like insurance companies'? The politics of risk and uncertainty in DRF

5.1. Introduction

As discussed in the previous chapter, DRF represents a shift towards triggering action based on information – measures of risk - instead of responding to disaster impacts that have actually occurred. This shift is important to the objectives of DRF, but it also creates a challenge for policymakers and practitioners because it opens up decision-making processes to interpretation, and poses questions about decision-making, mandates and liability.

In the previous chapter I outlined the policy landscape of DRF, which concluded with a discussion of differences in how individuals understand risk and uncertainty. This is influenced by a variety of factors such as the disciplinary and organisational backgrounds of interview participants. Science and technology studies scholarship is useful here to remind us of the role of knowledge in risk and uncertainty - bounding what we know, and what we don't know - and also remind us of the entanglements of power in knowledge (Stirling, 2009). This points to the politics of risk and uncertainty, which is the focus of this chapter.

The use of information in decision-making was a key theme in the previous chapter. Specifically, the need to justify actions taken based on risk information, rather than existing humanitarian need, has established 'credible' and 'defensible' decision-making as a key priority in DRF. This is not surprising in a policy context where one of the 'barriers' to timely response has been seen as inertia. For example, in a 2019 speech which covered a range of different DRF mechanisms, Mark Lowcock referred to decision-makers being 'paralyzed by the fear of getting it wrong' (Lowcock, 2019: 8), and encouraged them to be willing to act even if it is a false alarm, or an action in vain. Perhaps unsurprisingly, there is relatively little

discussion in policy literature about accepting the likelihood of action in vain, or of a tolerable potential frequency of such events, and instead, the framing of DRF places emphasis on ensuring that processes within DRF mechanisms make decisions credible and defensible. This resonates strongly in the three defining components of DRF. Although these are formulated differently by different organisations and actors – as discussed in Chapter 4 – in this thesis I define DRF as mechanisms which encompass the following:

1. a measure of disaster risk
2. pre-arranged finance and plans and
3. a mechanism to trigger response

Each of these components can be understood as supporting components to providing clarity and confidence for decision-makers and a justifiable basis for taking action, and not just the first pillar of a 'measure of disaster risk'. For example, the component requiring that financing and plans are pre-arranged is explained in one policy document as creating 'certainty about what finance will be available…' (Montier et al., 2019: 4), giving disaster managers and decision-makers confidence to act. Meanwhile, the third component of 'a mechanism to trigger response' is intended to overcome any potential inertia created by uncertainty. The purpose of the trigger component was further explained to me by one participant as: '*the function of triggers is not to tell you what to do, but when to act… you're changing the default from hesitating and wondering to taking action*' (Interview 18, Donor).

It is understandable that agencies involved in DRF are anxious to ensure decisions made through DRF mechanisms are credible, defensible and clear, which are worthy objectives. However, the vocabulary and framing of DRF is narrowly focussed on this at the expense of more fully acknowledging the uncertainties of acting based on information about disaster risk.

In this chapter, therefore, I further discuss the implications of DRF in terms of producing a need for systems which can defend and justify decision-making. I do this through a discussion of the politics of risk and uncertainty, explaining why risk and uncertainty are necessarily understood in distinct ways by different actors across the DRF sector. Specifically, there is a danger that the shift towards acting on measures of disaster risk leads to an excessive focus on constructs around 'risk' at the expense of more fully acknowledging the role of uncertainty.

I further argue that the drive for more 'defensible' and 'credible' approaches finds expression in the set of policy narratives around DRF such as the recommendations that DRF operate on more insurance-based principles. This is clearly expressed in the influential book '*Dull Disasters'*, where the authors argue: 'Our advice to such an agency, or to a ministry, or a local or international non-governmental organization (NGO) involved in disaster response is this: think like insurance companies and responses will be more cost-effective with better outcomes' (Clarke & Dercon, 2016: 79) . While the hybridisation of mechanisms and cross-fertilisation is certainly one feature of DRF, I argue that the narrative of 'thinking like an insurance company' also resonates across the sector in non-insurance mechanisms, because these approaches are seen as part of the 'defensible' and 'credible' logic of DRF.

Theoretically, in this chapter I bring to bear literatures from STS and disaster risk management to give a more nuanced account of the difficulties of predicting hazards and disaster and explore what it means to adopt more automated, trigger-based approaches. STS literature in particular has long noted an over-reliance on risk-based methodologies in several domains of science-policy interaction (Scoones, 2019; Stirling, 2007, 2009, 2010; Wynne, 1992). This tendency is associated with the notion that 'risk-based' approaches allow decisions to be conceived, asserted and defended, to achieve the 'vital political resource of justification'

(Stirling, 2009: 38). Moreover, assumptions around a binary distinction between risk and uncertainty also underplay the complexity of statistical methodologies as applied in modern catastrophe modelling and insurance practices (Bougen, 2003; Jarzabkowski et al., 2015; O'Malley, 2003) , approaches which DRF practitioners are seeking to draw from. Literatures from sociology and risk governance help us to better understand that the boundaries between risk and uncertainty therefore depend on 'degrees of calculability'. In efforts to anticipate hazards through the use of modelling and forecasting, there are many instances when these boundaries blur (Bougen, 2003; O'Malley, 2003) and become 'fuzzier' than we might realise.

In making these arguments, this chapter explores the politics of risk and uncertainty through which actors in the DRF space operate. There are numerous underlying policy drivers pushing towards more trigger-based and automated systems within DRF as part of the need to justify and defend decision-making to key constituencies, in particular donors. The chapter concludes by discussing the notion of the 'political economy of liability' – a term introduced by Leigh Johnson (2020) in her discussion about the use of parametric insurance - where she asks what happens when these instruments fail to pay out, and who is responsible? I use the same phrase, but do so to ask a different question, which is to highlight how concerns about liability shape DRF mechanisms and the wider sector, at the expense of fuller recognition of the role of uncertainty. In this chapter, therefore, I explore the 'political economy of liability' (ibid) to explore how concerns about liability are influencing the DRF wider sector, both discursively and materially in terms of the mechanisms themselves.

5.2. The challenge of decision-making in DRF: 'Think Like an Insurance Company'

As argued in Chapter 4, navigating risk and uncertainty is one of the central underlying challenges of DRF. Responding to hazards and disasters under any conditions requires this, but because DRF mechanisms trigger based on information and measures of risk such as forecasts, models and other data, DRF opens the possibility of acting in vain, or missing events which were not anticipated or accurately forecasted. This creates a challenge for practitioners, as articulated by one research participant quoted in Chapter 4: '*…early action is … to a certain extent open to interpretation… This is why it's fundamental to work on coherence and common approaches because that way we govern this, we manage this uncertainty, we manage the questions around the evidence, and we render it credible…'* (Interview 5, Humanitarian practitioner). Designing methodologies that help to render DRF 'credible' in a way which allows practitioners to confidently trigger action is therefore the critical challenge of DRF - but this is far from straight-forward.

In this section I further explore the way risk and uncertainty are understood in DRF. In view of the name disaster *risk* financing, it is no surprise that risk is a central focus of the policy landscape around DRF. However, as introduced in Chapter 4, the term disaster risk financing was first used by the World Bank and insurance and financing specialists, and then most notably defined in the book '*Dull Disasters*', by Daniel Clarke and Stephen Dercon, which was significant in extending the use of the term DRF across the sector. In this book the authors Clarke & Dercon advise agencies responsible for disaster management to 'think like insurance companies' (2016: 79), and in this first section I further discuss what 'thinking like an insurance company' means in the context of DRF and reflect on the influence that this policy narrative has had across the sector.

Specifically, Clarke and Dercon argue that if those responsible for disaster management were to 'think like an insurance company', responses would be more effective and more efficient (ibid). Here I discuss and explain the approach of DRF towards risk and what is implied in the phrase to 'think like an insurance company'.

Clarke and Dercon make this argument in the following way:

> 'Suppose there is an agency in charge of disaster response and preparedness. If it were to learn to think like a reputable insurance company, it would get better at credible financial planning for disasters. Suppose the agency and political leaders have agreed who and what will be protected, against what, and how the protection will work. This 'how' provides the blueprint for a well-defined response and recovery plan to which the agency is committed… this agency would then work with engineers and logistical experts to ensure it has a clear idea of how much cash the plan would require in the aftermath of different disasters. It would also work with scientists and risk modellers to understand the likelihood of different types of disaster occurring. These two tracks of technical work would allow the agency to develop a probabilistic assessment of its potential financial liability, its contingent liability. Armed with this, the agency would then use actuaries and other financial experts to piece together different budgetary and financial instruments to form a strategy that would ensure it could meet this contingent liability as cost-effectively as possible' (Clarke & Dercon, 2016: 78-79).

Clarke and Dercon's advice here refers to agencies in charge of – or who hold the mandate for disaster response - but it is perhaps most directly relevant to governments. They propose that in the sovereign financial context, 'thinking like an insurance company' would involve

drawing on a range of different tools to meet potential 'contingent liability', a financial term which means potential future costs contingent on the outcomes of particular events. As Clarke and Dercon describe, this would enable agencies to '…piece together different budgetary and financial instruments to form a strategy that would ensure it could meet this contingent liability as cost-effectively as possible' (ibid: 79). In practice, this would point to a range of potential mechanisms such as pre-agreed loans, Catastrophe Deferred Drawdown Options (Cat DDOs), pooling risk through sovereign risk pools and transferring risk such as through insurance.

Kevin Grove also analyses this passage in a recent paper about 'ex-ante' financing through the CCRIF mechanism, arguing that Clarke and Dercon's approach to contingent liabilities 'mathematizes the state's post-disaster response … subjecting them to a calculative rationality focused on developing the kind of financial self-sufficiency insurance companies must exercise' (Grove, 2021: 229).

It is also important to highlight the operational differences between the sovereign disaster response context versus the private sector that Clarke and Dercon are referring to as the example from which to draw lessons. While decisions about planning for contingent liability are always going to be complex, the requirements and standards that the private sector adheres to are different to those in the sovereign context, and very clear. For example, since the 2008 financial crisis, UK banks, building societies and insurers must comply with annual solvency stress testing, to demonstrate their ability to withstand another crisis based on hypothetical stress scenarios, as well as complying with biennial exploratory scenarios resulting from different risks, such as climate change or cyber-crime[41]. Most insurance

[41] More information about Bank of England stress testing is available here: https://www.bankofengland.co.uk/stress-testing Other jurisdictions have similar processes, for example US

companies manage this by holding a capital base sufficient to cover a set threshold of liability and purchasing reinsurance for the remaining amount that they are potentially liable for, thus transferring this to reinsurance markets.

It is worth noting that some of what Clarke and Dercon (2016) refer to as 'thinking like an insurance company', and some of the points they make about contingent liability evokes arguments made in Chapter 4 around the perception that insurance improves 'risk ownership' amongst governments. This is in part seen as an outcome of the processes of acquiring insurance: through assessing what contingent liability will be met with reserves, and what will be transferred or pooled through other financial tools, for example. This was expressed by one research participant as a process whereby DRF 'created certainty' by making explicit what those contingent liabilities were: '*…in most cases those liabilities are not actually quantified from the government. The government doesn't actually know how much funding they're on the hook for… so disaster risk financing can create certainty. Because it turns implicit liabilities into explicit liabilities*.' (Interview 14, DRF expert)

The key point to highlight here is that whilst this advice is most relevant in practice for the sovereign context – despite what the authors claim about relevance for any agency responsible for disaster response - the notion of 'thinking like insurance companies' has permeated across DRF as a narrative for the types of mechanisms, and underlying approaches about how risk is conceptualised. It is noteworthy that other publications used in the DRF sector as guidance documents follow a very similar outline to the recommendations made by Clarke and Dercon. For example, a working paper entitled a 'DRF toolkit' (Meenan et al., 2019), that I refer to further in Chapter 6, follows a very similar approach to Clarke and Dercon

banks are subject to two mandated stress test regimes, known as the Comprehensive Capital Analysis and Review (CCAR) and Dodd-Frank Act Stress Test (DFAST) exercises.

in terms of the steps to assess potential costs of hazards and decide how these will be met. The authors do not use the term 'contingent liability', but in other regards the process is very similar, setting out key steps about how to 'conduct a risk audit' as part of the initial stages of developing a DRF strategy (Meenan et al. 2019). They spell out the steps of a 'risk audit', which should consist of: i) defining the exposure at risk, ii) identifying what perils and hazards can impact that exposure, iii) quantifying the expected frequency and severity of impact from those perils, and iv) deciding a resilience target of how and to what extent those risks will be financially covered (2019: 16). This paper is significant because it is referenced in other policy literature, in particular relating to the development of the new START Financing Facility, where it is drawn upon to guide the development of the 'risk layered' facility (START Network, 2019) – demonstrating the wider influence of Clarke and Dercon's advice.

Furthermore, beyond applying the approach to assessing and managing contingent liability as suggested by Clarke and Dercon, I argue that the very notion of extending a more insurance-like approach has had a major impact across the DRF sector. For example, it can be seen in the message from Mark Lowcock's speeches on humanitarian and risk financing, such as in his Casement Lecture in 2018, where he argued throughout for making greater use of disaster risk insurance and urged humanitarian agencies: 'to build our financial skills, including by hiring more finance professionals, economists, data analysts and statisticians, as well as people with experience in banking, insurance and development finance institutions' (Lowcock, 2018: 10). In this speech he further suggested insurance mechanisms could meet more humanitarian needs, drawing evidence from UN OCHA that between 20-30 per cent of needs met in 2018 could in principle be met through insurance (ibid:4).

It is interesting to note how his message on insurance has shifted and nuanced over time,

however. In his follow-up speech, which focussed more on anticipatory financing, Lowcock emphasised that he wished to see more progress on developing insurance products which pay out earlier – anticipating crises – and those that incentivise risk reduction (Lowcock, 2019). Nevertheless, he still highlighted the potential benefits of insurance for risk financing, doing so in a way which underlined the benefits of a more 'insurance-like' approach instead of insurance *per se*. For example, in a passage discussing the benefits of index-based insurance, he argued that insurance can be useful because the trigger-based element creates an impetus for action, contending that '…the insurance here, in other words, provides not just the resources to act, but also the signal that action is necessary' (ibid:3).

This broader point about the benefits to DRF of the tools and lessons derived from the insurance industry was also made by participants. The call to draw from the private sector was further explained by one research participant in the following terms: '*how do you quantify risk, how do you identify risky areas, who are the people at risk? That's what the insurers would do for underwriting policies, how do you set triggers, when do you pay out? ... Those are all tools, processes, experience and expertise that can come from the insurance sector*.' (Interview 14, DRF expert). This participant went on to explain that in engagements with a range of stakeholders, what they were trying to achieve was not just to extend insurance coverage but to apply its tools and lessons: '….*from the World Bank, from donors, from countries themselves and development partners from their organisations ... they're looking to insurance, both insurance itself as well as instrument tools and lessons that we can learn from insurance for non-risk transfer*.' (Interview 14, DRF expert) This was also echoed by a participant from a donor organisation, explaining that they were not using insurance *per se*, but trying to apply what they perceived as the benefits of an insurance-based approach in their work: '… *insurance is a good thing because it's fast and because it is predictable. So,*

what we want to do in dealing with humanitarian problems is to borrow those two features or principles of insurance and apply them to our business models.' (Interview 18, Donor).

While to a certain extent the phrasing in the particular passage of Clarke and Dercon's work in terms of the advice to 'think like insurance companies' must be recognised as a soundbite designed for particular policy audiences, in a range of ways it has served as a powerful narrative across the DRF sector, carrying with it a range of assumptions relating to the presumed benefits of a more 'insurance-like' way of thinking about risk and disaster response. In the following section I further explore how a more 'insurance-based' way of operating has been translated across DRF as a policy sector. This includes a focus on numerical estimates and quantifications understood as measures of risk, which dominates the way in which the principles of insurance have been applied across DRF, and secondly, through a preference for the use of 'hard-triggers' for action.

5.2.1 The preference for automation and hard-triggers

Looking across the DRF sector the notion of 'thinking like an insurance company' are expressed within non-insurance mechanisms, in particular through the strong preference for more automated approaches and the use of 'hard-triggers' within mechanisms, which I further discuss in this section.

In terms of triggers, as noted in Chapter 4, DRF spans a range of different methodologies. This typology includes:

- budgetary instruments such as anticipation funds with a 'soft' trigger eg. expert judgement:

- contingent finance where there is a commitment to release finance based on a 'hard' trigger such as a forecast;
- market-based instruments which span different types of insurance, and finally;
- hybrid mechanisms which combine and often layer different mechanisms from within this typology.

There are examples of each type of mechanism within the DRF space. However, there are many more examples of mechanisms that use a 'hard' trigger – which refers to a numerical or objective threshold, than those which use a 'soft' trigger approach, as shown in the typology in Figure 8. To look at the latter category first, one example of a 'soft-trigger' based instrument within DRF was the START Network's Anticipation Window, which launched in 2016. As explained in Chapter 4, this system allows members of their networks to raise anticipation alerts and then review these alerts through an expert judgement-based process, led by START Network members and which drew additional advice from a network of experts, which START refers to as the 'FOREWARN' group, explained in Chapter 4, Section 4.4.1 (START Network, 2017). However, as is also noted in Chapter 4, the new financial architecture for the START Network in the future, known as START Ready and the START Financing Facility, will combine the 'soft-trigger' approach of the Anticipation Window, which will be designated in the future only for 'non-predictable' events such as conflict or urban fires, with a 'hard-trigger' approach for other events with greater degrees of predictability. The complexity of what is determined as 'predictable' is further explored and discussed in Chapter 6, but it is worth noting that the START organisation is shifting away from using a 'soft-trigger' or expert judgement-based approach for the majority of hazards.

Many of the other DRF methodologies emphasise the importance of a 'hard-trigger' approach. An archetypal example of this within DRF which is not a market-based instrument is FbF, now scaled up within the FbA by the DREF fund, which uses a forecast threshold as a 'hard-trigger' to take action. Within the FbF methodology there is an extensive process for determining triggers, which includes analysis of risks: validation of forecasts and consideration of hazard impacts and historical impacts, which taken together allow decision-makers to agree triggers (Red Cross Red Crescent Climate Centre, 2018a; Red Cross Red Crescent Climate Centre et al., 2021). It is notable that in one particular policy paper which discusses of the benefits of FbF, the authors argue that the use of a 'hard trigger' within the FbF methodology is beneficial because it avoids drawn out decision-making processes or interference from political considerations by basing decisions instead on transparent criteria (IFRC, 2018a). The involvement of scientists and the validation processes behind this are also seen to give further weight to the FbF methodology, along with the use of a hard-trigger approach which is seen to contribute to the credibility and trustworthiness of FbF as a DRF methodology. This is captured in some of the discussion in Chapter 4 about the importance of credibility and 'predictability' as one participant commented: '*To have a scientific approach, of course this gives FbF a lot of reliability … decisions are taken based on scientific facts… So, you can trust the decision-making processes within the organisations to be based on scientific facts.'* (Interview 16, Donor)

Looking across DRF more broadly, however, there is a general preference for methodologies which use 'hard-triggers'. Some of the rationale for this echoes the arguments made by the IFRC: that objective triggers avoid politicisation and delays. For example, a guidance note paper published by the Centre for Disaster Protection advising about trigger selection makes the argument that soft triggers 'leave an element of discretion to a deciding party about

whether or not to launch a response activity. Soft triggers are thus possibly prone to drawbacks such as delay and political bias…' (Lung, 2020: 14). The author does acknowledge that processes such as expert technical panels could be used to make triggering decisions, which may be less subject to politicisation (ibid). However, the authors here are limited in further justifying why soft-trigger approaches are seen to lead to delay, and in which contexts they may be more or less appropriate. Instead, the report concludes that triggers 'should, as much as possible, be automated and agreed in advance. This means that, wherever possible, triggers for action should be based on objective data' (ibid: 4).

Another underlying part of the argument in favour of 'hard-trigger' approaches is the argument that objective and clearly defined triggers are essential for securing reinsurance cover in DRF mechanisms which operate with an insurance element. In an article discussing two market-based DRF mechanisms, the African Risk Capacity scheme and the World Bank's Pandemic Emergency Financing Facility, Leigh Johnson makes this case, arguing that 'contractual structures designed to preserve tight control over payouts are necessary in order to secure reinsurance cover or capital market investments' (2020: 51). Such clear triggers are necessary so that reinsurance firms can model the likelihood of these conditions transpiring in order to accurately price contracts, exposures and hedge their portfolios, ensuring that they do not become over-exposed (ibid). However, this can have significant down-sides, such as restricting the ability of agencies to adapt in the event of a model error or 'basis risk event', because their hands are tied by narrowly defined payout triggers. This is why Hillier identifies such basis risk events 'as throwing into sharp relief the difference between an actuarial perspective, which resists ex gratia payments as they are deemed to undermine the whole insurance model, and a humanitarian perspective which considers

people's needs' (Hillier, 2018: 39). This issue re-emerges in Chapter 6 in the discussion about risk pools and the possible use of reinsurance.

In the case of DRF, the purpose of the trigger component – regardless of the specifics of how this varies between methodologies – should be to create systems which act despite conditions of uncertainty. However, the narrative framing of the purpose of triggers in DRF policy literature is often one of reducing and removing uncertainty, or as one session-lead put it during the 2019 Dialogue Platform conference: 'triggers and thresholds should help us eliminate uncertainty about when and how to act' (German Red Cross, 2019: 22). This is based on an understandable desire to incentivise preventative or 'no regrets' action, and create systems whereby decision-makers are no longer paralyzed by 'the fear of getting it wrong' (Lowcock, 2019: 8). However, as Hillier and Dempsey's influential report into the 2011 Horn of Africa crisis explains, better and earlier response in the future requires 'acting on uncertainty' (Hillier & Dempsey, 2012: 15). Instead, some of the policy framings outlined previously and the focus on risk seems to have come close to 'throwing the baby out with the bathwater'. Through concerns about credibility and defensible decision-making, there is a danger that DRF has focussed excessively on risk at the expense of acknowledging and managing uncertainty.

5.2.2 DRF and the complexity of 'acting based on risk'

The approach inspired by 'thinking like an insurance company' also belies a complexity in modelling and predicting hazards and disasters. Whilst the focus on risk relates understandably to trying to leverage the degrees of predictability we have for many hazard events, hazards and disasters are still to a large extent characterized by uncertainty. Moreover, predicting the likelihood and severity of hazard events occurring is a very different

process than quantifying the number of people exposed to this risk or the number of people impacted by the resulting disaster. For example, in Chapter 4, I discussed the knowledge chain for hazard early warning systems, which explains the process of anticipating a disaster from observation to modelling, impact forecasting and communication of risks (Golding et al., 2019). The analogy of a chain is imperfect to portray the complexity of this process, but it is useful for highlighting the different forms of knowledge that are required in the process of forecasting a hazard and understanding how this may translate into a disaster. The knowledge objectives of disaster risk management are to monitor, assess and understand disaster risk (UNISDR, 2015), to reduce uncertainty as far as possible, and through inter-disciplinary work to make uncertainty more visible (Pelling et al., 2020). A nuanced approach to disaster management involves quantification of uncertainty as far as possible — but as Donovan argues, it is also important to retain 'an awareness of the non-quantifiable ambiguities and indeterminacies involved' (2019: 12).

The complexity in predictions of hazard and disaster are to an extent reflected in the way different agencies and organisations use different information in DRF mechanisms and adopt different definitions of what makes a credible warning of disaster risk. For example, in Chapter 4.2.2 I define one of the pillars of DRF as 'a measure of disaster risk', which is one of the broadest ways of defining DRF to not exclude different mechanisms. In the book '*Dull Disasters*', despite the focus on insurance-based approaches and quantifying likelihoods and severities of impacts, the definition they use for 'prediction' is surprisingly loose, defined as an 'evidence based decision-making system' (Clarke & Dercon, 2016: 3). As discussed in Chapter 4, other definitions of 'measures of disaster risk' vary along a spectrum from quantifications to looser definitions of predictability. Indeed, the newly launched START Financing Facility, which will be discussed in Chapter 6, makes a division in their business

model, proposing a two-part system that separates crises that have 'predictability' such as floods, droughts and earthquakes, versus those that do not, such as for wildfires or conflict, which have a separate and flexible funding window (START Network, 2019). These differences in definition point to deeper questions around what makes a warning of disaster risk 'evidence based' or sufficiently 'predictable' to link to triggers for action?

In the case of the START Network example, physical scientists cannot forecast earthquakes with the model skill that exists for forecasts of floods or cyclones, but are they 'predictable' in a broader sense[42] – as suggested by the START Network? Is it possible to determine a minimum threshold for 'evidence', especially when comparing across different physical sciences, such as seismology versus meteorology? These are questions that require insights from work in disaster risk management, which has extensively shown that hazard forecasting is not a narrow technical issue but is influenced by a range of factors such as cultures of expert advisory, risk and epistemology (Donovan, 2017).

Taking the example of probabilistic forecasts used for hydro-meteorological hazards is instructive to explore the notion of predictability and the challenge of uncertainty. For example, the Global Flood Awareness System (GloFAS) (Alfieri et al., 2013) is a probabilistic flood model used as the forecast trigger for a number of Red Cross FbF projects such as those in operation in Togo and Uganda (Red Cross Red Crescent Climate Centre, 2019). Probabilistic models have been available for many years within weather services (Fundel et al. 2019), and because they have a high degree of forecast skill, flood forecasting was one of the earliest examples used by the Red Cross to trigger anticipatory humanitarian action in West Africa in

[42] I further discuss earthquakes and the way they are understood as 'predictable' within the START Financing Facility in Chapter 6, Section 6.3.

2008 (Braman et al., 2013; IFRC, 2009). However, while models such as GloFAS give a numerical output that can be tied to a trigger for action, it is important to emphasise that such models are not just characterised by uncertainty but are designed to express and quantify uncertainty by stating probabilities for the occurrence of particular events. In doing this, they move away from deterministic forecasts which are designed to find the 'best' estimates and instead they seek to quantify the predictive uncertainty. This output of 'quantifiable uncertainty' is understood widely as 'risk' within DRF because it is numerical. This is not uncommon – to go back to the work of Frank Knight, the definition of risk widely used by policymakers, economists and practitioners in DRF defines risk as numerically quantifiable uncertainty (Knight, 2006/1921). However, this is not exactly what probabilistic models are seeking to communicate, and this recalls the discussion of the confusion amongst DRF practitioners about the difference between quantifiable and unquantifiable uncertainty, and risk in Chapter 4.

This brings to the fore a number of challenges. One scientist from a hydrology background further explained, giving examples from the GloFAs flood models, and pointed out that the numerical outputs communicate and quantify the predictive uncertainty: '*Within FbF I think that's the most important thing because we don't have a lot of opportunity to reduce uncertainty necessarily… it's about really being able to understand the full range of uncertainty in the models that are being used and being able to sort of put some numbers on that and then being able to communicate it as well…. You've got the uncertainties that you can quantify, a sort of stochastic one, so you can say like a 50% chance of a flood, or you could say that GloFAS will say that there's a 50% chance of a flood…*' (Interview 27, Researcher). However, they went on to give an example of a second type of non-quantifiable uncertainty where different models contradict each other, as discussed in the previous chapter, asking

what you should do if you have two well-respected models that contradict each other: '*if they both say separate things then what do you do? Because there's uncertainty that goes beyond what that ensemble is representing, so there are those two types of uncertainty and I think that's really important.'* (Interview 27, Researcher) This evokes the descriptions of quantifiable and unquantifiable uncertainty in Chapter 4, Section 4.3, such as the catastrophe modeller who described unquantifiable uncertainty: '*Donald Rumsfeld's famous unknown knowns etc… there is that box of stuff we can't quantify...'* (Interview 13, Catastrophe modeller)

Moreover, these differences between quantifiable and un-quantifiable uncertainty are to overlook other forms of uncertainty within the modelling and disaster impacts process - such as data and model inputs, not to mention the wider question of how a hazard interacts with vulnerabilities and exposure to create a disaster – all issues expressed in the chain of uncertainty analogy (Golding et al., 2019) discussed previously.

The challenge of uncertainty in such modelling creates difficulties and tensions for decision makers. Given that the concept of DRF is based on taking advantage of degrees of predictability for hazards and pre-agreeing thresholds for action, making explicit the layers of uncertainty inherent within this is seen to add unnecessary complexity. As one participant commented, in order to implement FbF it would be: '*…totally ridiculous that (every disaster manager) would be expected to have a masters in climate science!...*' (Interview 3, humanitarian practitioner). Yet recent research points to challenges amongst UK-based flood managers using probabilistic forecast information (Arnal et al., 2020), and inconsistencies with the way such forecasts are interpreted by emergency managers working on flood planning in the United States (Wernstedt et al. 2019).

Other interview participants were more critical of the way uncertainty is navigated within DRF mechanisms, however. Commenting on the FbF methodology in particular, one person argued: '*I think that one of the problems at the moment is they very rarely explicitly include that uncertainty. So, they quantify it beautifully but when it comes to it… I think they communicate it to communities as "oh there is some uncertainty in this" (Gestures hand-waving*).' (Interview 15 – DRF expert). These are complex trade-offs, but what is clear is that the focus on 'risk' and 'predictability' does not remove the underlying uncertainties in efforts to forecast and anticipate hazards or disasters across DRF.

5.3. Knowing and predicting hazards and disasters

DRF is a relatively novel set of approaches, but it calls attention to themes that researchers in disaster risk management have grappled with for years, in particular the challenge of acting under uncertainty. Disasters are complex and call attention to the dynamics between human and earth systems, in ways which have recently been conceptualised as both 'more-than-natural' but also 'more-than-human' (Donovan, 2017; McGowran & Donovan, 2021). While many disasters are predictable to some degree, they are typically described in the public domain through a language of 'otherness' that reflects perceived 'un-precedentedness' (Hewitt, 1983). It is perhaps therefore one of the defining characteristics of disasters that they occur outside of the norm, as Hewitt describes, creating 'a rupture in the fabric of productive and orderly human relations' (ibid: 13). Disasters, therefore, expose limits of human control and technocratic management. This uncertainty confronts a modernist idea that through 'scientific expertise' and governance we can control our environs (I. Scoones, 2019). Such a conception largely defines governance approaches to disaster, such as through a disaster

management lexicon of monitoring, planning and control (Hewitt, 1983). It is not surprising therefore that recent years have shown one of the biggest challenges in disaster governance to be the justification and communication of decisions made under uncertainty (Donovan, 2017).

One of the fundamental underlying issues in disaster management is of how we understand the causes of disaster. The complexity of disasters' intersecting impacts across human and environmental worlds, their many impacts and implications, and the nature of disaster causality all undermine abilities to model or explain disaster (ibid). One aspect of this relates to whether disaster management focusses on the hazard component of a disaster, versus an approach that focusses more on underlying vulnerabilities and exposure. It is now usually accepted amongst DRM practitioners 'there is no such thing as a natural disaster' (Cannon, 1994; Chmutina & von Meding, 2019; Hartman & Squires, 2006; Hewitt, 1983; amongst others). Indeed, more recent theoretical contributions have nuanced this argument, understanding disasters through both the material and social, as 'more-than-natural' but also 'more-than-human' (Donovan, 2017; McGowran & Donovan, 2021).

In DRM scholarship the natural versus human distinction has often been framed as a 'hazard' versus 'vulnerability' paradigm (Gaillard & Mercer, 2013), although such differences in the underlying paradigms of disaster reduction are often more complex, and hidden by a unifying technical vocabulary (Bankoff and Hilhorst, 2009). It is worth noting, however, that the approach of DRF focusses mostly on hazard prediction. A number of FbF projects have sought to move towards 'impact-based forecasting' to include more diverse risk information such as vulnerability and exposure data (Harrowsmith et al., 2020), and data from past hazards and observational datasets to help define appropriate trigger thresholds (Weingärtner &

Wilkinson, 2019; Red Cross Red Crescent Climate Centre, 2018). However, such approaches are still premised on using exposure and vulnerability data to guide thresholds for taking action in a system which is ultimately triggered by a hazard forecast. This was highlighted by a humanitarian practitioner quoted in Chapter 4, who believed that DRF methodologies focussed on the hazard component at the expense of the vulnerability or exposure components of a disaster because of how they first developed: '*there has been a lot more focus on the hazard in the finding a trigger, partly because … of the sector where this comes from. It comes from the finance, science sort of things…*' (Interview 11, Humanitarian practitioner)

There are very few examples across the DRF policy landscape of mechanisms which factor vulnerability and exposure information into live decision-making processes (Boult et al., 2022), and where this has happened such as in the Mongolia Dzud case study discussed in Chapter 4, this has occurred within the expert judgement-based process of the START Anticipation Window to the START Fund and was contested by other actors. Vulnerability, meanwhile, is difficult to quantify (see for example Cutter et al. 2003; Birkmann, 2006) and many assessments rely heavily on poverty data as a simple proxy. Any efforts to include vulnerability information within DRF mechanisms may need to rely on expert judgement-based process, such as that suggested by Boult et al., which proposes the inclusion of an expert-judgement based process to assess dynamic vulnerability in order to modify thresholds for action within trigger-based mechanisms such as FbF (Boult et al. 2022).

The second aspect of how we understand disasters relates to how we perceive our ability to predict, anticipate and model. As noted previously, disasters confront the notion that through knowledge society's rationalism we can predict and understand uncertain events (Scoones,

2019). ‘Risk-based’ approaches, such as risk assessment and models are often the tools used to manage crises and potential hazards. However, scholars in the field of science and technology studies have long critiqued the over-reliance on ‘risk-based’ methodologies for managing hazards in response to incomplete knowledge and uncertainty (Stirling, 2010). Furthermore, Brian Wynne gives an account of the evolution of risk assessment as a way of analysing risk and safety problems, originally developed for mechanical problems such as in chemical or nuclear plants (1992). He argued that subsequently risk assessment was being applied to ‘badly structured extensive problems’, such as to environmental systems on a global scale (ibid: 113). The point about the misapplication of risk-based approaches to the latter category of problems, within which we could include disasters, is that despite vast scientific work, modelling such systems requires simplifications such as proxies and extrapolations that impose ‘man-made intellectual closure around entities which are more open ended than the resulting models suggest’ (ibid: 113).

Alternative approaches to the challenge of uncertainty recognise unknowns, ambiguities and even ignorance, based on methods such as vulnerability assessments, participatory deliberations, mapping methods and surveillance (Stirling, 2009). However, as argued in Section 2.1 of the Literature Review, risk-based approaches remain very dominant, due to a combination of disciplinary biases (I. Scoones, 2019) and perhaps above all, the perceived benefit that ‘risk-based’ approaches allow decisions to be conceived, asserted and defended. As a result, ‘trust’ and ‘blame’ can be effectively managed to achieve the ‘vital political resource of justification’ (Stirling, 2009: 38).

This echoes the narratives underpinning DRF in terms of ‘credibility’ and ‘defensible’ decision-making, because of the perceived benefit of justifying decision making. This is a strong theme

in DRF, for example in Mark Lowcock's first speech about DRF he argues: 'These evidenced-based, trigger-propelled, anticipatory financing models, when put together, and scaled up, can start to change the mind-set of decision-makers across the international community' (Lowcock, 2018: 7). His viewpoint also resonated in research interviews, with participants explaining the benefit of DRF approaches as being defensible, rigorous and scientific: '*To have a scientific approach of course this gives FbF a lot of reliability'* (Interview 16, Donor); '*a much more systematic way of identifying and prioritising risks'* (Interview 22, DRF expert); '*let's say a systematic risk financing strategy*' (Interview 23, Humanitarian practitioner).

The tools used in DRF further highlight the importance of such decision-making processes. As explained previously in the example of probabilistic flood modelling as used in FbF, where mechanisms use models that are designed to express uncertainty, this is partially communicated to stakeholders, and the surrounding narratives often remain stubbornly focussed on risk. As Andy Stirling puts it: 'Even when experts acknowledge uncertainty, they tend to do so in ways that reduce unknowns to measurable risk' (Stirling, 2010: 1029). This is a phenomenon other theorists have observed, such as Mary Douglas in her work about risk, responsibility and blame, where she notes that 'A great deal of risk analysis is concerned with trying to turn uncertainties into probabilities' (Douglas, 2013/1986): 42).

5.4. 'Fuzzy calculability': How can we better understand risk and uncertainty in DRF?

In the DRF literature, the language of risk is very dominant. So far, I have explored how and why the policy narratives around DRF tend to focus on risk at the expense of uncertainty. However, this understanding is based on the premise of clearly distinguishing risk from uncertainty as a binary opposite. As noted previously, this very often follows Frank Knight's

work, where he defines risk as anything which can be assigned numerical probabilities, whereas uncertainty is understood as anything that is non-quantifiable (Knight, 2006/1921). This distinction remains influential most notably amongst so-called 'risk society' theorists like Ulrich Beck, who argued that the shift from an industrial society to a risk society is defined by risks becoming increasingly 'incalculable' and therefore non-insurable (1992). According to this view, novel 'modernity' risks such as nuclear fallouts, pandemics or other 'black swan events' (Taleb, 2007) are not statistically predictable and cannot be constrained through risk methodologies based on calculating likelihoods and probabilities. As a result, they are non-insurable catastrophe risks, and define our 'modern times' as a 'risk society'.

However, in order to better understand the use of models and tools to predict disaster as applied in DRF it is helpful to nuance the binary approach to risk and uncertainty. Work in sociology and STS is particularly useful here, indeed recent work from Beck has nuanced his view about the difference between insurable and non-insurable catastrophe risks. As noted in the Literature Review, in his later work '*World At Risk'* (2009) he conceded that in the post-9/11 world, governments often take on the role of backstop or insurer of last resort for catastrophe risks, meaning that the idea of non-insurable risks becomes less clear-cut. Others have highlighted the case of contemporary financial innovations, arguing that these have blurred the classic distinction based on 'calculability' and knowledge, specifically referring to the use of reinsurance markets to render statistically improbable events 'insurable'. Insurance is usually regarded as the quintessential risk-based institution, as it is in the DRF world, because of the way it is understood to rely on numerical probabilities. However, taking the example of using reinsurance for catastrophes, scholars such as Bougen argue that 'the industry in dealing with low probability events has a particularly fragile connection to statistical technologies' (Bougen, 2003: 258). As such, he argues that the insurance industry

operates in a space characterised by inescapable uncertainty (ibid). Similarly, O'Malley argues that the statistical technologies used to derive probabilities in the securitization of catastrophes have become increasingly 'marked by educated guesswork… and hunches' (2004: 7). As a result, reinsurance practices for insuring potential disasters such as hurricanes increasingly came to involve a practical reconciliation of uncertainty and risk, to the extent that their distinction becomes blurred (Bougen, 2003), or as O'Malley puts it, where 'risk' becomes 'uncertainty' renamed (2004).

More recent analysis of the global reinsurance industry has further borne out the idea that such a binary distinction based on 'calculability' is no longer very representative of the world of insurance. For example, Jarzabowski et al. (2015) provide an account of reinsurance as financial markets for hedging against 'unknown unknowns', based on collective practices which span both technical but also 'contextual' expertise and experience. Recent work exploring insurance in the contemporary context of climate change demonstrates that: 'Virtually all catastrophe insurance involves the public sector, whether as regulator, as the provider of backstops or reinsurance, or in many cases as the consumer of private insurance products'(Collier et al. 2021: 165). As a result, the emphasis on 'calculability' of catastrophe risk and the extension of private insurance does not capture the contemporary dynamics of modern insurance and reinsurance practices.

This is salient for discussions in DRF because the nature of disasters that DRF seeks to plan and prepare for often fall under the category of what insurance would term 'catastrophe risk'. Secondly, it is relevant because it is technologies and approaches from the insurance and catastrophe modelling world that many proponents of DRF seek to leverage. Critically, when it comes to predictions of hazard, exposure and vulnerability interactions that result in

disasters, the definitions and distinctions between risk and uncertainty are more complex than is often assumed. Calculability is therefore 'fuzzier' than we often think.

The complex relationship between risk and uncertainty in relation to catastrophe modelling was highlighted in this research by a number of expert participants working on DRF, who had come to the sector from backgrounds working in catastrophe modelling and reinsurance. They argued that catastrophe modelling in their experience blended quantitative science with intuition in ways which evoke the idea of 'fuzzy calculability'. For example, one participant commented that: '*there is definitely a sort of, I would say intuition that builds up over time and I think has built up with people in the industry who have been using these models for 20 years or so … and see where they work well, where they don't work well, for what types of events are they reliable, for what type of events they aren't….'* (Interview 13, Catastrophe modeller). While this seems to be well understood within the catastrophe modelling world, interview participants from these backgrounds now working on DRF find that the way they work with uncertainty is not the same. For example, they explained that insurance and reinsurance companies, in their experience, use model outputs if not as nominal values, which is to say, they understand model outputs as an expected value with a full understanding of the surrounding uncertainties. In contrast, participants interview in this research explained in their experience, for humanitarian agencies working on DRF: '*things are often about next year or the next three years… they want a very fixed answer, often people look very much only at the single value output and say "Oh it's right or wrong"'...* (Interview 10, catastrophe modeller). However, the skill of forecasts and models cannot effectively be judged over such short periods of time, and individual cases or years when the outputs are 'right or wrong' can

only be judged as part of a longer-term trend, and indeed it is not helpful or accurate to think of an output from a probabilistic model as ever being 'right' or 'wrong'[43].

5.5. 'The Political Economy of Liability' and DRF

There is to a certain extent a dissonance between the policy framings of 'thinking like an insurance company' with a focus on risk and 'trigger-based' approaches to decision-making, and the experience and perspectives of practitioners such as those quoted previously, many of whom are sanguine about the challenges of DRF, risk and uncertainty. Given this dissonance, deeper reflections about the political context, objectives and liability questions posed by DRF are useful to consider.

One relevant factor here is the way in which many of the experts who participated in this research emphasised the difficulties of talking about uncertainty in their work, especially amongst research participants engaged in the public sector and by government donors. One participant from a government background noted a preference to merge uncertainty into risk: '*…risk is seen in a very clear way in government in particular… But uncertainty is seen as "I don't know the answer" and that tends to paralyse people… So, it's actually better to talk about managing risk - you know uncertainty being a risk*' (Interview 15, DRF expert). The way this participant explains it, uncertainties which are confronting for institutions to fully acknowledge are transformed into 'risk'– echoing the observation that uncertainty is often renamed as risk for the 'vital political resource of justification' (Stirling, 2009: 38).

[43] Probabilistic forecast models are designed to quantify predictive uncertainty by stating the likelihood of different outcomes in percentages. If a forecast gave a very small likelihood of a particular event happening, but it still occurred, this does not make the forecast 'wrong'. For more information about this in the context of weather forecasting and decision-making: https://www.metoffice.gov.uk/research/weather/ensemble-forecasting/decision-making

As discussed in Chapter 4 and further elaborated here, one of the key purposes of DRF is to provide 'predictability' to decision makers that financing will be there to support earlier responses. Some argue that practitioners should no longer be paralyzed by the fear of getting it wrong (Lowcock, 2019). This argument is in part supported by 'efficiency' and 'effectiveness' policy narratives outlined in Chapter 4, which make the case that actions based on false alarms could be taken several times before the financial costs outweighed the cost of late response. For example, the Cabot-Venton et al. cost-benefit review argues that 'for every early response to a correctly forecast crisis, early responses could be made 2–6 times to crises that do not materialise, before the cost of a single late response is met' (2013: 1). Even if this is accurate in financial terms, the 'cost' of acting in vain or missing an event is not static or financially quantifiable, as it includes reputational damages and risks associated with the loss of trust in models and mechanisms. Where similar situations have occurred, for example in the failure of the ARC model to pay out in Malawi in 2015/2016, it was widely critiqued and led to significant negative publicity for ARC, which was branded 'The wrong model for resilience' in a critical report published by ActionAid (Reeves, 2017). The event was covered by the international press such as The Economist[44] and several countries left the scheme. An independent evaluation report of ARC commissioned by DFID (who provided some initial capitalisation to ARC as well as technical advisory support) cited loss of trust following the Malawi event along with the cost of premiums and negative domestic politics as leading countries to withdraw from the scheme (Oxford Policy Management, 2017). This resulted in a contraction of the risk pool that was regarded as one of the most significant barriers to the

[44] Malawi later received a payout through an ex-gratia arrangement with ARC. The Economist coverage of the event is available online (paywall): https://www.economist.com/finance-and-economics/2016/08/25/arcs-covenant

sustainability of ARC (ibid). In the year 2018/2019, ARC only had 3 countries within the risk pool, though this had grown to 11 by the 2019/2020 agricultural season[45].

Focussing in particular on the domestic political context for UK development funding that goes towards DRF, participants in this research felt that proponents should be more realistic about the political context and appetite for risk from the funder perspective as well as from the perspective of beneficiaries of systems such as ARC, because of domestic political pressure. One participant was sceptical, for example, about evidence regarding the cost-benefit and return-on-investment used to justify the potential to act in vain, arguing that: *'you've got to frame that conversation in terms of the overall narrative which DFID sits within in the UK ... There's such a low tolerance for any sort of reputational risk or anything that smells like waste'* (Interview 6, humanitarian practitioner).

These challenges point to a deeper 'political economy of liability' (Johnson, 2020) that shapes disaster risk financing. Through the application of insurance-based principles such as automation and triggers, DRF and anticipatory financing are operating on new territory. It goes without saying that insurance companies and humanitarian agencies have a fundamentally different set of pressures, objectives and mandates. However, in the drive to design more effective and efficient systems inspired by thinking 'like insurance companies' (Clarke & Dercon, 2016), have these important differences in objectives, mandates and pressures become obscured?

In her work on insurance mechanisms, Leigh Johnson discusses the politics of triggers and payouts in the case of two market-based DRF mechanisms – the African Risk Capacity

[45] Memberships of the ARC risk pool by agricultural year are listed on their website: https://www.arc.int/risk-pools

sovereign drought insurance scheme and the World Bank's Pandemic Emergency Facility, intended to finance infectious disease outbreaks[46]. In this work, Johnson (2020) discusses events where each system failed to pay out when it should have and introduces the notion of the political economy of liability, arguing that systems which were designed to introduce automaticity and timeliness in fact created new domains of uncertainty. Her question aimed at such systems is: if and when they fail to pay out, who should be liable instead? In this chapter I find questions relating to liability are critical. However, I focus here on how concerns about liability, such as taking action in vain or missing events, are shaping DRF, both discursively and materially, by pushing towards narrower, risk-based approaches and leading to the preference for hard-triggers and more automated systems.

To interview participants who had come to DRF from the reinsurance sector, they explained how their colleagues: '*were comfortable with … a kind of expected value with a lot of uncertainty around it, because they're very much used to that as a financial idea*' (Interview 10, Catastrophe modeller). In the private sector they argued that uncertainty is a financial idea which insurance and reinsurance companies are well versed in managing. As Clarke and Dercon (2016) argue, in a well-regulated insurance market, insurance companies must demonstrate that they have the capital base to cover all but the most extreme potential losses and have reinsurance policies in place in the event that they exhaust their capital base, with the objective being to pay insurance premiums and remain solvent over a long-term time horizon. As such, when companies act on probabilistic information such as that produced by catastrophe models when 'pricing' risks, they do so in the knowledge that as long as the model

[46] The PEF was a controversial mechanism, developed following the 2014 Ebola crisis that was designed to finance responses to epidemic disease outbreaks, and operated as a catastrophe bond issued by the World Bank that sold to capital market investors and paid out to countries when particular trigger thresholds were met. It was closed in April 2021: https://www.worldbank.org/en/topic/pandemics/brief/fact-sheet-pandemic-emergency-financing-facility

is accurate over a long-time horizon, they will remain solvent. Indeed, recent research exploring time horizons when using forecasts for decision-making highlights that even good forecasts can be inaccurate over the short-term - in the context of FbF the authors argue it is very plausible that more than a decade may pass before a system will have some certainty of showing value (MacLeod et al. 2021a). A long-term time horizon is therefore an essential perspective to bring to decision-making based on forecasts and models.

This has a number of important implications for practitioners of DRF, however. Are DRF practitioners and their agencies willing to take a more insurance-based approach in terms of playing 'the long game' by using forecasts and models to make decisions? A discomfort with doing this has in some instances been understood as a lack of expertise, sensitization or understanding of how insurance works. Although this was in the context of sovereign governments, sensitising politicians was one of the suggestions made in the ARC evaluation referred to previously to build understanding about the need to see insurance as a long-term proposition (Oxford Policy Management, 2017).

Reflecting about DRF systems more generally, this poses a question around risk appetite when implementing DRF systems, and to understand that the way organisations perceive risk and uncertainty, and their ability to make decisions based on forecasts over a long-term time horizon. However, the implications of responding to disaster events means agencies and practitioners implementing DRF are subject to unique pressures, where missing events or acting in vain has significant ethical, reputational and practical costs.

Thinking more deeply about the roles and responsibilities of disaster response agencies is therefore required – and indeed has been called for many times before. For example, in their analysis of the humanitarian system failures in response to the famine in Somalia during the

2011 Horn of Africa crisis, Lautze et al. (2012) argue that the failure of humanitarian agencies to respond sooner to signs of deterioration in Somalia 'needs to be examined not only for improvement… but also for its limits. A system of last resort cannot also be expected to be a system of first resort' (ibid: 48). They further argue that what they refer to as providers of 'last resort' – which includes UN humanitarian agencies including the FAO, WFP and UN OCHA - should be part of a clearer system of agreed rights, resources, responsibilities and recourse between such agencies and people at risk (ibid). Many agreements do already exist, most notably of course, the humanitarian principles of impartiality and neutrality (International Committee of the Red Cross (ICRC), 1965). However, these came up in my research as principles that participants are now considering in a new light in view of the shift towards DRF. Indeed, the points made by Lautze et al. (2012) pre-date many of the developments that have come about under the auspices of DRF, and this serves to underline the importance of their suggestions.

Questions about responsibilities and mandates were raised by some research participants, for example one donor argued that an approach more in line with triage would be a better way to manage disaster response: '*this is a conversation about when is the right moment to save a life…. there is a need to opt in the way in which we interpret humanitarian principles in light of the science and options that we now have available ... People are interpreting the principles in a very neutral way, and I feel ... the humanitarian imperative requires us to think about saving lives much in the same way as good doctors and good hospitals think about saving lives.'* (Interview 18, Donor) Indeed, 'triage' is the exact terminology used by Jagers et al. in their critical account of insurance in the context of climate change as a governance rationality for differentiating subjects and making governance decisions (Jagers et al., 2005). In the case of emerging approaches in DRF however, this is a political question as much as it

is ethical, and another participant thought that the same humanitarian principles required them to do the opposite: '*ultimately… we're not researchers. We have the humanitarian mandate. We can't play with people's realities*.' (Interview 1, Humanitarian Practitioner).

The wider debate that this points to goes beyond the scope of this chapter. However, there are some initial steps that practitioners of disaster risk financing could adopt. Firstly, there is a need for DRF to find a better vocabulary and become more comfortable with communicating uncertainties. Not shying away from uncertainty, complexities of science, knowledge and non-knowledge is something Andy Stirling calls for in his manifesto for better science-policy interactions, and this research suggests the same principles would benefit DRF; 'When knowledge is uncertain, experts should avoid pressures to simplify their advice' (Stirling, 2010: 1029).

In practice this could include developing approaches which build in contingencies to better manage uncertainties, such as layering in alternative sources of finance for higher return period events, as well as contingency funds for cases where thresholds for mechanisms are not met. This specifically relates to insurance-based mechanisms, where the need for clearly defined triggers may lead to these being too narrowly defined, especially where this is needed to secure reinsurance cover (Johnson, 2020), or where terms and conditions resist payouts outside of the normal clauses of a contract (Hillier, 2018). A shift towards using 'risk layering' as an approach which combines several different DRF mechanisms, often including contingency and emergency funding, is one recognition of this need to better manage contingencies in DRF (Harris & Jaime, 2019).

Secondly, and related to better communication about uncertainties, DRF instruments should find ways to more effectively factor hazard impact and underlying vulnerability into decision

making systems, which are still quite narrowly focussed on hazard and risk prediction. Potential ways to do this include incorporating expert judgement of dynamic vulnerability into a system which modifies trigger thresholds for action – as suggested by Boult et al (2022).

More fundamentally, it is necessary for humanitarian and development agencies in the DRF sector to interrogate their own politics of risk, liability and risk appetite in order to assess the potential for more anticipatory approaches. There is emerging evidence of the sector exploring this, for example in the foreword to a report assessing the potential to pool the funds held by the Red Cross for taking early action, Pascale Meige (Director of Disasters, Climate and Crises for the IFRC) writes that: 'While we need to embrace the expertise from the financial sector … as humanitarians we also need to ensure a human-impact driven lens to risk financing by identifying the financial and operational needs from the ground up while serving those who are most in need' (UK Government Actuary's Department (GAD), 2021: 5). However, I argue that this recognition needs to go further towards fleshing out what 'thinking like an insurance company' should look like in the DRF context, and whether this is possible or sustainable for the agencies involved. This should start from the point that for disaster response agencies, uncertainty is not simply a financial concept. Critical questions need to be explored relating to whether disaster response agencies can, or should, shift to a longer-term planning horizon based around acting on forecasts and models as measures of risk? Would this inhibit their ability to be agencies of 'last resort', and if so, are there agencies who can and should fulfil this role, and from a political standpoint, how would this impact on their reputation, credibility and trust among donors and other stakeholders?

5.6 Reflections

In this chapter I have discussed the politics of risk and uncertainty in DRF, and specifically the political economy of liability. I argue that the policy narrative of 'thinking like an insurance company' over-simplifies the uncertainties of attempts to use forecasts, models and measures of risk to trigger response to disasters. I argue that there is a tendency to simplify the 'fuzzy' boundary between risk and uncertainty, where any predictive modelling and warnings which give numerical outputs are understood as measures of risk, regardless of the uncertainties therein. This contributes to a policy literature that focusses on 'risk' – expressed through a focus on automation and 'hard-triggers' -but which often does this at the expense of acknowledging the very real challenge of uncertainty faced by practitioners.

The chapter concludes with a reflection on the emerging 'political economy of liability' (Johnson, 2020) brought to the fore by such disaster risk financing mechanisms. How we understand risk and uncertainty is always mediated and constructed – by background, organisational factors, cultural appetites for risk and political pressures. This reflects a point that has been well made in the STS literature, which demonstrates how understandings of risk and uncertainty are deeply shaped by factors such as knowledge and positionality (Lash et al., 1998). This is one of the reasons why the vocabulary of 'risk' as it is articulated in DRF supports the so-called 'defensible' decision support frameworks that legitimate anticipatory action, and echoes the long-noted propensity for uncertainty to be renamed as risk - for the 'vital political resource of justification' (Stirling, 2009: 38). However, this does not mean that uncertainty is not there. Cost-benefit evidence suggests that the financial cost of acting earlier outweighs the costs of 'acting in vain' (Cabot-Venton, 2013), but this overlooks more

meaningful engagements with the non-financial, political and reputational costs of potential false alarms.

Johnson's notion of the 'political economy of liability' (2020) as it applies to questions of responsibility when mechanisms such as index-based insurance fail to pay out has usefully started to open up questions relating to the politics of risk and uncertainty in such mechanisms. However, this chapter has emphasised how questions of liability are discursively and materially shaping the sector of DRF through the mechanisms themselves, pushing towards more automated approaches, reliance on 'hard-triggers' and contributing to a policy literature dominated by a vocabulary of risk at the expense of recognising uncertainty. Understanding DRF mechanisms as part of a common landscape is particularly important to make this argument, for example, drawing out what FbF shares with insurance approaches such as ARC or CCRIF highlights the common concerns around liability, and the shared narrative framing around 'risk-based' decision making – despite the fact that the instruments themselves have many differences.

The chapter concludes with policy recommendations for practitioners and policymakers in DRF to engage more with the challenges of uncertainty, and to focus on layered mechanisms which build in contingencies and a more impact and vulnerability focussed approach. This should be grounded in recognising that for humanitarian and development agencies, uncertainty is not simply a financial concept, and that acting in the face of uncertainty can have different implications for different individuals and agencies across the sector. This would contribute to building a more robust landscape for DRF as the innovations in the sector open the way for new and more hybrid financing mechanisms – such as risk pooling – a development which will be further discussed in Chapter 6.

6. Risk, Speculation and Contingency: Humanitarian risk pooling and DRF

6.1 Introduction

In the final empirical chapter of this thesis, I focus on the emergent approach of 'risk pooling' within humanitarian funds. As discussed in the introduction in Chapter 1 and later in Chapter 4, risk pools are one of the most recent developments within the DRF landscape and are interesting because of the way they demonstrate hybridisation across the sector. Risk pooling is being developed by two of the major actors in the DRF sector. It has been scoped by the IFRC, who recently published their report on financing the FbA by the DREF fund through a risk pool (UK Government Actuary's Department (GAD), 2021), meanwhile, the START Network launched their new mechanism 'START Ready', which includes a risk pool, at CoP 26 in November 2021 (START Network, 2021)[47].

Risk pooling is a diversification strategy that means combining and spreading risks to reduce overall exposure in a shared portfolio. It is being implemented to adapt two pre-existing DRF mechanisms, the START Fund, which would have been described in its original form as a 'budgetary instrument' and the FbA by the DREF fund, which is a 'contingent financing fund', according to the typology of DRF mechanisms introduced in Chapter 4. Previously, such funds held money in reserve, either for alerts raised by members, or committed to partner agencies to pay out when pre-agreed thresholds are met. However, under a risk pooling approach, instead of holding finance in reserve, agencies are now planning to over-commit their funds,

[47] START Ready works in tandem with the existing START Fund, and together they form the 'START Financing Facility' (SFF), which is the umbrella term for the whole system, as shown in Figure 16. This is the terminology used in several policy papers authored by the START Network, however, the specific part of the facility which uses a risk pool is called 'START Ready'.

based on probability estimates of the return period of the hazards they are committed to paying out for. Risk pooling means agencies can spread their funding, such that if every hazard occurred in the same year, they would exhaust the fund. However, so long as this does not happen, using a risk pooling approach means you can cover more hazards with the same sized fund. As one research participant put it: '*it's just very simple… why can't you do more with less*?' (Interview 26, Humanitarian practitioner).

As has been described in previous chapters, DRF is characterised as a paradigm shift away from acting based on existing need, towards 'acting based on risk' (De Wit, 2019: 6). Throughout the thesis I have explored the implications and complexity of this in different ways. In Chapter 4 I discussed the policy landscape of DRF and the different ways in which risk and uncertainty are conceptualised. In Chapter 5 I focussed on the politics of risk and uncertainty and explored some of the reasons why DRF mechanisms and policy narratives focus on risk at the expense of more fully acknowledging uncertainty, relating to concern about the need for justification and what I explain as the 'political economy of liability' (Johnson, 2020).

Here I provide a deeper explanation of the re-ordering of decision making and financing based on a logic of risk. I focus on the politics enacted by DRF through mechanisms ordered around a logic of risk, whereby risk pooling represents the culmination of scaling up a 'risk-based' approach across disaster financing. Specifically, I argue that through risk pooling, diverse hazards and crises are made amenable to the probability-based logic of the risk pool. As a result, narrowly conceived measures of probability are becoming the dominant logic through which these funds are ordered, representing a fuller extension of a more insurance-like logic into the humanitarian system.

This chapter draws from risk governance literature that explores risk as 'a way in which we govern and are governed' (O'Malley, 2000: 458). As discussed in the literature review in Chapter 2, scholars working in this area see the management of 'contingency' as a key characteristic of risk-based governance (Aradau et al., 2008). What is meant by the term contingency here however is not the layperson's notion of contingency but is instead tied up with Foucauldian theories about biopolitics - the government of life as part of a political rationality which takes the administration of life and populations as its subject - 'to ensure, sustain, and multiply life, to put this life in order' (Foucault, 1990/1976: 138). According to this body of literature, 'contingency' refers to knowing and governing the uncertainty inherent to biological life, whereby life cannot be secured against contingency: it can only be secured through contingency.

Specifically, I draw from Michael Dillon's (2008) theoretical contributions, where he argues that risk is the predominant tool of biopolitics in modern liberal governance. He traces the development and deployment of the risk technologies of contemporary finance capital, in particular insurance, as an example of the 'biopolitical state' (2008). Specifically, Dillon argues that through measures of risk, exposure to liability is calculated and commodified (ibid). In so doing, Dillon argues that contemporary finance and capital markets, and in particular insurance, have become 'a pervasive governmental technology', and 'one of the principal currencies through which contemporary biopolitics enact the 'transactional economic logic' that Foucault first identified' in his lectures (2008: 311).

Dillon's (2008) paper on risk as a tool of biopolitics is predominantly theoretical and draws from examples of financial markets and insurance practices with limited empirical application of these concepts. His theorisations, however, have been applied to work on climate

insurance, for example Leigh Johnson (2013) discusses how catastrophe risk insurance makes diverse risks fungible to be traded on capital markets. Taking a slightly different approach, Lobo-Guerrero (2010) has argued that the extension of insurance markets into the Global South amounts to an extension of global liberal security as a securitising knowledge practice. In both cases, insurance offers a convergence point for theorisations about risk and biopolitics. Indeed, as Dillon argues, insurance 'captures the essence of how risk operates as an assemblage of mechanisms for measuring and commodifying exposure to contingency' (2008: 310). However, the case I set out in this chapter is different because risk pools are not directly linked to financial markets or extending insurance into the humanitarian context *per se*. Instead, this case study is about the extension of a more 'transactional' insurance-based logic into humanitarian funds, through the organising logic of risk.

In this chapter I argue that risk pooling positions risk as the operating logic through which decisions in humanitarian risk pools are made, and through which such decisions are legitimated. I then explore the implications of this, first discussing the implications of over-committing the two humanitarian funds in question, and how agencies might manage this. I suggest that risk pooling has become a new form of speculative risk-taking with the objective of getting maximum value to agencies for each dollar of humanitarian funding, linking back to the efficiency logics of DRF introduced in Chapter 4. The agencies scoping and developing risk pooling approaches within DRF are exploring 'back-stop' options to ensure they will not run out of funds. Ultimately though, taking a risk-pooling approach requires tolerating the possibility of exhausting funds, otherwise there can be no efficiency gains accrued from over-committing.

Finally, I argue that risk-pooling is leading to a new set of operational parameters for disaster response agencies, whereby risk provides a means of 'navigating contingency, avoiding loss and seeking gain' (Dillon, 2008: 321). This reflects what Dillon identified in his work discussing risk and insurance as a form of biopower, where he argues that 'the revolution in commercial and governmental power/knowledge of the last thirty years has transformed risk from one management device and form of calculation … into what has many of the features of a universal system of account and a new order of governance' (Dillon, 2008: 325). As a result, risk pooling points to a deeper shift in the objectives and metrics of success for DRF and humanitarian financing, of 'living with' contingency, measured by the number of those 'protected' from disasters – which refers to those who *could* receive aid, rather than those who do. This reflects back to the key characterisation of DRF as a paradigm shift away from acting based on existing need towards acting based on risk (De Wit, 2019). This evokes Foucault's notion of biopower (2008), because DRF mechanisms cannot, and do not intend, to prevent hazards and disasters from happening. Instead, they offer payouts as a form of 'protection' to partner agencies – a terminology that is repeatedly used in the policy materials and webinars about risk pooling. In a world of climate change, conflict and pandemic, humanitarian practitioners are looking for a way to better navigate contingency, triage crises and make trade-offs about what to finance, and risk pooling provides a means to do this.

Empirically, this chapter draws from interview data combined with publicly available policy papers relating to the IFRC's FbA by the DREF and START Ready, although as noted in Footnote 47, many of these policy documents refer to the umbrella name for the overarching START financing infrastructure, the START Financing Facility (SFF), within which the pool is located. The IFRC has been scoping and researching the move towards a risk pooling approach, while

the START Network are at a more advanced stage, having launched START Ready in November 2021.

As discussed in the methodology in Chapter 3, I conducted a close reading and NVivo based textual review of these documents – many of which are used specifically in this chapter. These documents were selected for in-depth textual analysis because they outline proposals and practicalities for risk pooling, and are the most detailed source of information for Research Question 3 addressing risk pooling. A table of the policy documents most relevant to this chapter is included below in Table 5, but these are also listed in the policy documents discussion in Chapter 3, Section 3.3.3, Table 4.

Document	Document Type	Analysis
START Network (2019) START Financing Facility (SFF) Board Paper	Board paper proposing the SFF to the START Network board	Nvivo textual analysis
UK Government Actuaries Department (2020) START Network Quantitative Report	Quantitative report commissioned by the START Network	Nvivo textual analysis
Meenan et al. (2019) GIZ DRF Toolkit Report	GIZ/ RMS policy paper	Close reading
UK Government Actuaries Department (2021) Financing the Forecast-based Early Action Protocols	Quantitative report and policy paper commissioned by the IFRC	Close reading

Table 5 - List of the policy documents that were specifically used in this Chapter.

I also refer to publicly available and recorded webinars about the two risk pools, both of which I attended in person, making notes and my own recording of the session, but which were later made publicly available online. Where I quote directly from these it is referenced with a footnote stating a timestamp to particular moments within the recording. These events which were most relevant to this chapter are also listed below, in Table 6, and are also listed within the events list in Annexe 1.

Event	Event Type
Sectoral Community Workshop: Linking Anticipatory Action to Risk Financing Webinar, 20th September 2021	Webinar hosted by InsuResilience Secretariat and the two co-chairs of the Sectoral Community 'Linking Risk Financing and Anticipatory Action'
Technical Talks | Webinar #4 - Start Financing Facility, 22nd September 2021	Global Risk Financing Facility (GRiF) Technical Talk

Table 6 - Details of the virtual policy events specifically relevant to this Chapter, also listed in the list of policy events attended in Annexe 1.

6.2 Introducing Risk pooling in DRF

In this section I explain how the two agencies in question have scoped risk pooling as an approach and how they propose to integrate it within the structure of the existing funds. As discussed in the typology explained in Chapter 4, both the FbA by the DREF fund and the START Financing Facility began as traditional DRF mechanisms. FbA by the DREF was a 'contingent financing' fund, meaning the fund pre-agreed financing and made a commitment to release this when a 'hard' trigger such as a forecast threshold is met. In contrast, the START Financing Facility seeks to bring together various different DRF mechanisms in operation by the START Network, but the original START Anticipation Window is defined as a 'budgetary instrument' because it used a 'soft-trigger' for response, which in this context refers to alerts raised by members. An updated version of the DRF typology (Figure 8), is included below which highlights the DRF mechanisms are now being re-structured as risk pools (Figure 15).

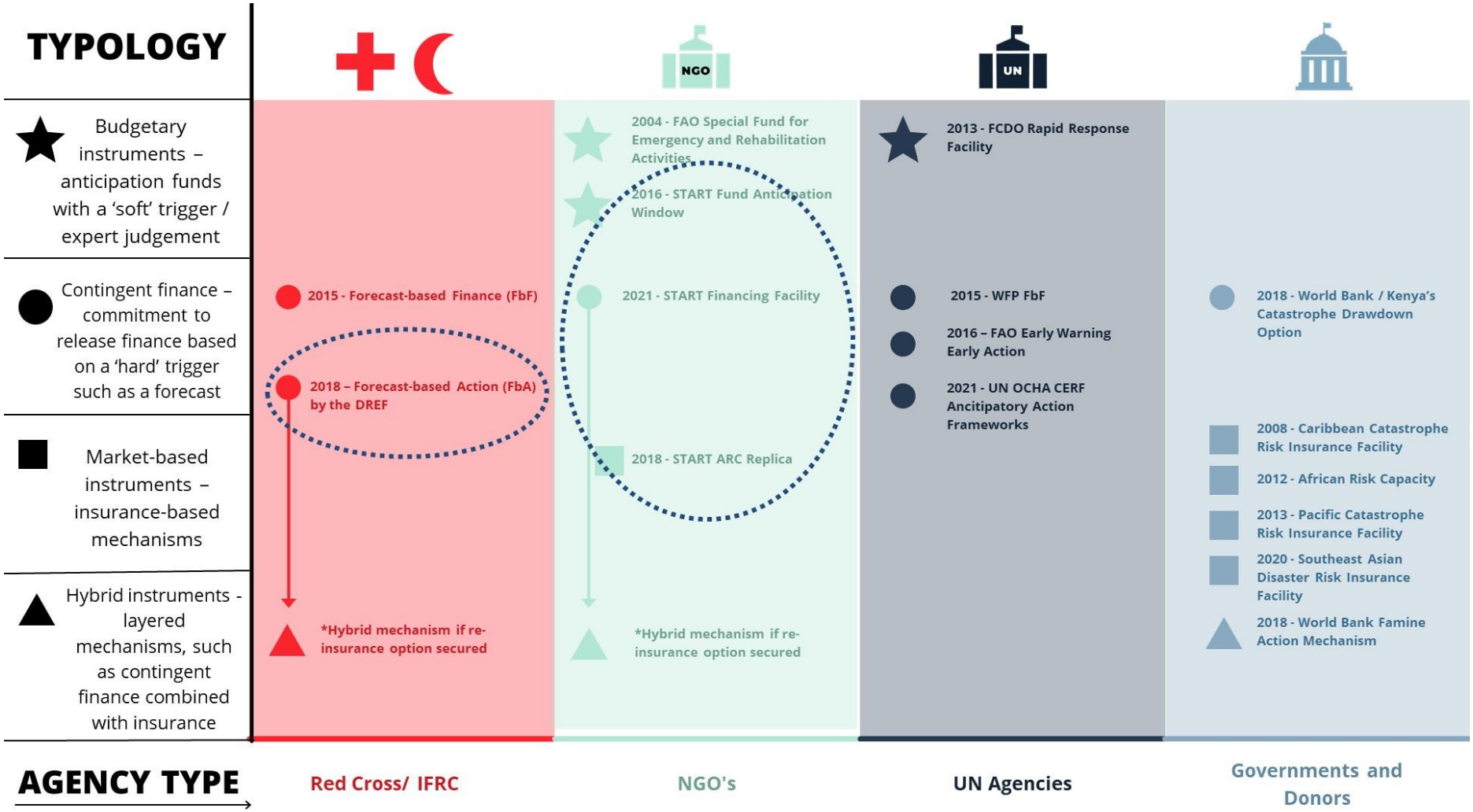

Figure 15 - Figure 8 with the mechanisms being transformed into risk pools circled. The START Financing Facility (SFF) proposed to merge several of the START Network's mechanisms with different triggering options (for example there will remain a 'soft-trigger' element within the SFF, but the new risk pool 'START Ready' will become a contingent financing tool). Meanwhile the IFRC FbA by the DREF was originally a contingent financing tool but will be funded differently through the risk pool. However, both mechanisms would be categorised as 'hybrid instruments' if the agencies take out re-insurance coverage, which appears to be the case for START Network.

What both funds previously had in common was that agencies had to have financing ready in reserve at all times. This led to money sitting in reserve until warnings were received, or particular forecast thresholds are reached, at which point they paid out. However, this was seen as impractical and inefficient, and risk pooling was proposed as a solution by offering a method to sustainably over-commit the funds. As one research participant explained: '…*what we risked ending up happening is just loads of little pots of money sitting all around the world for things that may or may not happen. And there's a huge amount of need in the world and there's no way that donors or any of us are going to be happy with money sitting around unused.'* (Interview 22, DRF expert)

The way in which this has evolved with the two funds adopting risk pooling as an approach demonstrates the learning and cross-fertilisation that has taken place across DRF as a sector. In the reports written to scope risk pooling, the START Network Board Paper acknowledges expert input from the Centre for Disaster Protection, along with the World Bank, Willis Towers Watson and PwC (START Network, 2019). The most recent report launching START Ready also acknowledges technical inputs from the World Bank - who have experience implementing risk pooling within sovereign disaster financing contexts (START Network, 2021) - while the Quantitative Analysis report was written by specialists from the UK Government Actuary's Department (UK Government Actuary's Department (GAD), 2020). In the case of the IFRC, their risk pooling report was also authored by the UK Government Actuary's Department (UK Government Actuary's Department (GAD), 2021) and published by the Centre for Disaster Protection. One research participant further described this process and the connections forged between specialists in finance and humanitarian practitioners: '*we needed to do that work to know, okay, can we put some figures behind those ideas that we say, okay, what is the probability? How could we determine this? … And then through the work from one of our*

colleagues that works very closely with the Centre for Disaster Protection, the Centre was the one who said well, we have this connection with the Government Actuary Department in the UK, and we think they could help you in doing some of those calculations that you need.' (Interview 21, humanitarian practitioner)

In terms of the specific development of the funds, the proposed framework for risk pooling is laid out in more detail in the START Network's proposal paper for the new mechanism (START Network, 2019). It is important to note here that risk pooling is proposed to be one of the many tools within the SFF, which is designed to implement a 'risk layering' approach, referring to a wider financing strategy that uses a mix of instruments including contingency funds, the risk pool and insurance to meet needs (START Network, 2021), based on analysis of the hazard type in question. This means that partner agencies begin a process of developing a financing strategy that includes undertaking risk analytics, contingency planning and operational protocols before funding for future hazards is pre-positioned. The logic of this approach is to identify which DRF financial tool is best suited to the risk types START Network partners have, whereby the 'risk pool' is envisioned as the middle layer of the financing architecture. This is laid out in Figure 16 below, which highlights how insurance could be used for the least frequent but most severe hazards, alongside the risk pool for middle likelihood and severity risks, and finally, using 'hub' or national funding as a contingency fund for risks which are the most frequent and least severe. Thus, the START Financing Facility (SFF) provides an overarching structure which enables 'diverse risks need to be met by a menu of coherent and organised financial instruments in order to ensure the most effective delivery of donor financing to frontline humanitarian responders' (START Network, 2019b: 19).

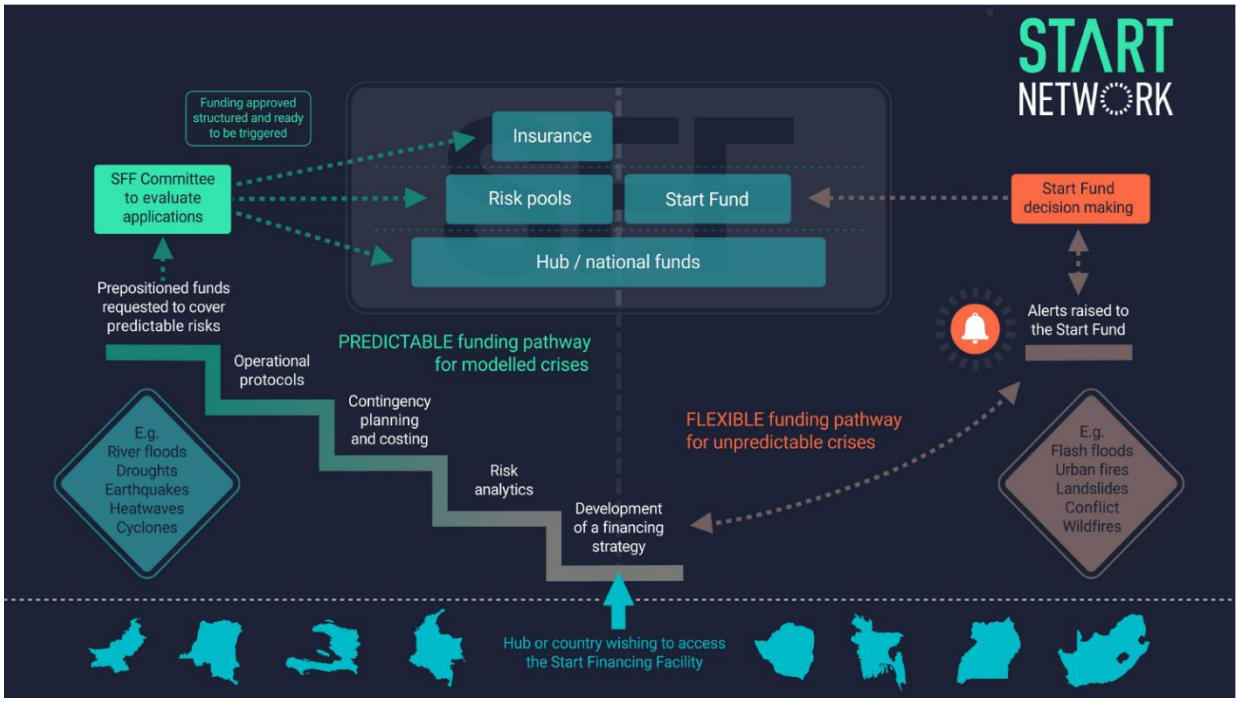

Figure 16 - Infographic of the START Financing Facility. Note the layered funds in the top middle, including insurance for the 'top' risk layer, 'hub/ national funds' for the bottom, and risk pooling which is intended to be used for all middle severity / frequency risk types. Also note the division between hazard types into 'predictable' or 'unpredictable' and what types of hazard are included here. START Ready, which is the component which includes the risk pool, refers to all of the mechanisms on the left hand side of this infographic. Reproduced from public webinar slides - GRiF Technical Talks 22nd September 2021.

In terms of the technical details of the START Ready risk pool, many of the key considerations relevant to this are laid out in the Quantitative Analysis report, which outlines a 'theoretical illustration of how a facility could pool risks' (UK Government Actuary's Department (GAD), 2020:3). The report highlights the decisions that need to be made by START in relation to trade-offs around three key aspects. These considerations include: i) Liability management – limits such as the size and number of individual risks undertaken by the central risk pool and covered by the fund; ii) Capital reserves – the amount to hold in reserve to meet payments and iii) Contingency actions – what contingencies to arrange should the fund be exhausted by multiple risks triggering at once (ibid). The authors discuss the relative strengths and weaknesses of specific contingency actions, including taking out reinsurance to be triggered

if payouts from the pool exceed a set amount, recourse to donors for additional funding, or a reduction or end to payouts from the pool to partners.

Evidence from interviews suggests practitioners working on risk pooling are sceptical of the option of reverting to donors for additional funding, pointing out that if the risk pool was to become exhausted, several crises would likely be occurring at once and donors would also be under pressure. This approach of having to revert back to donors in the event of an emergency would also undermine the objective of moving towards a system of pre-agreed financing. Instead, interview participants thought reinsurance would be the most likely contingency option to be selected, and that this would be necessary to meet the objectives of the fund in terms of sustainably over-committing: '*If you don't do the reinsurance part from the beginning or as you say, have some kind of recourse to go and get extra capital on a bad year, then we'll end up holding too much money and too much money will sit around unused. So, there has to be some kind of strategy in place from the very beginning to get that in place to avoid too much money sitting around. So, I think it's likely that we probably will do the reinsurance bit quite early on…*' (Interview 22, DRF expert). Taking reinsurance cover for the risk pool component of the START Financing Facility was later confirmed in a technical webinar in September 2021, where participants confirmed that 75% of the pool will be covered by reinsurance, with 25% non-covered[48]. This approach has the benefit of enabling the START Network to have some degree of flexibility in paying out when triggers are not met if there are any cases of 'basis risk' incidents, meaning cases where modelling does not match the reality on the ground. This is because as noted in the previous Chapter, insurance contracts

[48] Webinar available online, details of the re-insurance cover of the pool are discussed, timestamp 28.09: https://www.youtube.com/watch?v=URBVzz5MEvY

tend to resist ‘ex-gratia’ payments outside of the normal clauses of contract and can therefore be difficult to adapt in cases where a basis risk event occurs.

Turning to the IFRC, the risk pool mechanism in this case is not a new facility as such but is intended to be a change to how the IFRC fund validated Emergency Action Protocols (EAPs) within the FbA by the DREF. The FbA by the DREF funding system is at an earlier stage of development than START Ready, and notably never uses the term ‘risk pooling’ at any point in the technical report that I draw upon here (UK Government Actuary’s Department (GAD), 2021). However, it is clear that this is what is being scoped: the report executive summary describes its objectives as ‘a high-level overview of how adjusting the FbA by the DREF funding structure can maximise humanitarian impact … based on the current level of funds in the FbA by the DREF, showing how these funds could be used to cover additional EAPs with a small probability that funds could run out’ (ibid: 6).

The operation of risk pooling in the IFRC mechanism is less clear at this stage. However, in terms of the technical content, the IFRC commissioned report is very similar to the quantitative analysis report undertaken for the START Network. Both were led by authors from the UK Government Actuary’s Department, both conduct an analysis based on hypothetical numbers of risks that can be covered in one year, and the resultant probabilities of exhausting the fund. Both reports discuss how the probability levels decided upon depend on the risk appetite of the respective agencies, and outline options for contingency plans to cover shortfalls, such as the transfer of funds from other sources, donor agreements or reinsurance.

The IFRC commissioned report particularly focuses on assessing options for funding shortfalls and identifies three criteria these will be measured against. These are: i) the certainty of being

able to meet commitments, ii) ownership of risks and iii) operational feasibility (UK Government Actuary's Department (GAD), 2021). Interestingly, the IFRC defines 'certainty of being able to meet commitments' as 'ensuring the risk of a funding shortfall is low and therefore funding is available to meet needs' (ibid: 14). Whilst the meaning here is understandable, it is important to note that 'low probability' of exhausting funding is clearly not the same as 'certainty'. It is of note that the START Network commissioned report more clearly acknowledges that moving to a risk pooling approach requires tolerating the possibility of exhausting the fund: 'To guarantee all risks will be met 100% of the time would be to set the SFF up for failure (either because it would fail to do this or because the number of risks it could cover would be very small). Instead, by accepting and managing this risk, near-certainty of cover can be provided for many more risks'(UK Government Actuary's Department (GAD), 2020:11).

The final difference in the technical structure of the risk pools is that the FbA by the DREF mechanism is not a layered tool and does not have other financial instruments within the structure of the financing system. Instead, risk pooling is a shift in how the IFRC finances its FbA by the DREF fund, although of course there are potentially significant implications for Red Cross National Societies who have EAPs agreed. As the report points out: 'Decisions surrounding the options will need to take into account the sentiment of donors and national societies—there will be political costs to consider as well as financial ones' (UK Government Actuary's Department (GAD), 2021:16). The implications for beneficiaries cannot be fully understood at this stage, and though both agencies say that feedback from beneficiaries will be important, they do not cite any direct feedback from their partner agencies as yet, other than support for a more coherent financing infrastructure in the case of the START Network proposals.

However, one of the striking commonalities between the SFF and the IFRC funds in both interviews and policy content is that neither explicitly state that the scoping of a risk-pooling approach was driven by demand in terms of needs outstripping funding within their systems. Although it is clear that this is a challenge on a macro-scale in the humanitarian system as a whole, as explored in Chapter 4, this is not a challenge being faced within these specialised funds. In fact, as one interview participant commented, from the inception of their fund, they wanted it to operate as a risk pool: '*Even from the beginning the idea was to have that flexibility of over-committing because we said, well, we know that we might not need all the funds at the same moment, so we want the option of over-committing.'* (Interview 21, Humanitarian practitioner). The objective from practitioners was to create an efficient mechanism that did not leave large amounts of funding sitting in reserve – thus the focus seems to be very much about improving financing structures from an organisational and efficiency perspective, and perhaps to prepare the funds for a future in which they come under greater demand – rather than as a direct response to need. In the words of Colin Wilson, the UK's Deputy Government Actuary who co-authored the report for the IFRC, risk pooling, in his view, is about 're-defining over-commitment as optimising coverage'[49].

6.2.1 Policy objectives and benefits of risk pooling

The concept of risk pooling is completely new on the humanitarian side of disaster risk financing mechanisms, however, it is not new to the DRF sector as a whole. In general, risk pooling as a concept is widely used as a diversification strategy within insurance, and it plays a role within each of the sovereign catastrophe risk facilities active in DRF such as CCRIF, ARC,

[49] Comments made during recorded public session InsuResilience Sectoral Community Workshop: Linking Anticipatory Action to Risk Financing, 20th September 2021, Timestamp 36.35: https://www.youtube.com/watch?v=RmchPUQU8Sc&t=2199s

PCRAFI and SEADRiF. There is experience therefore in implementing risk pooling across sovereign risk financing pools which fall within the 'Market-based instruments' category of risk financing as described in the typology in Chapter 4. A recent World Bank report on risk pooling for sovereign and disaster contexts, led by the Disaster Risk Financing and Insurance Program, explains the premise of risk pooling as combining and spreading a large number of different, and preferably un-correlated risks, to 'ensure that each contributor's share of the portfolio is less risky than its initial share' (World Bank, 2017:8). The report argues that risk pooling can deliver a range of benefits for members involved in sovereign risk financing initiatives, such as helping countries to access insurance markets on more competitive terms by spreading risk, as well as improving catastrophe risk modelling for the countries involved in the pool (ibid).

Indeed, as discussed in the preface to the Introduction in Chapter 1, reducing premium costs for national governments in the Caribbean was seen as one of the initial benefits of the CCRIF mechanism when it was first established. The most recent document published with the launch of START Ready cites mutual risk sharing between members of the network as a benefit of risk pooling (START Network, 2021). Certainly in their board paper proposing a risk pooling approach, START cites feedback from partner agencies requesting a more streamlined financing system as a whole (START Network, 2019). However, unlike sovereign governments, for whom risk pooling might facilitate lower insurance premiums, it is not clear if there are any tangible benefits for partner agencies or for beneficiaries of risk pools in the humanitarian context. Existing mechanisms such as FbA by the DREF already give commitments to pay out when particular hazard thresholds are met, so the shift to a risk pooling approach does not seem to offer any material benefits, indeed, it only makes the 'certainty' of receiving such a payout slightly more complex and fragile.

In contrast, the benefits of a risk pooling approach for agencies such as START and the IFRC, and for donors, are quite clear and are described in detail in the policy literature. Firstly, for the START Network, they propose to implement risk pooling within a new financial infrastructure to manage all of their risk financing mechanisms, in order to create a more streamlined and scalable financing system. This overcomes one of the particular traits of DRF mechanisms in the past relating to fragmentation and the development of lots of different, but small, funding mechanisms - as discussed in Chapter 4. Over several years the START Network have been very active in the DRF sector and developed a number of mechanisms. For example, in 2016 they developed the first anticipatory funding model, with the START Fund 'Anticipation Window' (START Network, 2017). In 2019, they then developed and took out the world's first humanitarian insurance 'replica' policy of the African Risk Capacity (START Network, 2020b). Until this point however, each of these tools were separate financing mechanisms, which created a complicated system (START Network, 2019). Feedback from donors cited in the SFF board paper points to a desire for a more streamlined system and this was reinforced in interviews. For example, one participant described feedback received about the need to consolidate from both donors and partner agencies who received funding: '…*we were getting feedback from our members that, "This is all getting quite complicated!" And similarly, our donors saying, "You're doing too much, there's too much happening, we can't really track or understand what's going on"...'* (Interview 22, DRF expert).

Secondly, as I argued in Chapter 4, a drive for humanitarian agencies to differentiate themselves through developing agency-specific 'humanitarian authority' (Krause, 2014b) plays a role in the development of different individual mechanisms, and this also seems to be the case with risk pools. This point is made particularly clearly in the policy documents published by the START Network, such as in the START Financing Facility board paper which

is particularly concerned with highlighting the benefits to donors of START's unique new approach. For example, the paper argues that the facility offers a rare channel for bilateral donors to meet humanitarian assistance commitments, such as the Good Humanitarian Donorship Principles[50] and the Grand Bargain commitments on localisation[51] (START Network, 2019). They further cite supportive feedback from their donors about the usefulness of the new financing facility being in line with their objectives to move towards acting on risk: 'We are trying to shift to a risk-based approach instead of needs-based, with more preparedness and early action. Right now, 90% of our funds are response (and that's not good enough)' (START Network, 2019:8).

The final policy benefit of a risk pooling approach, particularly for donors, is the ability to fund the pool with restricted or earmarked funding. The START Network's existing fund, the START Fund (and the START Anticipation Window within this), did not allow money to be earmarked for particular crises or geographies because they did not know what types of events might happen and flexibility was therefore key. In contrast, because of the structure, risk analytics and pre-agreements required, risk-pooling is more suited to a 'restricted funding' approach (START Network, 2019). This means that donors can request that funds be pre-identified for a specific country or 'thematic package' – as they refer to it in the SFF Board Paper (START Network, 2019). As a result, the START Financing Facility can be more targeted for particular donors, by creating tailored entry-points around particular issues or types of hazard. In their board paper, START identifies climate and development donors as potential funders for a specific package of 'resilience-linked finance', as well as outlining a proposal to develop a

[50] https://www.ghdinitiative.org/ghd/gns/principles-good-practice-of-ghd/principles-good-practice-ghd.html
[51] https://interagencystandingcommittee.org/more-support-and-funding-tools-for-local-and-national-responders

'Pooled Crisis Modifiers/SDG Protection Package', to offer 'protection' to development investments from sudden disaster shocks (ibid). This demonstrates some of the policy drivers and donor politics at play in determining the shape of future funding models, and also points to the perceived benefits of a risk pooling approach in offering much greater specificity to donors in justifying where expenditure goes and knowing in advance under which conditions those funds will be triggered: because of the risk analytics and modelling component.

6.3 Risk as a calculative logic and operating 'grammar'

The central argument of this chapter is to show how a narrowly conceived metric of 'risk' is becoming the logic for decision-making within the two examples of humanitarian risk pools. DRF has been characterised by a paradigm shift away from acting based on existing humanitarian need, towards acting 'based on risk' (De Wit, 2019), and I argue here that risk pooling approaches represent the culmination of risk-based logics into disaster financing. I therefore explore how through the logic of risk, diverse hazards come to be grouped and made commensurable through the practice of risk pooling, providing a deeper explanation of why the concept of 'risk' has become such a dominant logic for decision-making in DRF.

As I have outlined in other places, definitions and understandings of 'risk' are epistemologically complex, but the common ground between the three different literature groups I draw from in this thesis is that risk is not objectified or seen as neutral. Drawing from risk governance theory specifically, in this chapter I apply Michael Dillon's (2008) concept of risk as a tool of biopolitical governance, where risk is not an objective state or condition. Instead, risk is a 'carefully created artefact'… produced through 'computational and discursive practices that constitute specific risks as they are' (ibid: 322). This understands risk in a constructivist way, focussing on understandings and categorisations of risk, and the politics

and implications of this. For example, the Foucauldian scholar François Ewald discusses the meaning we attribute to risk, in particular through the lens of insurance: 'Nothing is a risk in itself… the category of risk is a category of understanding' (Ewald, 1991:199). In applying this theorisation to risk pooling, I find there is a strong resonance with the notion of risk as 'artefact'. This is not because the hazards and disaster events for which financing is needed are not real, but because of the work required in order to produce 'risk' as a measure of probability - from diverse hazards - that aligns with the logic of the risk pool and through which decisions are made.

Specifically, the process of risk pooling requires both discursive and computational work to allow hazards caused by a range of phenomena to be understood together in one portfolio. Risk Pooling and DRF more widely, borrows heavily from financial expertise to do this – and here I draw from Chapter 5 in the discussion about what it means to '*Think like an Insurance Company'* - and also from a report authored by Meenan et al. (2019) which is cited by the START network in the '*SFF Board Paper*'. This report explains a process to assess the suitability of particular hazards for different DRF mechanisms, through what the authors call a 'risk audit' (ibid). In Chapter 5 I analysed the process of the risk audit to demonstrate how it reflected the approach to assessing 'contingent liabilities' introduced by Clarke and Dercon (2016) in '*Dull Disasters*'. Here, I develop this to show how a process of 'risk auditing' conceptualises risk through both computational and discursive practices. The four steps that make up the risk audit are to '(i) define the exposure at risk to understand what needs to be managed; (ii) identify what perils and hazards can impact that exposure, (iii) quantify the expected frequency and severity of impact from those perils, ideally using a probabilistic risk analysis, and (iv) set a resilience target to identify the extent to which risks will be explicitly managed' (ibid: 16). These four steps span both computational estimations of risk, and

subjective and political decision-making to determine risk thresholds, such as 'resilience targeting' which refers to determining the amount of risk that will be actively managed – the remaining 'residual risk' is 'retained by the risk holder' at a 'tolerable level' (ibid: 16). It is important to note that while the language here is analytical and objective, what is being decided is effectively what will and will not be financed, should a disaster occur: it is therefore a deeply political process.

A number of these recommendations are applied in the START Financing Facility documentation, including risk identification, quantification and targeting steps outlined previously. This is further outlined in Table 7 below, which is a table from the SFF Board paper that is adapted from recommendations made in the Meenan et al. paper, and which identifies which risks are better suited for which financial instruments within the SFF as a whole (START Network, 2019), as part of the 'risk layering' approach adopted throughout the SFF.

Table 7, which is reproduced from the START Network Board Paper (START Network, 2019) - which is itself based on the Meenan et al. work - maps risks to particular financing mechanisms based on risk characteristics including the timing of hazards, meaning when funding is needed; the severity, meaning the return period of the risk; and predictability. For example, risk transfer, which means reinsurance, is shown to be most suitable for 'predictable' risks of high severity and with infrequent return period, whilst risk aggregation, meaning the risk pool, is shown to be more suited to predictable risks of a lower severity and more frequent return period.

		Timing				Risk level					Predictability	
		When is funding needed				Severity / frequency of the event (return period)					How predictable is the event, can we model its likelihood?	
		Preparedness	Anticipation / Early Action	Response	Early Recovery	Annual	1-5 years (small crises)	5-10 years (med crises)	10-25 years (large crises)	25+ (v large crisis)	Predictable	Unpredictable
Action	Instrument											
Risk Transfer	Re-insurance		X	X	X				X	X	X	
	Donor call for support			X	X				X	X		X
Risk Aggregation	Risk pool	X	X	X	X		X	X	X	X	X	
	Bridge loan facility		X			X	X	X	X	X	X	X
	Pooled crisis modifiers	X	X	X	X		X	X			X	X
	Flexible global contingency funds	X	X	X		X	X	X				X
Risk Retention (national / hub level)	Flexible national/hub level contingency funds	X	X	X		X	X	X				X
	Trigger-based contingency funds	X	X	X		X	X				X	
Risk Reduction	Loans	X			X	X	X					
	Bonds	X			X	X	X	X	X	X	X	
	Impact bonds	X			X	X	X	X	X	X	X	

Table 7 - Adapted from START Network (2019), showing a demonstration of a 'risk layering' approach based on risk analysis and identification, identifying which hazards are better suited to particular financing mechanisms, based on the timing of when funding is needed and the severity and predictability of the potential event.

Whilst there is an appeal to this logic of risk management that echoes the intuitive appeal of the anticipatory approach of the sector as a whole, it is important to reflect on the combined computational and discursive practices at work here transforming diverse hazards into 'risks' which can then be allocated to different financial tools. Hazards and disasters do not translate neatly into single metrics of risk. Not only are different hazards understood using different methodologies and epistemologies, but they also have differing degrees of predictability, as discussed in Chapter 5. Indeed, significant research resources have been invested in particular parts of the DRF research agenda in an attempt to define how useful different forecasts are for humanitarian decision-making. This body of research draws out significant nuance about the use of forecasts for humanitarian decision-making, such as comparing the utility of different hydrological models, or predictability of the same model at different lead-times (see for example Ward et al., 2015; De Perez et al., 2017 and Macleod et al., 2021). However, in this case of risk pooling a much more simplistic approach is adopted. Diverse hazard events must be measured through a narrow metric of probability that allows them to fit into the structure of the financing tools that are available to DRF practitioners, and more implicitly as part of a wider logic of a set of pre-determined mechanisms to finance disaster response.

Dillon's argument further makes the case that risk calculation relates to understanding *how* risk operates as a biopolitical tool through DRF and fleshes out the characteristics of these forms of governance. Here I apply Dillon's notion of risk as a 'calculable measure of exposure to contingency' which makes exposure generalisable and fungible – meaning it can be exchanged and aggregated like a commodity. Dillon explains this as the process through which risk commodifies exposure to contingency, 'calculated through the generalized measure of probability' (2008:320), making diverse eventualities both calculable and fungible through measures of probability.

There is some precedent in analysing the way in which risk operates as a tool to make exposure to contingency both 'calculable and fungible'. For example, this is explored in Johnson's (2013) work on catastrophe bonds, where she argues that catastrophe bond trading has required the creation of a single risk measure from diverse events and hazards. She charts the process of creating catastrophe bond markets, requiring that myriad geophysical and biological phenomena are made commensurable, in this case by presenting model results through a single metric of 'expected loss' (Johnson, 2013: 35). In so doing, diverse and complex catastrophes and hazards which are not otherwise comparable are 'made the same' through the creation of common 'expected loss' metrics and become fungible commodities that can be traded on bond markets (ibid).

In the case presented here, although the creation of a risk pool within a humanitarian fund is different to making a market for catastrophe bond trading, there are strong parallels in its computational and discursive production of 'risk'. While risk pooling within DRF does not seek to make a market, it still requires that hazards and disasters are made commensurable and effectively fungible in order for them to be aggregated and exchanged as part of the pool. Risk pooling does not, therefore, trade or exchange hazards and disasters like a market, but it does require that risks are turned into 'generalized measures of probability' and made to be both calculable and fungible in order to be pooled together.

Referring once again to the START Financing Facility, we see that the steps outlined previously as part of the 'risk audit' already do much of the computational and discursive work in creating the logics of the risk pool. However, the pool aspect of the SFF focusses in particular on the 'predictability' of hazards - which is critical to establish the financial viability of the fund. We see this in the Quantitative Report commissioned for the START Network, which has a strong

focus on modelling possible payouts over the course of a typical year (UK Government Actuary's Department (GAD), 2020). Taken together, the information required to analyse how pooling would work are: the amount and terms regarding any payouts, for example whether there is a cap on total potential payouts and whether it is possible to pay out more than once per year, per hazard; the relationship and degree of correlation between hazards covered; and above all, the return period of hazards. In practice however, the 'generalized measure of probability' which most determines the risk pools is whether or not a hazard is deemed as predictable, and what its return period is deemed to be. While there are a number of other variables under consideration, the return period of risks is the critical aspect of constructing the risk pool because this is essential to calculate the likelihood of each risk within the pool triggering in any one year. Variables such as size and terms of payout can be modified if necessary, but the hazards themselves cannot. Moreover, as the START Network quantitative report concedes, the most severe events are usually the most underestimated, and therefore any error in estimating the likelihood of events poses the most significant risks to the fund running out of money (UK Government Actuary's Department (GAD), 2020).

It is important to acknowledge, however, that the process of identifying both 'predictable' hazards and then calculating return periods is both a computational and discursive manoeuvre. As I outlined in Chapter 5, predictability is more complex than it might at first seem, especially when looking across different types of hazards, forecasting methodologies and disciplines. In the case of the SFF, 'predictability' is supposed to indicate the suitability of hazards for the SFF pool, but it is notable that START groups a variety of hazards into the category of 'predictable' that conventionally might not be understood as 'predictable'. The obvious examples here are earthquakes (see Figure 1), which are not conventionally understood as 'predictable' in the sense that they cannot be forecasted, unlike hydro-

meteorological hazards for which disaster managers widely use skilful forecasts. This understanding is useful for making sense of some of the idiosyncrasies of the risk pooling approach to defining particular hazards as amenable to the pool - or not.

Indeed, this is a point which reflects to a great extent the argument made in Chapter 4 about fragmentation and a lack of coordination across the sector when there is such a diversity of approaches. Specifically, within the same agencies some are increasingly trying a more insurance-based process, which takes a very different approach to 'predictability', while other individuals within the same agency are adopting a physical sciences-based approach, for example researching the basis of predictability in different meteorological or hydrological contexts. This is certainly the case for the IFRC, who are experimenting with a more insurance-based approach through risk-pooling, while at the same time they remain closely involved with climate science research, led by the Red Cross Red Crescent Climate Centre, which in recent years have led the publication of several papers determining the scientific basis of predictability for humanitarian decision-making. Such approaches are not necessarily mutually exclusive, but in this case the understanding of the term 'predictability' is different. As one research participant explained, the almost experimental approach to some of these mechanisms reflects a process whereby: '… *humanitarian agencies are trying out different language. Almost like trying different suits to see if they fit*...' (Interview 7, DRF expert)

Thus, the particular metrics which START use to define 'predictability' have more to do with the financial logic of the SFF of being able to calculate a 'return period' - than with what climate or physical scientists would understand as 'predictability'. This definition was explained in interviews, where the metric used by the START Network to define a 'predictable' hazard in the context of the SFF was explained as '*anything that you can fit a historical index*

to…' (Interview 22, DRF expert). Here, interview participants specifically referred to the requirements of the risk pool, explaining that such a historical index is necessary because it: '*tells you the pattern of regularity and essentially allows you to set a return period to it, to price it. Because that's what we want to do… we want to set return periods to the risks. Because it's only by knowing how often they occur or the likelihood of their occurrence in any one year, that we can actually then properly work out how much money that we need to have available.'* (Interview 22, DRF expert).

Importantly, therefore, different hazards become amenable to the risk pool, following the process of abstraction into metrics of probability, the resultant risks take on a new ontological status – a new metric based on which people can make decisions. For example, Johnson notes in her article about catastrophe bonds that the risk metrics that make different hazards calculable and fungible bear 'an extraordinary resemblance to Marx's account of abstraction, commodification, and fetishization' (Johnson, 2013: 35). Thus, in order to pool together different risks and to calculate how much of the fund must be in reserve and what the likelihood is of the fund becoming exhausted, risk in the humanitarian pool reflects what both Dillon (2008) and LiPuma & Lee (2004) have observed as displaying some of the essential properties of money – something that is fungible and can be traded, shared and pooled. As a participant quoted previously explained, allocating a risk metric: '*tells you the pattern of regularity and essentially allows you to set a return period to it, <u>to price it'</u>* (emphasis added) (Interview 22, DRF expert). Thus, the resultant risk metrics of return periods – as measures of probability – can be pooled together and exchanged. In so doing, these measures of risk provide an operating logic for the risk pools – determining what types of hazards can be covered through the pool, and how far they can extend the fund without running out of money. As a result, they serve as key logics for decision-making, providing the basis for the

extension of a transactional economic logic - that Foucault (2008) first identified as essential for biopolitical governance - into humanitarian decision-making and financing. The unique aspect of this in the case of humanitarian risk pooling is that this extension of an economic logic into decision-making is happening without the creation of a market or financialization in a concrete sense, but is instead more subtle and complex in the way it is re-articulating decision-making processes and logics.

6.4 Implications: Speculation and Contingency

6.4.1 Speculation: 'In simple terms: they bet'

In this section I explore the implications of taking such a 'risk-based' logic of decision-making through the construction of risk pools in DRF and the extension of a transactional economic logic through this. Specifically, I argue that risk pooling represents a new form of speculative risk-taking, as one interview participant explained to '*do more with less*' (Interview 26, Humanitarian practitioner).

The framing of risk as a speculative decision-making tool is one of the key points of Dillon's arguments about risk as a tool of biopolitical governance, highlighting how decision-making based on risk inherently has a speculative nature. Picking up on the process of curating risk, once calculable probabilities have been produced through risk analyses, Dillon argues that: 'Events and eventualities are allocated probabilities, a generalized measure of account, then correlated with their projected outcomes and given a score. People take a chance on that score. In simple terms, they bet' (2008: 320). The idea of acting on a probability, in essence 'taking a bet', is not to trivialise this process. Instead, as Oulahen (2021) writes in his discussion of risk and flood hazards where he discusses three different imaginaries of risk, he identifies the importance of risk as a critical hinge point around which actors make decisions.

This process of decision-making based on risk points to one of the aspects of risk which Dillon argues has been over-looked because of the way risk is often associated with danger or the threat of loss – such as in Beck's notion of the 'risk society' (1992). Instead, Dillon writes that as much as risk is associated with the potential for loss, it 'is simultaneously also associated with the occasion for gain or profit… Our entire global civilisation revolves around the nexus of profit and loss that informs risk' (2008: 320). Indeed speculation - meaning investments made in the hope of gain, but with the risk of loss – is one of the cornerstones of capitalist economic and social relations. David Harvey makes this case, arguing that: 'Capitalist development is always speculative – indeed, the whole history of capitalism can best be read as a whole series of miniscule and sometimes grandiose speculative thrusts piled historically and geographically upon one another' (Harvey, 2001:365-366). This was even identified by Frank Knight (2006/1921) in his theory of profit, where he understood profit as the return to the entrepreneur for bearing the uncertainty in business. Thus, speculation is very much the crux of profit-making activities, and thus, for furthering a 'transactional economic logic' (Dillon, 2008) into decision-making.

Of course, the concept of speculation is strongly associated with markets and capital accumulation, but this chapter applies the concept of speculation in quite a different way because of the lack of financial incentives, at least in regard to profit-making potential. However, there is resonance in terms of understanding the speculative aspect of decision-making, based on risk, in the hope or possibility of gain. Specifically, in the usual mode of humanitarian and disaster response where agencies respond in the aftermath of disasters, there is limited anticipation and limited scope for more efficient or effective response. However, by acting instead on risk information, DRF creates the potential for efficiency savings and a more effective response system. Through risk pooling, agencies are speculating

that they can cover more hazards or potential disasters with the same sized fund. As one participant commented: '*You know already how many EAPs you have… it's just very simple… why can't you do more with less?*' (Interview 26, Humanitarian practitioner). Indeed, as the IFRC actuarial report into '*Financing the Forecast-based Early Action Protocols'* argued, the 'value of each dollar needs to go further than before' (UK Government Actuary's Department (GAD), 2021: 5). All of these arguments strongly evoke the 'efficiency' policy narratives explored in Chapter 4, that humanitarian needs which outstrip budgets provide the key logic for DRF mechanisms.

Assessing and managing the right level of hazards to cover through the risk pool – in other words, deciding what level of 'bet' to make – is the central concern of the quantitative analysis papers undertaken in support of risk pooling. As the START Financing Facility quantitative paper argues: 'Pooling risks within a central risk pool provides the benefits of diversification as not all risks are likely to pay out at the same time. Therefore, if you accept a small possibility that the funds will not be sufficient (and have contingency plans in place for this) then you can hold significantly less than the total possible amount which could be triggered' (UK Government Actuary's Department (GAD), 2020:3). This is where there are difficult political decisions that need to be made and it is notable that the two risk pooling examples discussed here deal with this differently.

As outlined previously, the IFRC commissioned reports state a number of key principles in assessing the options for contingency financing in the risk pool, including 'the certainty of being able to meet commitments'(UK Government Actuary's Department (GAD), 2021:14). However, they define this 'certainty' as 'ensuring the risk of a funding shortfall is low and therefore funding is available to meet needs' (ibid). This is clearly not the same as 'certainty'.

In contrast, it is evident that the START Network commissioned report is more sanguine and specific in how it describes the inherent risk of moving towards a pooling approach. Here, the report states that while 'the aim of the SFF is to provide certainty, we do not think that the idea of reducing payouts in exceptional circumstances should be completely discounted… To guarantee all risks will be met 100% of the time would be to set the SFF up for failure (either because it would fail to do this or because the number of risks it could cover would be very small). Instead by accepting and managing this risk, near-certainty of cover can be provided for many more risks' (UK Government Actuary's Department (GAD), 2020: 11).

This is an essential point which makes explicit the speculation needed to move towards a risk pooling approach: the chance that the fund will be exhausted and not able to meet its commitments can be managed through any number of strategies. However, the premise of risk pooling as an approach relies fundamentally on being willing to tolerate the possibility – or as Dillon words it, to take that bet (2008) - that at a particular threshold the benefit of efficiency savings and optimising coverage for more hazards will be worth the chance of exhausting the fund. Without over-commitment to some degree, risk pooling simply does not work.

Moreover, it is important to note that the possibility of exhausting the fund is particularly high for the first few years of operation, evoking the discussion from Chapter 5 about needing to adopt a long-term time horizon when making decisions using forecasts. To put it simply, it is possible that agencies might just be unlucky, and events which they expected to only occur once in every 5 years might occur more often than that (MacLeod et al., 2021a). Over time, this should smooth out. However, it is particularly difficult politically, if in the early years of introducing such an approach they either do not trigger at all to demonstrate their value, or

they do so too frequently. Another danger, of course, is that the estimations of return period based on acting at a particular threshold prove to be inaccurate. The challenge with this would be that it is difficult to know if climate change or another factor is contributing, or if it is simply a result of stochastic variability. Indeed, this is an ongoing challenge for the FbA by the DREF fund (separate from any developments regarding the shift to a risk pooling approach), as practitioners have found that in the few years it has been in operation, EAPs which are supposed to trigger only 1 in every 5 years are being triggered much more frequently than that. This was something one research participant commented on, explaining that: '*The whole idea is that if I have 10 EAPs in a given year, I may only activate maybe two. But if I find myself, which was the case of 2019- So in 2019 we approved eight, out of those eight in 2020, five were triggered…. So that means that because if you follow this five-year return period, and it might be that it still holds because maybe - It's always probability, so you can say, "Well it was a low probability that they all happened"...'* (Interview 21, Humanitarian practitioner)

The emphasis here turns to the ways in which this possibility of the fund being exhausted can be managed, which includes seeking aggregate reinsurance, raising additional funds by recourse to donors or reducing or stopping payouts. These are fundamentally political decisions which evoke ideas about 'the political economy of liability' discussed in Chapter 5. As one of the reports concludes: 'Although calculations can help indicate how likely it is that the fund will run out of money, the decision about what is an appropriate level of risk of the fund being exhausted is a political decision rather than an actuarial one' (UK Government Actuary's Department (GAD), 2020: 10).

6.4.2 Contingency: 'how do you make a trade-off between saving a life today and saving a life tomorrow'?

In this final section I outline how risk pooling is starting to re-orient humanitarian disaster response to an approach defined by contingency. To the layperson, contingency refers to possible future events which cannot be predicted with any certainty and is usually meant as preparing for the un-predictable. In theoretical terms in the risk governance literature however, contingency has a particular meaning relating not to the arbitrary chance of such future events but represents a complex discourse about the knowledge of that uncertainty (Dillon, 2008). Drawing from Foucauldian biopolitics, contingency refers to the securing of populations through such knowledge practices, which Dillon calls the 'emerging sciences of the contingent', in particular through statistics and probability (Dillon, 2007: 46). Of course, the practices of biopolitics have undergone substantial changes in the years since Foucault's original work, relating to changes in demography and in particular because of information availability and digitisation (Dillon & Lobo-Guerrero, 2008). Moreover, processes such as climate change are creating new domains of contingency. For example, Angela Oels has argued that climate change is leading to the emergence of a new paradigm of risk management through contingency, to prepare for and manage the 'inevitable' primary and secondary impacts of unmitigated climate change (Oels, 2013). In the context of this exposure, risk operates as a biopolitical tool of governance to manage our uncertain future, and our knowledge about it. As Dillon argues, this is accomplished through technologies of risk which provide the 'means of navigating that contingency, avoiding loss and seeking gain' (Dillon, 2008: 321).

Climate change is understandably a cause for concern amongst humanitarian practitioners and is certainly one of the main problems that DRF mechanisms such as risk pools, which offer

significant potential efficiency savings, are designed to navigate. The sense of humanitarian needs outstripping available finance was conveyed by many participants in this research, as discussed in the Chapter 4 section on policy drivers. This concern about increasing humanitarian needs can also be found in the literature relating to the two risk pools discussed here. For example, in the opening sections of their board paper in explaining why the humanitarian system as a whole needs facilities such as START Ready, the START Network argues that 'In a world of increasing climate risks, we need a much more resilient, adaptive humanitarian system with the capabilities to manage crises far more effectively' (START Network, 2019: 5). Similarly, the IFRC commissioned report notes that the 'intensity and frequency of natural hazards is increasing, leaving behind an unprecedented and growing level of humanitarian need' (UK Government Actuary's Department (GAD), 2021: 5).

Michael Watts (2015) describes the discursive framing of climate change in adaptation policy as something that was unimaginable until recently. In his work, Watts presents climate change as a planetary emergency framed in the language of uncertainty, unpredictability and contingency (Watts, 2015). Adaptation to such a changing climate is now embedded within a worldview of life understood as a living and complex adaptive system characterised by radical contingency, where adaptation can only be meaningfully performed through contingency, shaping exposure to such contingent events (ibid). If Watts was correct in identifying a shift in the discursive framing of climate change adaptation in 2015, it is certainly ever more the case today given widespread declarations of the climate emergency and the UN Secretary-General's response to the IPCC 6th Assessment Report in 2021 as 'code red for humanity'[52].

[52] UN Secretary-General António Guterres issued a statement on the Intergovernmental Panel on Climate Change (IPCC) Working Group 1 report on the physical science basis of the sixth assessment in August 2021, describing the report as 'code red for humanity': https://www.un.org/press/en/2021/sgsm20847.doc.htm

Here then, DRF and specifically the measures described here should be understood as a response to this, shaping exposure to contingent future events, deploying statistical and actuarial tools to calculate risk as a measure of exposure to this contingency and to structure and justify decisions about responses to such risks.

This is evoked in DRF not only through the risk-based approach and the work that goes into calculating and curating risk metrics through probability, but in the framing of risk pooling and DRF as approaches based on knowledge practices, which Dillon calls the 'strategizations of the contingent' (Dillon, 2008:318). For example, a discussion with one participant strongly evoked the sense of risk pooling being driven by the knowledge we have about future hazards and disasters, and the sense of a complex and radically contingent world as requiring such tools: '*…it has to do with the access to information….we have been able to put together data through the co-platform, but we also have this annual world disaster report. I think having all that systematised data it's making us see that the risks are getting, you know, that there are more things to think about but they're also much more complex, and I think that that visualisation of data and the availability, it's one of the factors that has been pushing this ...*' (Interview 21, Humanitarian practitioner).

In terms of how such a contingency approach manifests in the context of risk pooling in humanitarian finance, contingency is articulated through the drive to be prepared for future possible catastrophes. Critically though, this is not to foreclose such events from happening, but to be precautionary, prepared, and to pre-empt that such events will likely happen. Here, as part of a shift towards a rationality characterised by radical contingency, biopolitical technologies provide ways to make decisions and 'live with' such possibilities. As noted previously, biopolitical technologies 'seek to provide means of navigating that contingency,

avoiding loss and seeking gain' (Dillon, 2008: 321). Or, as he later explains, referring specifically to risk pools as deployed in insurance:

> '*Risk analysis pools individuals into risk pools, seeking profit by speculating on future events to which such pooled individuals may be exposed. Such security practices do not prevent things happening to people or corporations; they provide opportunity for gain or they compensate people for any loss they may incur, allowing them to continue to actively circulate in the general combinatorial and transactional economy of contingency formed by risk*' (Dillon, 2008: 327).

The notion of shifting the logic of response towards a contingency approach is demonstrated in reports describing the shift that risk pooling represents, in particular through the way they describe risk pools as offering 'protection' to member agencies, or even to investments into particular development projects and gains. For example, the START Network board paper argues that risk pooling '…requires a shift in mindset to measuring impact based on numbers of people *protected* annually from crises (which will be pre-determined by the funds available), in addition to numbers actually reached (which depends on whether crises happen and triggers are met during the project)' (emphasis added) (START Network, 2019: 18). Here then, beneficiaries are no longer those who do receive a disaster response, but those who could, and are therefore 'protected' by such a system being in place.

Of course, this could be more simply interpreted as a desire to maximise the figures for number of beneficiaries reached for Monitoring and Evaluation reports and to demonstrate maximum value for money to donors. However, my research interviews reflect a deeper shift that risk pooling represents within DRF and humanitarian financing in terms of using risk-based tools as a logic to navigate future contingency and to justify decision-making. For

example, when commenting on the quote above, a research participant explained that: '*the protection aspect is really important… it's basically just moving away from the kind of ad hoc reactive way of giving, to a much more systematic way of identifying and prioritising risks and communities that deserve … a response if a crisis happens. And then ensuring that there are the funds available…*' (Interview 22, DRF expert). Similarly, the START Network Board Paper proposes that risk pooling approaches offer a way to provide 'protection' for development investments and could be used by donors seeking to secure those investments. Here, START identify climate and development donors as potential funders for a specific package of 'resilience-linked finance', as well as a proposal to develop a Pooled Crisis Modifiers/SDG Protection Package, working with development delivery agents to plan and cost ways to mitigate risks posed by disasters to their programmes 'and then pre-position suitable funding within the SFF to be released when needed to 'protect' development gains from humanitarian crises' (START Network, 2019: 25). Thus, while risk pooling approaches may allow for efficiencies in coverage, it does not overcome the problem of humanitarian needs outstripping available finance. Instead, it provides a tool and a logic to make decisions about where to intervene and on what basis. Much in the same way that insurance does not prevent disasters from happening, as Dillon (2008) points out, it provides compensation for losses which may be incurred; risk pools in this context offer 'protection' for agencies and their partners in a similar way.

This shift is very significant in terms of changing the way humanitarian financing operates, and underlying this, in changing the objectives – or metrics of successful disaster response. Commenting on the system, one prominent DRF expert from a development financing background commented that until now: '*The issue we've got is... the humanitarian system is such that as soon as money comes in, it just needs to seek out the greatest possible need at*

that moment in time, so it sort of becomes laser focussed on finding greatest need ... Then obviously there's no thinking about tomorrow, there's no planning for tomorrow and ... there's no risk management because actually you're not thinking about tomorrow.' (Interview 7) Reflecting further, the same participant commented that now the humanitarian system was trying a new set of approaches, grappling to find an answer to the question of how you justify decision-making when need outstrips resources: '*you need to have some way of making trade-offs. So how do you ... how do you make a trade-off between saving a life today and saving a life tomorrow? And economists would sort of say well, you should turn everything to numbers and then have a discount rate ...* ' Commenting on the value of a 'risk management' approach, they finally argued: *' the transformation that I quite fundamentally believe in ... about risk management is ... There is a legitimacy to the decision-making process about how those trade-offs are made'* (Interview 7, DRF expert).

This is significant because it shows that what is being proposed through DRF and this example of risk pooling is a biopolitical technology for making crucial, and highly political, decisions about disaster response. The risk-based technologies of DRF and risk-pooling provides a logic for making difficult decisions about what receives funding and what does not when response agencies are overwhelmed - a process akin to triage (Jagers et al., 2005) – where financing is all pre-arranged, in the most efficient way possible, and decisions and trade-offs are made in advance.

Reflecting back to material from political ecology scholars such as Watts (2015) and Grove (2014), this is one of the aspects of 'adaptation thought' that they are most critical of: that biopolitical technologies will not stop or prevent such crises, and nor do they seek to. In this case, risk pooling as a biopolitical tool offers methodologies for humanitarians to finance their

responses in more efficient ways, so that they can 'live with' more frequent and or severe hazards as is expected in the world of climate change and 'radical contingency'. Critics of contemporary adaptation and resilience argue that these approaches lead people to 'live with vulnerability rather than remake the world to remove the sources of their insecurity' (Grove, 2012: 206). Here I argue that DRF and risk pooling present a similar process, but in this case, it is for humanitarian and development agencies to 'live with' the increasing cost of disaster response and growing humanitarian needs.

Michael Watts describes contemporary adaptation thought as invoking a new sense of 'homo economicus', a figurative human characterized by an infinite ability to make rational decisions (Watts, 2015). Specifically, he argues that: 'The challenges of adapting to the radical uncertainties and perturbations of global climate change invoke a new sense of homo economicus. A decision-maker in self-organizing, adaptive systems confronting catastrophic threats becomes "an entrepreneur of himself" (Foucault, 2008/1979: 241), a sort of hedge-fund manager for his contingent, turbulent, and unpredictable life' (Watts, 2015: 41).

I find this resonates deeply with developments across the DRF sector, in particular through risk pooling. Humanitarian agencies and practitioners are learning from and adopting the approaches of insurers and actuaries in order to manage contingent futures, and in particular to hedge their budgets. This is a re-structuring process of making explicit humanitarian decisions that were previously implicit, or to quote research participants, '*scattergun*' (Interview 7, DRF expert). Clearly, this is not an insignificant change – it represents the extension of a particular logic of liberal governance into humanitarian decision-making in novel ways. At most, it signifies a subtle but powerful extension of the transactional economic logic of neoliberal rule into humanitarian decision-making. As Dillon puts it, 'the revolution in

commercial and governmental power/knowledge of the last thirty years has transformed risk from one management device and form of calculation … into what has many of the features of a universal system of account and a new order of governance' (Dillon, 2008: 325). The critical point here, however, is that such a 'universal system of account' is not neutral, despite the objectivity of risk-based logics and the seeming 'legitimacy' that this gives to decision-making. Instead, risk is a constructed artefact and ought to be considered as such, so that emerging modes of humanitarian decision-making and governance can be analysed and properly understood.

6.5 Reflections

In this chapter I have discussed risk pools as the most recent development within the DRF landscape, which demonstrate much of the hybridisation of mechanisms, integrating insurance-based techniques within the structure of humanitarian funds. The discussion has focussed on the politics enacted by DRF in terms of decision-making within humanitarian funds and argued that the way in which risk is operationalised within these mechanisms operates as a calculative logic and decision-making paradigm that is taking shape as a novel form of biopolitical governance within the humanitarian and development sector.

The chapter applies the theoretical insights from risk governance literature, in particular Michael Dillon's work about risk as the most pervasive biopolitical technology of security in contemporary society (2008). As Dillon notes, insurance provides a mechanism for the extension of the 'transactional economic logic' - that Foucault (2008/1979) first identified as essential for biopolitical governance, extending this into everyday decision-making and economic relations. In this chapter I have applied these concepts to the emerging case of risk pools within humanitarian funds. This is novel because the risk pools in question are not

directly tied to markets or the private sector. However, the way in which risk is operationalised within these mechanisms operates as a calculative logic and decision-making paradigm that reflects much of what has been documented in other interactions, such as in the creation of catastrophe bond markets (Johnson, 2013a).

In terms of the practical implications of this shift, the risk pools within both funds are still in the very early stages of development, with START Ready (part of the START Financing Facility) having launched in November 2021 and the FbA by the DREF risk pool still under development. We do not know therefore how sustainable risk pooling will be. In Sections 6.2 and 6.4 I discussed the strategies reviewed by the different agencies to manage the funds in case they do exhaust funding, as noted previously the START Network has chosen to take out reinsurance to cover 75% of the risk pool within START Ready. It is not yet clear what options the IFRC will select moving forwards. None of these choices are straight forward. Besides the cost of paying for reinsurance, taking out such a policy would require very clear contractual payment terms and would restrict agencies in terms of their ability to make payouts outside of the standard terms of the contract, should, for example, a modelling error or 'basis risk' event occur.

This points back to some of the discussions in Chapter 5 about the 'political economy of liability'. One observation I would make from my interviews about risk pooling was the reluctance to reply, and the lack of depth to responses, when I questioned participants about the idea of 'risk appetite' in the humanitarian context, and how this influences the decisions around ensuring that the pool does not run out of funding. There are a number of understandable reasons why I might not have received useful responses to this, and it is not a simple question: how does a humanitarian agency work out its 'risk appetite'? Perhaps this

is still too novel a concept for the sector, but it is terminology explicitly used in both actuarial reports commissioned for the START Network and IFRC (UK Government Actuary's Department (GAD), 2020, 2021). Understanding what 'risk appetite' means in the context of a humanitarian agency is highly relevant to successfully implementing approaches like risk pooling, but clearly not straightforward - bearing in mind the concluding arguments made in Chapter 5 about the way in which uncertainty is not simply a financial concept for agencies in this sector. Either way, it is a key point that through the calculative logic of risk, humanitarian agencies are expecting to optimise their overall financing strategy by a shift away from the certainty of providing funds following a disaster'.

In conclusion, I acknowledge that the two risk pooling mechanisms in question are both quite small in comparison to the total humanitarian response budget, and perhaps taking a more experimental approach is important for innovation in the sector. However, risk pooling is also very much the culmination of what DRF practitioners have been pushing towards in recent years. It is the best example of hybridisation across the sector, integrating financial and actuarial approaches within humanitarian funding systems. It is also notable that risk pooling is the logical extension of pre-arranging financing, because without over-committing funding in this way, agencies would have money sitting in reserve waiting to be triggered, which as I argued previously, is seen as an example of the inefficiencies DRF is supposed to move away from. Above all, risk pooling is symbolically important because it represents the fullest extension of the logic of 'acting based on risk', through which I have understood DRF as a whole. Even if small, therefore, risk pooling is symbolically and materially an important example of the types of financial mechanisms DRF is ushering in. It is therefore particularly important that they are critically analysed and understood, and I would not be surprised to see further developments of this type of mechanism in the future.

7. Conclusions

This thesis has explored the nascent field of disaster risk financing, a set of policy mechanisms that enable agencies to respond earlier to disasters, based on a measure of disaster risk, pre-arranged finance and plans, and a mechanism to trigger response. DRF mechanisms span both those designed to anticipate disasters, and those designed to trigger more timely response to disasters. What they have in common is the use of information about risk to trigger response.

This analysis has been rooted in a broadly defined political economy approach, which prioritises understanding the actors and institutions within the DRF landscape and their different policy objectives. The backdrop to these developments of course is a wider picture of donor politics and the pressures on humanitarian financing as a result of climate change, conflict and the Covid-19 pandemic.

Whilst conducting this research, there has continually been a sense of growing momentum behind DRF, which was often something interview participants commented on. However, during the latter stages of 2021 as I was writing up, this sense of momentum has been culminating. The High-Level event on Anticipatory Action, hosted by the Governments of Germany and the United Kingdom in September 2021 was undoubtedly a key moment, where donors substantially increased their commitments to risk financing (United Nations and the Governments of Germany and the United Kingdom, 2021). What is perhaps even more significant is the rhetoric around making such approaches the 'new normal', as the FAO put it in an online statement following the High-Level event (FAO, 2021), signifying an intent to mainstream these approaches widely across humanitarian financing. The lack of critical literature that reflects on DRF is clearly, therefore, a glaring gap.

In the following I return to the research questions posed in the introduction in Chapter 1. I summarise findings for each and highlight some key implications for policymakers and practitioners, before concluding by identifying avenues for further research.

7.1 Research questions summaries and implications for policymakers and practitioners

The first empirical chapter linked to Research Question 1, and asked:

1. How can we critically understand the policy landscape of DRF?
   1a) What were the key actors, moments and policy narratives which shaped the emergence of DRF?
   1b) How is DRF defined, and why do the definitions commonly used differ?
   1c) What are the main tensions in DRF as a policy landscape?

This chapter laid much of the groundwork for understanding DRF as an integrated, but complex and fragmented policy landscape. The chapter unpacked and explained DRF through a political economy rooted account of the key actors, events and policy narratives that shape the policy landscape. It provided a timeline of the emergence of the sector, charting the launch of individual DRF mechanisms by different actors, as well as important events and developments, such as key publications, reports and policy papers.

I discussed the definition of DRF, tracing when different terms emerged and why some agencies have preferences for particular terminology, making the case that the terminology around 'anticipatory humanitarian action' is not necessarily helpful because of the increasing hybridisation of the mechanisms themselves, and because of the complex temporality of disasters. While the distinction that is drawn around temporality is an important normative objective for the sector, I argued that overall, the approaches in DRF have more in common than that which separates them, and that it is analytically helpful to understand them as

different tools within an integrated landscape. Indeed, while insurance mechanisms do not anticipate disasters, the examples of 'basis risk' events where the model fails to pay out when it should - such as in Malawi in 2015/2016 that I describe in Chapter 5 - show that they are no less subject to questions of interpretation and liability than mechanisms which are 'ex-ante' and anticipate disasters. Thus, the shift towards triggering actions based on information - instead of responding to disaster impacts that have actually occurred - is critical, because it opens up decision-making processes to interpretation. This poses questions about knowledge, decision-making and ultimately, about how agencies understand and manage risk and uncertainty. I elaborate further about the implications of this and make some suggestions in Figure 17 about how policymakers could focus on the operational aspects of different DRF mechanisms to concentrate on common challenges rather than becoming embroiled in definitional debates.

One of the key contributions of this work therefore has been to look beyond the distinctions that are often used in policy literature to delineate anticipatory humanitarian action from risk financing mechanisms. I introduced a typology in Figure 8, to make sense of the different mechanisms, defined in one of four ways: budgetary instruments with a 'soft' trigger; contingent finance based on a 'hard' trigger to release funds such as a forecast; market-based instruments which span different types of insurance, and finally, hybrid mechanisms which combine different mechanisms from within this typology.

In the latter part of Chapter 4, I discuss key drivers behind DRF in particular focussing on efficiency and effectiveness as the mutually reinforcing policy narratives of DRF. These twin narratives had been widely absorbed by practitioners of DRF, who often referred to them in interviews, although in many cases there was some scepticism about the extent to which the

narratives were borne out in practice. Indeed, the evidence that DRF is more efficient and effective is complex, and relatively few of the cost-benefit studies cited in the policy literature were conducted specifically for DRF.

In the final section of the chapter, I discuss the central tensions and challenges across the sector, summarised in the graphic illustration provided in Figure 11. These exist at three levels: the first addresses the tension between the need to collaborate and the fragmentation and competition between agencies in DRF. The second tension concerns the different methodologies and types of information used in DRF mechanisms. The final tension, underlying all of the above, addresses the very different understandings of risk and uncertainty held by different agencies, practitioners and actors across the sector.

Research Question 1: How can we critically understand the policy landscape of DRF?

Implications for policymakers and practitioners:

- Most DRF mechanisms were originally developed by different organisations and agencies at different times and for different reasons – often linked to particular disaster events where response was later criticised - and which served as catalysts for change. This contributes to some of the complexity around terminology and methodologies in the sector.
- In terms of how DRF is defined, significant resource has been invested in trying to clarify the vocabulary and terminology used across the sector. One ongoing challenge is the umbrella term for the sector itself. The way I define the sector in this thesis, using the term 'DRF', is not something that all practitioners in this area would agree with. Alternative terms such as 'anticipatory action', 'anticipatory humanitarian action' and/ or 'crisis financing' are frequently used by practitioners and preferred by some of the agencies in the sector. In particular, some key donors and actors have a preference for distinguishing between humanitarian and sovereign disaster financing because of valid concerns about the potential loss of

humanitarian impartiality. However, the increasing hybridisation of mechanisms as demonstrated by humanitarian risk pools suggest this concern may soon, if it has not already, become redundant.

- Furthermore, while I recognise the symbolic importance of terminology, I conclude that attempts to delineate the policy mechanisms within the sector based on this are unhelpful, because of the complex temporality of disasters. While earlier action is an important normative objective, I recommend that practitioners working in this area focus instead on understanding what these mechanisms have in common, by focussing on how the mechanisms work. For example, typologies such as that proposed by Willitts-King et al. (2020), which I have adapted and extended in Figure 8 are rarely referred to in policy events and in the policy literature. Focussing on how DRF mechanisms work – such as how they use information about hazards and risk, what type of information they use, on what basis they trigger, and on what basis they payout, would more usefully frame the discussion around operational questions. This would help to overcome some of the definitional and terminological complexity of the sector that has not necessarily been helped by the production of thesauruses and glossaries, and usefully focus on the challenge that these mechanisms all have in common: which is using information, rather than actually existing humanitarian need, to enact response. This may also help to enhance learning across the sector.
- DRF is a very interdisciplinary sector, and effectively a convergence zone for different ways of thinking about risk and uncertainty, linked to different organisations, epistemologies, mandates and liabilities. Practitioners and agencies have shown a willingness to invest significant resources in terminology discussions and explorations, such as the Thesaurus for Anticipatory Action (De Wit, 2019). One recommendation from this research is to conduct a similar exercise which specifically focusses on disciplinary and organisational understandings of risk and uncertainty within the DRF sector. There are good reasons why actuaries and catastrophe modellers think about risk and uncertainty in a different way to humanitarian practitioners and disaster management professionals. This might seem like an intellectual exercise, but this research shows that differences in how

practitioners understand risk and uncertainty underlie many of the tensions and complexities in DRF. This would help policymakers and practitioners to recognise that the way in which individuals and institutions understand risk is mediated by background, organisational factors, cultural appetites for risk and political pressures.

Figure 17 – Box of findings and implications of Research Question 1 for practitioners and policymakers.

The second empirical chapter addressed Research Question 2, and asked:

2) How does the politics of risk and uncertainty influence DRF?

2a) How are concerns about liability and justifying decisions made based on risk information expressed in DRF?

2b) How are DRF mechanisms and the policy landscape shaped by such concerns?

2c) How can we understand the role of risk and uncertainty in DRF in a more nuanced way?

The chapter explored how the politics of risk and uncertainty shapes the field of DRF. I traced how concerns about liability lead to the call throughout the DRF policy literature for 'credible' and 'defensible' decision-making. I argued that such a concern finds expression in the drive towards automation and specifically a preference for 'hard-triggers' for action within DRF mechanisms. This is also captured in the policy narratives around DRF such as the recommendations that DRF operate on more insurance-based principles, or the advice to agencies involved in disaster response to: 'think like insurance companies and responses will be more cost-effective with better outcomes' (Clarke and Dercon, 2016: 79).

The chapter draws from STS literature to elucidate a tendency to rely on risk-based methodologies in several domains of science-policy interaction (Scoones, 2019; Stirling, 2007, 2009, 2010; Wynne, 1992), and also to complicate what is often seen as a binary distinction between risk and uncertainty. I argued that this underplays the complexity of the type of

statistical methodologies applied in modern catastrophe modelling and insurance practices (Collier et al. 2021; Jarzabkowski et al., 2015), and those which proponents of DRF are seeking to leverage.

The chapter concludes with reference to the 'political economy of liability', a term coined by Leigh Johnson in her work on other parametric insurance mechanisms (Johnson, 2020). She applies this concept to raise questions about where responsibility lies when mechanisms such as index-based insurance fail to pay out. However, my work in this thesis and specifically in Chapter 5 has emphasised how questions and concerns about liability are shaping the sector both discursively and in practice through the design of DRF mechanisms. Specifically, I argue that concern about liability, such as being able to defend and justify decision-making, seems to be pushing DRF mechanisms towards more automated approaches, and a reliance on 'hard-triggers'. Understanding DRF mechanisms as part of a common landscape is particularly important to make this argument, because it brings into sharper focus what mechanisms such as FbF have in common with insurance approaches such as ARC or CCRIF, which is a common concern around liability. This contributes to a shared discursive framing around 'risk-based' decision making, despite the fact that the instruments themselves have many differences. I reflect on the implications of these questions for practitioners and policymakers below in Figure 18, recommending that agencies involved in DRF consider their institutional and political liabilities, and recognise how these might differ in comparison with other agencies they are working with, and in particular those in the private sector. Agencies involved in DRF may be able to learn much from the expertise of catastrophe modellers and the private sector, but in this Chapter I conclude that it is important that they remember what the implications are of risk and uncertainty to them as institutions, in view of the unique humanitarian mandate held by many – but not all – of the actors in the DRF sector.

Research Question 2: How does the politics of risk and uncertainty influence DRF?

Implications for policymakers and practitioners:

- DRF systems look to automate decision-making in the interest of more timely response and to avoid the inertia that is seen to be linked to subjective decision-making. However, the uncertainties inherent to DRF could be more fully recognised in the policy arena and in the policy literature. This would help to manage expectations of beneficiaries, donors and other practitioners alike. It would also help to sensitize the different actors involved in DRF of the challenges posed by moving away from the status quo of 'ex-post' response to existing humanitarian need and prepare them to take a longer-term perspective in making this shift. This is because there is no guarantee that the benefits of making decisions based on information such as forecasts will materialise in the short-term (MacLeod et al., 2021a).
- Although there is a clear logic to the perceived benefits of more automated decision-making, early DRF mechanisms such as the START Anticipation Window used an expert-judgement based 'soft-trigger' approach for several years. It seems, however, that the recent consensus is shifting towards a preference for 'hard-triggers', forgetting previous approaches. Moreover, it is helpful to highlight that the binary difference between 'soft' and 'hard' trigger approaches is often less clearly divided in practice, as an element of subjectivity and human decision-making is difficult to remove. This was borne out in interviews, such as the participant quoted in Chapter 4, Section 4.3 (Interview 27) who said that they monitor other cyclone models in addition to the validated model for the particular FbF mechanism that was operational in the Philippines. They explained that when monitoring this, they wondered whether they should trigger action when the models contradicted each other. This was also borne out in a recent review of FbF mechanisms in the context of the Covid-19 pandemic, when many Red Cross National Societies adapted their early action plans. Tozier de la Poterie et al. argued that such adaptations ought to be encouraged by the IFRC through a mechanism to modify FbF processes and encouraged a more flexible funding approach generally (Tozier de la Poterie et al., 2021).

- This research also recommends that agencies involved in DRF consider their liabilities. They should ask questions about the implications of acting in the face of risk and uncertainty in their context, and how this might differ from other actors, such as those in the private sector. This applies to all agencies operating in DRF but is particularly pertinent to those with a humanitarian mandate.

Figure 18 - Findings and implications of Research Question 2 for practitioners and policymakers.

The third empirical chapter addressed Research Question 3, and asked:

3) How is risk operationalised as a particular logic for decision-making, and what are the implications of this?

3a) How will humanitarian risk pools operate and how are they linked to the rest of the mechanisms developed under DRF?
3b) How does risk operate as a calculative logic within risk pooling?
3c) What are the implications of 'acting based on risk' for decision-making in humanitarian funds?

The third and final empirical chapter of the thesis focusses on the politics enacted by DRF in terms of decision-making within humanitarian funds, considering the newest and most hybrid forms of DRF mechanisms, humanitarian risk pools. Risk pools are one of the most recent developments within the DRF landscape and are interesting because of the way they demonstrate hybridisation across the sector, premised on applying an insurance-based diversification approach to enable agencies to over-commit their funds.

Through risk pooling, I argue that diverse hazards are made amenable to the probability-based logic of the pool, expressed as a measure of 'risk' – specifically, the return period of hazards. In terms of implications, I suggest that risk pooling has become a new form of speculation with the objective of getting maximum value to agencies for each dollar of

humanitarian funding, linking back to the efficiency logics of DRF introduced in Chapter 4. While the agencies developing risk-pools are exploring 'back-stop' options to ensure they will not run out of funds, ultimately a risk-pooling approach requires tolerating the possibility of exhausting the fund, otherwise it could not be over-committed. This form of speculation reflects what risk governance theorists such as Michael Dillon argue is a way of instrumentalizing decision-making, whereby: 'Events and eventualities are allocated probabilities, a generalized measure of account, then correlated with their projected outcomes and given a score. People take a chance on that score. In simple terms, they bet' (2008: 320).

It is important to remember that the extent to which risk pools are over-committed, and the form and basis of the back-stop options, are fundamentally political choices for the agencies involved. This is recognised in the various quantitative reports I refer to in the chapter. Despite this, there is very little transparency about the basis on which these decisions are made, especially in comparison with the transparency offered regarding the quantitative side of risk-pooling and the hypothetical calculations offered in both reports cited in the chapter. I reflect further on this issue of transparency in Figure 19 below, amongst other recommendations for practitioners and policymakers pertinent to Research Question 3.

Finally, I argue that risk-pooling leads to a new set of operational parameters for disaster response agencies, whereby risk provides a means of 'navigating contingency, avoiding loss and seeking gain' (Dillon, 2008: 321). Specifically, practitioners expecting that humanitarian needs will continue to outstrip available resources are looking for new tools to guide decision-making, as one research participant memorably explained: '*…you need to have some way of making trade-offs. So how do you... how do you make a trade-off between saving a life today*

and saving a life tomorrow?' (Interview 7, DRF expert) This participant then went on to argue that risk management approaches lend a legitimacy to decision-making processes – thus making explicit choices that have previously always been implicit.

In the final conclusions of the chapter I reflect on Michael Watt's assertion that contemporary adaptation thought is invoking a new sense of 'homo economicus', where we must adapt to a radically uncertain future by becoming a sort of hedge-fund manager for a 'contingent, turbulent, and unpredictable life' (Watts, 2015: 41). He makes this argument in his assertion that adaptation should sit alongside security, risk management, and resiliency as the contemporary discourses through which life is governed in the context of neoliberal rule (ibid). This resonates with the chapter strongly in the sense that humanitarian agencies experimenting with risk-pooling approaches are implementing the concepts of diversification and 'hedging' which make insurance companies profitable. However, Watt's contention that one can adapt to a turbulent and unpredictable life assumes a high degree of agency. It is not clear if the beneficiaries of humanitarian funding can also do this, or if they are capacitated to do this by the types of support enabled by DRF. In general, as I will discuss below, it is much less clear throughout the DRF sector what the benefits of DRF are for beneficiaries and recipients of humanitarian funding – in comparison to the agencies enacting them.

Research Question 3: How is risk operationalised as a particular logic for decision-making, and what are the implications of this?

Implications for policymakers and practitioners:

- It is interesting to note that the START Network and IFRC phrase the 'certainty' of providing payouts differently in their respective reports cited in Chapter 6. It is important to remember that the concept of over-committing is premised on tolerating the possibility of exhausting the fund – and this cannot be avoided in its entirety - even with well-considered back-stop arrangements. This is especially the

case because the early experience of implementing FbA by the DREF as a 'contingent financing' tool has demonstrated that Emergency Action Protocols (EAPs) were being triggered more often in practice than had been expected, based on the return period that was being targeted. It is too soon to know if this is related to a problem with estimating return periods for particular hazard thresholds, or simply an outcome of variability that will smooth out over time. It is important therefore to fully recognise that moving towards a risk pooling approach necessarily requires accepting a small possibility of exhausting the fund.

- Both agencies discussed in Chapter 6 are very transparent in releasing and making public the quantitative reports conducted to assess the financial viability of risk pooling and providing hypothetical calculations about the key variables under consideration. However, they provide very limited information about how decisions pertaining to financial back-stop arrangements for the risk pools will be made, although they concede this will be a political judgement in both quantitative reports. The quantitative report conducted for the IFRC does compare the different options available such as reinsurance versus recourse to donors. However, considering how important such back-stop arrangements are, and how critical they will be for partner agencies, I would recommend that agencies are fully transparent around the decision-making for financial back-stop arrangements and release the reports and decision-making processes that determined these.
- So far there is very limited experience of implementing risk pools within the humanitarian funding context, although there is some relevant experience of using risk pools within sovereign risk financing. However, some of the benefits of risk pooling for governments do not translate well to the humanitarian context – such as reducing the cost of insurance premiums - since partners of response agencies do not pay for coverage or to be part of the risk pool in the first place. For partners of humanitarian agencies using a risk pool, therefore, the benefits are much less clear. I acknowledge that agencies are exploring meaningful and well considered back-stop options, but the guarantee of financing when trigger thresholds are met is slightly more complex and fragile under risk pooling than they would have been otherwise. Agencies such as the START Network and IFRC ought to be forthright about this and

try to find other ways risk pooling can provide tangible benefits for their partners, and ultimately, for beneficiaries too.

Figure 19 - Findings and implications of Research Question 3 for practitioners and policymakers.

7.2 Avenues for further research

Because there is such a dearth of critical literature about DRF there are many potential avenues for future research. This is even more the case because the mechanisms are at an early stage of development, meaning that there is significant scope for the empirical basis of DRF to change, and indeed for studies which focus on the implementation of DRF mechanisms. Moreover, because the sector is very interdisciplinary, bringing to the fore questions ranging from risk governance, to STS, finance, climate and hazard modelling and humanitarian practice, there are numerous potential 'ways in' and disciplinary lenses that could be brought to bear. In this section I outline some of the avenues of interest that arose from this research.

There were a variety of avenues of research not explored in this thesis relating to the potential to apply insights from the use of scientific and expert advice in emergencies and risk policy. Potential strands of interest relate to the debate around different methods of expert advice in emergencies and nuancing the notion of 'subjective' versus 'objective' methods of triggering action, or 'soft' versus 'hard' triggers as they are termed in DRF. As discussed in Chapter 5, there is a strong preference in the DRF policy literature which advocates the benefits of a more 'automated' decision-making approach common to many DRF methodologies. However, research into decision-making processes, as implemented in different DRF mechanisms, would be of interest to explore the way in which triggers,

thresholds and emergency action plans are determined in practice, which I expect would probably be a more complex picture of semi-subjective decision-making and expert input throughout the process. For example, a recent review of FbF mechanisms in the context of the Covid-19 pandemic highlighted the ability of many Red Cross National Societies to adapt their action plans to the pandemic – such as amending distribution processes to enable social distancing (Tozier de la Poterie et al., 2021). However, the authors found many of these adaptations were made informally because of a perception that it would be a slow bureaucratic process to formally modify the validated Emergency Action Protocols (EAPs) (ibid). The authors therefore called for transparent guidelines from the IFRC that would proactively encourage response agencies to adapt existing plans when needed, as well as calling for more flexible funding mechanisms (ibid). This is not to detract from the benefits of establishing more transparent decision-making processes within DRF mechanisms such as FbF, but rather to recognise the necessity and the strengths of a more subjective 'human-element' that comes from having disaster managers implement such systems. Discussions from the history and philosophy of science about the nature and difference between 'objective' and 'subjective' thought (Donovan, Oppenheimer and Bravo, 2012a), applied to debates such as the role of expert elicitation in disaster management could be instructive here for nuancing and better understanding the decision-making processes in DRF beyond a simplification of the options being either an entirely objective and automated process versus an entirely subjective process.

A second avenue of interest for future research is to more carefully consider processes of financialization within and through DRF. Recent financialization of the state literature has demonstrated how 'financial narratives, practices and measurements are dominating different branches of government, public authorities and semi-public institutions' (Aalbers,

2017: 548). This focusses not just on re-structuring and privatisation, but on a more nuanced account of how financial logics come to pervade in a variety of public institutions, and what the consequences and implications are of this. For example, a recent paper exploring critical financial analysis of a housing authority in Chicago explored the effects of financialization on public bodies as complicating their responsibilities, in this case leading to a public housing authority shifting to a management logic where the strength of their financial position was a key objective, operating more like a for-profit entity (Kass, 2019). There are similar themes in this thesis in terms of tracing the effects of financialization as an influence on the operating logics of institutions in the humanitarian sector, who are trying to manage funds in ever more efficient ways. In the case of the public housing authority referred to above, this brought their management logics and mandate in terms of their services into tension (ibid). I find there is a similar case in the context of DRF, where the pressure on humanitarian agencies to demonstrate efficient use of funds comes into conflict with their responsibility to serve as agencies of 'last resort' (Lautze et al., 2012), as it was described in Chapter 5. This appears to be specifically the case with the emergence of risk pools, which operate with the explicit objective of making each dollar of funding go further than before, but with the trade-off being an acceptance that funding in the event of a disaster can no longer be guaranteed with absolutely certainty. It would therefore be interesting and useful to explore the empirical case of DRF through the lens of this financialization literature.

Finally, there is potential to bridge gaps between critical disaster studies and risk governance literature through considering DRF as an empirical case, as discussed in the literature review in Chapter 2. Specifically, McGowran and Donovan's recent paper highlights the potential to use Assemblage Theory (AT) to develop the convergence between critical disaster studies, with its origin in studies of humanitarian practice, and geographies of emergency and crisis

governance, with its roots in political philosophy (McGowran & Donovan, 2021). In this case, McGowran and Donovan note the differences between the two as the types of disaster events which tend to be studied, whereby disaster studies tends to focus on physical hazards, whereas geographies of governance work tends to focus on political, state and security relevant debates (ibid). They also point to the difference in the temporal focus of analysis, specifically that political ecology-based studies analyse how political economy and environmental factors have shaped disasters that have occurred in the past, yet studies of emergency and crisis governance focus instead on the governance of future emergencies (ibid). I would argue that the topic of DRF would be well-suited subject matter for advancing this theoretical material. DRF requires an understanding of the material and social origins of disasters, whilst at the same time being future-oriented because of the temporal shift proposed by DRF, and because it is inherently engaged in decision-making and governance for potential future disasters.

7.3 Final reflections

This thesis has explored the complex, fractured and nascent policy landscape of DRF. There is very little social science literature which addresses DRF, and therefore I have sought to lay the groundwork for future analysis. The particular contributions of this thesis are firstly, to provide an account that understands DRF in an integrated way - rather than reviewing particular individual mechanisms – and thereby allow analysis to focus on the common challenges that the mechanisms face regarding questions of liability and decision-making. Secondly, I have sought to connect critical social science analysis to this empirical case, to explore the politics of risk and uncertainty in DRF, and to understand the politics enacted by DRF through the calculative logics of risk extended by risk pooling mechanisms.

Some of the thematic areas I have drawn upon, in particular regarding the role of insurance in the context of climate change, have long been a field of academic interest that brings together diverse analyses. The literatures I draw from here span both Foucauldian analyses of governing the future (Ewald, 1991; Grove, 2014; Jagers et al., 2005; Lobo-Guerrero, 2010a, 2010b) with Marxian accounts of financialization (Grove, 2012; Johnson, 2013a). Given the trend of developing increasingly hybrid mechanisms within DRF, and the likelihood that this is going to continue, the nexus between these analytical approaches is going to be of great important to understanding DRF. As one interview participant commented: '*I'm seeing a future in maybe 20 years in which there is going to be … a super strong role of the insurance sector in humanitarian action and there is going to be a rethink … how different financial pools like CERF, DREF, the START fund, all these things will change because I think they have to be able to adapt to what is coming, sadly*.' (Interview 23, Humanitarian practitioner)

However, it is important to remember that the empirical case presented here is more nuanced than simply an example of extending insurance mechanisms into humanitarian and disaster financing. Instead, there is a more complex process of hybridisation through the new mechanisms developed under the rubric of DRF, which bring with them different conceptualisations of risk, as well as new policy narratives and implications of shifting liabilities and decision-making logics for response agencies.

From an analytical perspective, understanding such a complex story of hybridisation has required an interdisciplinary approach, drawing from three main bodies of work. Firstly, science and technology studies and sociology have been essential to draw attention to the complexity and indeterminacy of scientific knowledges as they are applied in hazard modelling. Such studies also highlight the way in which our understanding of risk and

uncertainty is shaped by epistemology, and fundamentally remind us of the importance and inescapability of uncertainty. Secondly, risk governance literature has been important because of the way it analyses the political effects of governing through risk. Finally, political ecology and disaster studies literature was necessary to ground this account of DRF in a recognition that disasters are phenomena that result from hazards coming together with vulnerable and exposed populations, and crucially, that risk in the environment is not randomly distributed.

The analysis of DRF in this thesis has therefore been built upon engagement with a diverse group of literatures, but it has also challenged these literatures and provided a novel empirical account with which we can make some theoretical advances. For example, this case study calls for an understanding of issues relating to hazard modelling and forecasting that is relatively unusual subject matter for sociologists and political scientists. This is also the case for risk governance scholars, who have tended to focus on political and security emergencies in developed countries. However, this case of DRF has demonstrated the need for engagement with the discursive and computational processes through which diverse hazards are made amenable to the 'risk-based' logic of mechanisms such as risk pooling, which highlights a need for greater fluency with the language of finance as well as modelling and physical sciences. Turning to the disaster studies literature, this account of the shifting conceptualisations and politics of risk in disaster financing and response is also somewhat unusual. As Hewitt has pointed out, scholars in the field of disaster studies rarely examine their own cultures and perceptions of risk (Hewitt, 2015), but in particular in Chapter 4, I have argued that what underlies many of the tensions and complexities in DRF are the different disciplinary lenses and approaches to risk and uncertainty that converge in this field. Finally, for political ecology scholars, there has been a tendency to analyse cases of insurance in the

context of climate change through the prism of financialization, critiquing this as an extension of poverty finance (Isakson, 2015) or a mechanism which proliferates new forms of risk for policyholders (Johnson, 2013b). What these analyses would miss if applied to this case study, however, is the more subtle process of how an 'insurance-based' way of thinking about risk is being extended into traditional disaster and humanitarian funding models, with the effect of creating new decision-making logics, and new political economies of liability (Johnson, 2020) for response agencies.

One of the key characteristics of my approach in this thesis has been an analysis rooted in political economy which seeks to understand the politics of risk and uncertainty: how and why they are understood differently by individuals, actors and agencies across the DRF sector. One of the key interview quotes which demonstrates the value of this approach was from a participant with a background in disaster risk management, who is now working for a major donor, and who alluded to frustration in meetings with a private-sector catastrophe modelling company. Specifically, the participant explained that the way people spoke about risk differed substantially from his own approach: '*In a presentation someone from RMS*[53] *said "the great thing about risk is it can be mapped, it can be visualised…" Presenting these wonderful graphics… But that's not the kind of risk I'm interested in, I'm mostly interested in the poor, risk to the poor, as should (my agency)*[54]*…'* (Interview 4, Donor)

The way the participant expressed this distinction resonated with me and shaped my subsequent lines of enquiry about how DRF as a sector brings together different epistemologies and conceptualisations of risk. The notion the participant described of risk as

[53] Risk Management Solutions (RMS) are a prominent catastrophe modelling company - see footnote 34.
[54] Agency name redacted for anonymity reasons.

something that can be mapped and visualised reflects some of the arguments made in the latter chapters of this thesis about risk as a way of seeing and measuring, and as a metric through which decisions can be made about the future. This represents a very significant change in decision-making logics, which has not perhaps been fully recognised in the existing debates around the shift towards DRF and triggering response based on forecasts or other measures of risk.

In this thesis, therefore, I have argued that a more 'insurance-like' way of thinking is being introduced to disaster response, signifying the extension of a new logic into humanitarian decision-making. This has significant consequences for practitioners and policymakers, who are grappling with the challenges posed by acting based on measures of risk rather than actually existing humanitarian need – which opens them up to new questions of interpretation and liability. This is also incredibly significant in shifting the responsibilities and liabilities of response agencies towards an approach defined by contingency – whereby beneficiaries are no longer those who receive a disaster response, but those who could - and are therefore 'protected' by a system being in place.

While I have raised a number of questions about the implications of DRF, a better understanding about the outcomes of this shift for recipients and beneficiaries of disaster financing delivered through DRF must be a priority for further empirical work, especially as new mechanisms become operational. Currently it is clear how DRF is potentially beneficial for donors, helping them to smooth out and pre-agree financing obligations, and in the case of response agencies, offering a way for them to differentiate themselves and their policy solutions to donors through developing innovative, and ever more 'efficient and effective' mechanisms. As highlighted in Chapter 6 and in the policy and practice recommendations in

Section 7.1 above, however, it is far from clear if approaches such as risk pooling offer any tangible benefits to recipients of funding. Many of the questions about the implications and outcomes are yet to be fully articulated in this policy landscape, however, and one of the reasons behind this is arguably the complex and gradual process of hybridisation that has occurred across this emerging policy space.

Thus, what started in the Caribbean as a sovereign financing solution through insurance, and in West and Central Africa as a way to make climate information actionable and improve preparedness, have increasingly hybridised. It is critical now that we start to understand the field of DRF as a varied but integrated policy landscape, which poses challenging questions about the use of information for decision-making, mandates and the politics of risk and uncertainty. Disaster response agencies are striving to navigate times of unprecedented demand, but what is being brought to the fore by the mechanisms developed under the auspices of DRF represents a potentially momentous shift in the logics and liabilities of humanitarian response and must be scrutinised through further critical research and reflection.

8. Bibliography

Aalbers, M. B. (2017). The Variegated Financialization of Housing. *International Journal of Urban and Regional Research*, *41*(4), 542–554. https://doi.org/10.1111/1468-2427.12522

Agrawal, A. (2005). Environmentality: Community, intimate government, and the making of environmental subjects in Kumaon, India. *Current Anthropology*, *46*(2), 161–190. https://doi.org/10.1086/427122/0

Alfieri, L., Burek, P., Dutra, E., Krzeminski, B., Muraro, D., Thielen, J., & Pappenberger, F. (2013). GloFAS-global ensemble streamflow forecasting and flood early warning. *Hydrol. Earth Syst. Sci*, *17*, 1161–1175. https://doi.org/10.5194/hess-17-1161-2013

Amoore, L., & De Goede, M. (2008). *Risk and the War on Terror* (Louise Amoore & M. de Goede, Eds.) Routeledge. https://doi.org/10.4324/9780203927700

Amoore, Louise. (2011). Data Derivatives. *Theory, Culture & Society*, *28*(6), 24–43. https://doi.org/10.1177/0263276411417430

Anderson, B. (2010). Preemption, precaution, preparedness: Anticipatory action and future geographies. *Progress in Human Geography*, *34*(6), 777–798. https://doi.org/10.1177/0309132510362600

Anderson, B. (2016). Governing emergencies: The politics of delay and the logic of response. *Transactions of the Institute of British Geographers*, *41*(1), 14–26. https://doi.org/10.1111/TRAN.12100

Anderson, B., Grove, K., Rickards, L., & Kearnes, M. (2019). Slow emergencies: Temporality and the racialized biopolitics of emergency governance: *Https://Doi.Org/10.1177/0309132519849263*, *44*(4), 621–639. https://doi.org/10.1177/0309132519849263

Anderson, B., Kearnes, M., McFarlane, C., & Swanton, D. (2012). On assemblages and geography. *Dialogues in Human Geography*, *2*(2), 171–189. https://doi.org/10.1177/2043820612449261

Anticipation Hub. (2021). *Anticipation Hub Strategy 2021-2024*. Retrieved from https://www.anticipation-hub.org/Documents/Other/Anticipation-Hub-Strategy_2021-2024.pdf

Anticipatory Action Task Force (AATF). (2021). *Anticipatory Action Task Force: Terms of Reference*. Retrieved from https://www.anticipation-hub.org/Documents/Other/Anticipatory_Action_Task_Force_ToR_JAN_2021.pdf

Aradau, C., Lobo-Guerrero, L., & Van Munster, R. (2008). *Security, Technologies of Risk, and the Political: Guest Editors' Introduction*. *Security dialogue*, 39(2-3), 147-154. https://doi.org/10.1177/0967010608089159

Arnal, L., Anspoks, L., Manson, S., Neumann, J., Norton, T., Stephens, E., … Cloke, H. L. (2020). "Are we talking just a bit of water out of bank? Or is it Armageddon?" Front line perspectives on transitioning to probabilistic fluvial flood forecasts in England. *Geoscience Communication*, *3*(2), 203–232. https://doi.org/10.5194/GC-3-203-2020

Baldwin, A., & Stanley, A. (2013). Risky natures, Natures of risk. *Geoforum*, Vol. 45, pp. 2–4. https://doi.org/10.1016/j.geoforum.2012.12.016

Bankoff, G. (2003). Cultures of Disaster : Society and Natural Hazard in the Philippines. *Cultures of Disaster: Society and Natural Hazard in the Philippines*, 1–232.

https://doi.org/10.4324/9780203221891

Bankoff, G., & Hilhorst, D. (2009). The politics of risk in the Philippines: comparing state and NGO perceptions of disaster management. *Disasters*, *33*(4), 686–704. https://doi.org/10.1111/j.1467-7717.2009.01104.x

Barnett, C. (1998). The cultural turn: fashion or progress in human geography? *Antipode*, *30*(4), 379–394. https://doi.org/10.1111/1467-8330.00085

Basher, R. (2006, August 15). Global early warning systems for natural hazards: Systematic and people-centred. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, Vol. 364, pp. 2167–2182. https://doi.org/10.1098/rsta.2006.1819

Beck, U. (1992). *Risk Society: Towards a New Modernity*. Sage.

Beck, U. (2009). *World At Risk*. Polity.

Beck, Ulrich. (2002). The Terrorist Threat. *Theory, Culture & Society*, *19*(4), 39–55. https://doi.org/10.1177/0263276402019004003

Bhaskar, R. (2008). A Realist Theory of Science. In *Cognitive Psychology* (1st Edition). Routeledge.

Binder, S. B., & Baker, C. K. (2017). Culture, local capacity, and outside aid: a community perspective on disaster response after the 2009 tsunami in American Sāmoa. *Disasters*, *41*(2), 282–305. https://doi.org/10.1111/DISA.12203

Birkmann, J. (2006). Measuring vulnerability to promote disaster-resilient societies: conceptual frameworks and definitions. In Birkmann J (ed) (Ed.), *Measuring vulnerability to natural hazards. Towards disaster resilient societies.* UNU-Press, Tokyo.

Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (2004). *At Risk: Natural Hazards, People's Vulnerability and Disasters*. Routeledge.

Blaikie, P. and Brookfield, H. (1987). *Land Degradation and Society* (1st Edition). London: Routeledge.

Bosher, L., Chmutina, K., & van Niekerk, D. (2021). Stop going around in circles: towards a reconceptualisation of disaster risk management phases. *Disaster Prevention and Management: An International Journal*. https://doi.org/10.1108/DPM-03-2021-0071/FULL/PDF

Bougen, P. D. (2003). Catastrophe risk. *Economy and Society*, *32*(2), 253–274. https://doi.org/10.1080/0308514032000073428

Bracking, S. (2019). Financialisation, Climate Finance, and the Calculative Challenges of Managing Environmental Change. *Antipode*, *51*(3), 709–729. https://doi.org/10.1111/ANTI.12510

Braman, L. M., van Aalst, M. K., Mason, S. J., Suarez, P., Ait-Chellouche, Y., & Tall, A. (2013). Climate forecasts in disaster management: Red Cross flood operations in West Africa, 2008. *Disasters*. https://doi.org/10.1111/j.1467-7717.2012.01297.x

Briceño, S. (2015). Looking Back and Beyond Sendai: 25 Years of International Policy Experience on Disaster Risk Reduction. *International Journal of Disaster Risk Science*, *6*(1), 1–7. https://doi.org/10.1007/s13753-015-0040-y

Bringer, J. D., Johnston, L. H., & Brackenridge, C. H. (2016). Using Computer-Assisted Qualitative Data Analysis Software to Develop a Grounded Theory Project: *Field Methods*, *18*(3), 245–266. https://doi.org/10.1177/1525822X06287602

Buchanan-Smith, M., Davies, S., & Petty, C. (1994). Food Security: Let Them Eat Information. In *IDS Bulletin* (Vol. 25). Retrieved from https://www.ids.ac.uk/files/dmfile/buchananetal252.pdf

Bulkeley, H. (2001). Governing climate change: the politics of risk society? *Transactions of the Institute of British Geographers*, *26*((4)), 430–447. https://doi.org/https://doi.org/10.1111/1475-5661.00033

Burton, I., Kates, R. W., & White, G. F. (1978). *The Environment as Hazard* (1st Edition). New York City: Oxford University Press.

Burton, I., Kates, R., & White, G. (1993). *The Environment As Hazard* (2nd Edition). Guilford Press.

Cabot Venton, C. (2013). *The Economics of Early Response and Resilience: Summary of Findings*. Retrieved from https://assets.publishing.service.gov.uk/media/57a08a0bed915d622c000521/61114_Summary_of_Findings_Final_July_22.pdf

Cabot Venton, C. (2017). *Economics of Resilience to Drought: Kenya Analysis*. Retrieved from https://www.usaid.gov/sites/default/files/documents/1867/Kenya_Economics_of_Resilience_Final_Jan_4_2018_-_BRANDED.pdf

Cabot Venton, Courtenay, Fitzgibbon, C., Shitarek, T., Coulter, L., & Dooley, O. (2012). *Economics of Resilience Final Report The Economics of Early Response and Disaster Resilience: Lessons from Kenya and Ethiopia*. Retrieved from http://www.fao.org/fileadmin/user_upload/drought/docs/Econ-Ear-Rec-Res-Full-Report .pdf

Campbell, L. M., Corson, C., Gray, N. J., MacDonald, K. I., & Brosius, J. P. (2014). Studying Global Environmental Meetings to Understand Global Environmental Governance: Collaborative Event Ethnography at the Tenth Conference of the Parties to the Convention on Biological Diversity. *Global Environmental Politics*, *14*(3), 1–20. https://doi.org/10.1162/GLEP_E_00236

Cannon, T. (1994). Vulnerability analysis and explanation of "natural" disasters. . In ed. A. Varley (Ed.), *Disasters, development and environment* (pp. 13–30). London: John Wiley and Sons.

Cannon, T., & Müller-Mahn, D. (2010). Vulnerability, resilience and development discourses in context of climate change. *Natural Hazards*, *55*(3), 621–635. https://doi.org/10.1007/s11069-010-9499-4

Centre for Disaster Protection. (2020). *Process Learning from UN-OCHA 2020 Monsoon Anticipatory Action Pilot in Bangladesh*. Retrieved from Process Learning from UN-OCHA 2020 Monsoon

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. London: Sage Publications.

Chmutina, K., & von Meding, J. (2019). A Dilemma of Language: "Natural Disasters" in Academic Literature. *International Journal of Disaster Risk Science 2019 10:3*, *10*(3), 283–292. https://doi.org/10.1007/S13753-019-00232-2

Christophers, B. (2016). Risking value theory in the political economy of finance and nature: *Progress in Human Geography*, *42*(3), 330–349. https://doi.org/10.1177/0309132516679268

Clarke, D., & Dercon, S. (2016). *Dull Disasters?: How Planning Ahead Will Make a Difference*. New York: Oxford University Press.

Collier, S. J., Elliott, R., & Lehtonen, T.-K. (2021). Climate change and insurance. *Economy and Society*, *50*((2)), 158–172. https://doi.org/10.1080/03085147.2021.1903771

Contreras, D. (2016). Fuzzy Boundaries Between Post-Disaster Phases: The Case of L'Aquila, Italy. *International Journal of Disaster Risk Science*, *7*(3), 277–292. https://doi.org/10.1007/S13753-016-0095-4/FIGURES/5

Corry, O. (2011). Securitisation and 'Riskification': Second-order Security and the Politics of Climate Change. *Millenium*, *40*(2), 235–258. https://doi.org/10.1177/0305829811419444

Coughlan De Perez, E., Stephens, E., Bischiniotis, K., Van Aalst, M., Van Den Hurk, B., Mason, S., … Pappenberger, F. (2017). Should seasonal rainfall forecasts be used for flood preparedness? *Hydrology and Earth System Sciences*, *21*(9), 4517–4524. https://doi.org/10.5194/HESS-21-4517-2017

Coughlan De Perez, E., Van Den Hurk, B., Van Aalst, M., Amuron, I., Bamanya, D., Hauser, T., … Zsoter, E. (2016). Action-based flood forecasting for triggering humanitarian action. *Hydrology and Earth System Sciences*, *20*(9). https://doi.org/10.5194/hess-20-3549-2016

Coughlan De Perez, E., Van Den Hurk, B., Van Aalst, M. K., Jongman, B., Klose, T., & Suarez, P. (2015). Forecast-based financing: An approach for catalyzing humanitarian action based on extreme weather and climate forecasts. *Natural Hazards and Earth System Sciences*, *15*(4). https://doi.org/10.5194/nhess-15-895-2015

Cutter, S. L., Boruff, B. J., & Shirley, W. L. (2003). Social Vulnerability to Environmental Hazards*. *Social Science Quarterly*, *84*(2), 242–261. https://doi.org/10.1111/1540-6237.8402002

Dalby, S. (2013). Biopolitics and climate security in the Anthropocene. *Geoforum*, *49*, 184–192. https://doi.org/10.1016/j.geoforum.2013.06.013

Davis, I. (2019). Reflections on 40 years of Disasters, 1977–2017. *Disasters*, *43*(S1), S61–S82. https://doi.org/10.1111/DISA.12328

De Wit, S. (2019). *Getting ahead of crises: A Thesaurus for anticipatory humanitarian action*. Retrieved from https://cerf.un.org/sites/default/files/resources/Thesaurus_single column_WORKING_DRAFT.pdf

Death, C. (2011). Environmental Politics Summit theatre: exemplary governmentality and environmental diplomacy in Johannesburg and Copenhagen. *Environmental Politics*, *20*((1)), 1–19. https://doi.org/10.1080/09644016.2011.538161

Dempsey, J. (2013). Biodiversity loss as material risk: Tracking the changing meanings and materialities of biodiversity conservation. *Geoforum*, *45*, 41–51. https://doi.org/10.1016/j.geoforum.2012.04.002

Development Initiatives. (2021a). *Cuts to the UK 2020 aid budget: What IATI data tells us*. Retrieved from https://devinit.org/resources/cuts-uk-2020-aid-budget-iati-data/

Development Initiatives. (2021b). *Global Humanitarian Assistance Report 2021*. Retrieved from https://devinit.org/resources/global-humanitarian-assistance-report-2021/

DFID. (2011). *Humanitarian Emergency Response Review* . Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/67579/HERR.pdf

DFID. (2016). *Business Case and Intervention Summary Science for Humanitarian Emergencies and Resilience (SHEAR)*. Retrieved from https://devtracker.fcdo.gov.uk/projects/GB-1-201884/documents

DFID. (2017). *Business Case: Centre for Global Disaster Protection*. Retrieved from https://devtracker.fcdo.gov.uk/projects/GB-1-205231/documents

Dillon. (2008). Underwriting Security. *Security Dialogue*, *39*(2–3), 309–332. https://doi.org/10.1177/0967010608088780

Dillon, M., & Lobo-Guerrero, L. (2008). Biopolitics of security in the 21st century: an introduction. *Review of International Studies*, *34*(2), 265–292. https://doi.org/10.1017/S0260210508008024

Dillon, Michael. (2007). Governing through contingency: The security of biopolitical governance *. *Political Geography*, *26*, 41–47. https://doi.org/10.1016/j.polgeo.2006.08.003

Donovan, A. (2017). Geopower: Reflections on the critical geography of disasters. *Progress in Human Geography*, *41*(1), 44–67. https://doi.org/10.1177/0309132515627020

Donovan, A. (2019). Critical volcanology? Thinking holistically about risk and uncertainty. *Bulletin of Volcanology*, Vol. 81, pp. 1–20. https://doi.org/10.1007/s00445-019-1279-8

Donovan, A., & Oppenheimer, C. (2015). Modelling risk and risking models: The diffusive boundary between science and policy in volcanic risk management. *Geoforum*, *58*, 153–165. https://doi.org/10.1016/j.geoforum.2014.11.005

Donovan, A., Oppenheimer, C., & Bravo, M. (2012a). Reply to comment from W.P. Aspinall on "Social studies of volcanology: knowledge generation and expert advice on active volcanoes." *Bulletin of Volcanology*, *74*(6), 1571–1574. https://doi.org/10.1007/s00445-012-0626-9

Donovan, A., Oppenheimer, C., & Bravo, M. (2012b). Social studies of volcanology: knowledge generation and expert advice on active volcanoes. *Bulletin of Volcanology*, *74*, 677–689. https://doi.org/10.1007/s00445-011-0547-z

Douglas, M. (2013). Risk and blame. In *Risk and Blame*. Routeledge. https://doi.org/10.4324/9781315015842

Duffield, M. (2010). The Liberal Way of Development and the Development-Security Impasse: Exploring the Global Life-Chance Divide. *Security Dialogue*, *41*(1), 53–76. https://doi.org/10.1177/0967010609357042

Duffield, M. (2011, June 1). Total war as environmental terror: Linking liberalism, resilience, and the bunker. *South Atlantic Quarterly*, Vol. 110, pp. 757–769. https://doi.org/10.1215/00382876-1275779

Duffield, M. (2012). Challenging environments: Danger, resilience and the aid industry. *Security Dialogue*, *43*(5), 475–492. https://doi.org/10.1177/0967010612457975

ECLAC. (2005). *Comparison of the socio-economic impacts of natural disasters on Caribbean societies in 2004 | Publication | Economic Commission for Latin America and the Caribbean*. Retrieved from https://www.cepal.org/en/publications/27585-comparison-socio-economic-impacts-natural-disasters-caribbean-societies-2004

Ewald, F. (1991). Insurance and Risk. In Burchell, Gordon, & and Miller (eds). (Eds.), *The Foucault Effect: Studies in governmentality* (pp. 197–210). Chicago University Press.

FAO. (2021). *News Article: Acting ahead of crises should become the new normal*. Retrieved from https://www.fao.org/news/story/en/item/1438363/icode/

Forsyth, T. (2001). Critical realism and political ecology. In G. Stainer, A. and Lopez (Ed.), *After postmodernism: critical realism?* (pp. 146–154). A&C Black

Forsyth, Tim. (2008). Political ecology and the epistemology of social justice. *Geoforum*, *39*(2), 756–764. https://doi.org/10.1016/j.geoforum.2006.12.005

Foucault, M. (1990). *The History of Sexuality Volume I: An Introduction*. New York: Vintage.

Foucault, M. (2003). *Society Must Be Defended: Lectures at the Collège De France, 1975-76*. London:

Palgrave Macmillan.

Foucault, M. (2007). Security, Territory, Population: Lectures at the Collège de France, 1977-78. In *Foucault Studies*. London: Palgrave Macmillan.

Foucault, M. (2008). *The Birth of Biopolitics - Lectures at the Collège de France, 1978-1979*. London: Palgrave Macmillan.

Fundel, V. J., Fleischhut, N., Herzog, S. M., Göber, M., & Hagedorn, R. (2019). Promoting the use of probabilistic weather forecasts through a dialogue between scientists, developers and end-users. *Quarterly Journal of the Royal Meteorological Society*, *145*(S1), 210–231. https://doi.org/10.1002/qj.3482

G7 Statements & Communiques. (2021). *The Road to COP: Statement by the UK Presidency of the G7 - G7 UK Presidency 2021*. Retrieved from https://www.g7uk.org/the-road-to-cop-statement-by-the-uk-presidency-of-the-g7/

Gabor, D. (2021). The Wall Street Consensus. *Development and Change*, *52*(3), 429–459. https://doi.org/10.1111/DECH.12645

Gaillard, J. C. (2010). Vulnerability, capacity and resilience: Perspectives for climate and development policy. *Journal of International Development*, *22*(2), 218–232. https://doi.org/10.1002/JID.1675

Gaillard, J. C., & Mercer, J. (2013). From knowledge to action: Bridging gaps in disaster risk reduction. *Progress in Human Geography*, *37*(1), 93–114. https://doi.org/10.1177/0309132512446717

German Red Cross. (2017). *5th International Dialogue Platform on Forecast-based Financing*. Retrieved from https://www.drk.de/fileadmin/user_upload/FBF/ReportBerlinDP17_final.pdf

German Red Cross. (2018). *6th Global Dialogue Platform on Forecast-based Financing*. Retrieved from https://www.forecast-based-financing.org/wp-content/uploads/2019/03/Report_DP18Berlin.pdf

German Red Cross. (2019). *7th Global Dialogue Platform on Anticipatory Humanitarian Action*. Retrieved from https://www.forecast-based-financing.org/wp-content/uploads/2020/04/Global-Dialogue-Platform-2019-Report.pdf

German Red Cross and Federal Foreign Office. (2015). *Framework: Action Plan of the Federal Foreign Office for Humanitarian Adaptation to Climate Change*. Retrieved from https://www.dkkv.org/fileadmin/user_upload/Veranstaltungen/WCDRR_2015/GRC__2015__FFO_Action_Plan_CCA_engl.pdf

Glaser, B. G., & Strauss, A. L. (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research. In *Discovery of Grounded Theory: Strategies for Qualitative Research*. https://doi.org/10.4324/9780203793206

Golding, B., Mittermaier, M., Ross, C., Ebert, B., Panchuk, S., Scolobig, A., & Johnston, D. (2019). A Value Chain Approach to Optimising Early Warning Systems. *Contributing Paper to GAR2019. UNDRR.* Retrieved from https://www.preventionweb.net/files/65828_f212goldingetalvaluechain.pdf

Grove, K. (2010). Insuring “our common future?” Dangerous climate change and the biopolitics of environmental security. *Geopolitics*, *15*(3), 536–563. https://doi.org/10.1080/14650040903501070

Grove, K. (2012). Preempting the next disaster: Catastrophe insurance and the financialization of disaster management. *Security Dialogue*, *43*((2)), 139–155. https://doi.org/https://doi.org/10.1177/0967010612438434

Grove, K. (2013). Hidden transcripts of resilience: power and politics in Jamaican disaster management. *Resilience*, *1*(3), 193–209. https://doi.org/10.1080/21693293.2013.825463

Grove, K. (2014). Biopolitics and Adaptation: Governing Socio-Ecological Contingency Through Climate Change and Disaster Studies. *Geography Compass*, *8*(3), 198–210. https://doi.org/10.1111/gec3.12118

Grove, K. (2021). Insurantialization and the moral economy of ex ante risk management in the Caribbean. *Economy and Society*, *50*(2), 224–247. https://doi.org/10.1080/03085147.2020.1853363

Harris, C., & Jaime, C. (2019). *Thinking Impacts Before Instruments in Humanitarian and Disaster Risk Financing*. Retrieved from https://startprogrammes.app.box.com/s/znjq52m9dp2603psh6m23n61lcewtm06

Harrowsmith, M., Neilsen, M., Jaime, C., Uprety, M., Johnson, C., Van den Homberg, M., … Comment, T. (2020). *The Future of Forecasts: Impact-based Forecasting for Early Action*. Retrieved from https://www.forecast-based-financing.org/wp-content/uploads/2020/09/Impact-based-forecasting-guide-2020.pdf

Hartman, C. W., & Squires, G. (2006). *There is No Such Thing as a Natural Disaster: Race, Class, and Hurricane Katrina*. New York; Abingdon: Routeledge.

Harvey, D. (2001). Globalization and the spatial fix. *Geographische Revue: Zeitschrift Für Literatur Und Diskussion* , *3*(2), 23–30.

Hastrup, K., & Skrydstrup, M. (2013). *The social life of climate change models : anticipating nature* (Vol. 8). Routledge.

Heinrich, D. and, & Bailey, M. (2020). *Forecast-Based Financing and Early Action for Drought - Guidance Notes for the Red Cross Red Crescent*. Retrieved from https://www.forecast-based-financing.org/wp-content/uploads/2020/06/1.-Guidance-Notes-A-Report-on-FbA-for-Drought.pdf

Hewitt, K. (1983). The idea of calamity in a technocratic age. In K. Hewitt (Ed.), *Interpretations of calamity* (1st Edition, pp. 3–32). Routeledge.

Hewitt, K. (2015). Framing disaster in the 'global village': cultures of rationality in risk, security and news. In F. . Krüger, G. . Bankoff, T. . Cannon, B. . Orlowski, & L. Schipper (Eds.), *Cultures and Disasters: Understanding Cultural Framings in Disaster Risk Reduction* (1st ed., pp. 35–52). https://doi.org/10.4324/9781315797809-10

High-Level Panel on Humanitarian Financing, & Report to the Secretary-General. (2016). *Too important to fail—addressing the humanitarian financing gap*. Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/%5BHLP Report%5D Too important to fail—addressing the humanitarian financing gap.pdf

Hillbruner, C., & Moloney, G. (2012). When early warning is not enough-Lessons learned from the 2011 Somalia Famine. *Global Food Security*, Vol. 1. https://doi.org/10.1016/j.gfs.2012.08.001

Hillier, D. (2018). *Facing Risk: Options and challenges in ensuring that climate/disaster risk finance and insurance deliver for poor people*. https://doi.org/10.21201/2017.2258

Hillier, D., & Dempsey, B. (2012). *A Dangerous Delay: The cost of late response to early warnings in the 2011 drought in the Horn of Africa*. Retrieved from www.savethechildren.netwww.oxfam.org

Hutchison, A. J., Johnston, L. H., & Breckon, J. D. (2009). Using QSR-NVivo to facilitate the

development of a grounded theory project: an account of a worked example. *International Journal of Social Research Methodology*, *13*(4), 283–302. https://doi.org/10.1080/13645570902996301

IFRC. (2008). *Early Warning, Early Action: An Evaluation of IFRC West and Central Africa Zone Flood Preparedness and Response*. Retrieved from https://www.preventionweb.net/files/12247_EarlywarningEN.pdf

IFRC. (2009). *West and Central Africa: Flood preparedness and response. Emergency appeal n° MDR61003*. Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/AB624FAF58A55628C1257619004181F0-Full_Report.pdf

IFRC. (2018a). *Forecast-based Action by the DREF*. Retrieved from https://www.forecast-based-financing.org/wp-content/uploads/2018/10/DRK_Broschuere_FUND_Web_ENG.pdf

IFRC. (2018b). *Practical information on Forecast based Action by the DREF* . Retrieved from https://media.ifrc.org/ifrc/wp-content/uploads/2019/03/0097_19_003_Broschuere_National-Society_210x297_EN.pdf

IFRC. (2019a). Mongolia: Dzud Early Action Protocol Fact Sheet. Retrieved June 21, 2021, from https://www.anticipation-hub.org/Documents/Briefing_Sheets_and_Fact_Sheets/Mongolia_Dzud_EAP_Fact_Sheet.pdf

IFRC. (2019b). *Mongolia: Dzud Early Action Protocol Summary*. Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/DZUD EAP_Mongolia.pdf

IFRC. (2021). *2021 Annual Plan: Disaster Relief Emergency and Forecast-based Action Fund*. Retrieved from https://www.ifrc.org/sites/default/files/2021-06/20210125_DREF_Plan2021_NEW.pdf

InsuResilience Concept Note. (2018). *Shaping the InsuResilience Global Partnership*. Retrieved from https://www.insuresilience.org/wp-content/uploads/2018/05/20180502_Concept-Note_InsuResilience-Global-Partnership.pdf

InsuResilience Global Partnership and the Anticipation Hub. (2021). *Report on the 1st Workshop of the Sectoral Community "Linking Anticipatory Action to Risk Financing."* Retrieved from https://www.anticipation-hub.org/Documents/Reports/Sectoral-Community-AA-DRF_20Sep2021-WS_REPORT.pdf

International Committee of the Red Cross (ICRC). (1965). *International Review of the Red Cross, November 1965 Fifth year - No. 56*. Retrieved from https://www.loc.gov/rr/frd/Military_Law/pdf/RC_Nov-1965.pdf

IPCC. (2014). Summary for policymakers. In C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastrandrea, T. E. Bilir, … L. L. (eds.)]. White (Eds.), *Climate Change 2014: Impacts,Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 1–32). Cambridge, United Kingdom and New York, NY, USA: CCambridge University Press.

Isakson, S. R. (2015). Derivatives for Development? Small-Farmer Vulnerability and the Financialization of Climate Risk Management. *Journal of Agrarian Change*, *15*(4), 569–580. https://doi.org/10.1111/joac.12124

Jagers, S. C., Paterson, M., & Stripple, J. (2005). Privatizing governance, practicing triage: securitization of insurance risks and the politics of global warming. In D. L. Levy & P. J. Newell (Eds.), *The Business of Global Environmental Governance* (pp. 249–274). MIT Press: Cambridge.

Jarzabkowski, P., Bednarek, R., & Spee, P. (2015). *Making a Market for Acts of God: The Practice of Risk Trading in the Global Reinsurance Industry*. Oxford University Press.

Jasanoff, S. (2004). *States of KnowledgeThe Co-Production of Science and the Social Order*. Routledge.

Jasanoff, Sheila. (2011). Cosmopolitan Knowledge: Climate Science and Global Civic Epistemology. In J. S. . Dryzek, R. B. . Norgaard, & D. Schlosberg (Eds.), *The Oxford Handbook of Climate Change and Society*. https://doi.org/10.1093/OXFORDHB/9780199566600.003.0009

Jensen, K. B., & Glasmeier, A. K. (2010). Policy, research design and the socially situated researcher. *The SAGE Handbook of Qualitative Geography*, 82–93. https://doi.org/10.4135/9780857021090.N6

Johnson, L. (2013a). Catastrophe bonds and financial risk: Securing capital and rule through contingency. *Geoforum*, *45*, 30–40. https://doi.org/10.1016/j.geoforum.2012.04.003

Johnson, L. (2013b). Index insurance and the articulation of risk-bearing subjects. *Environment and Planning A*, *45*, 2663–2681. https://doi.org/10.1068/a45695

Johnson, L. (2020). Sharing risks or proliferating uncertainties? Insurance, disaster and development. In A. S. Ian Scoones (Ed.), *The Politics of Uncertainty Challenges of Transformation* (pp. 45–57). Routeledge .

Karl S. Zimmerer, & Thomas J. Bassett. (2003). Approaching Political Ecology Society, Nature, and Scale in Human–Environment Studies. In E. Karl S. Zimmerer (Ed.), *Political Ecology: An Integrative Approach to Geography and Environment-Development Studies* (p. 1:25). Retrieved from https://www.guilford.com/excerpts/zimmerer.pdf

Kass, A. (2019). Working with Financial data as a Critical Geographer. *Geographical Review*, *110*(1–2), 104–116. https://doi.org/10.1080/00167428.2019.1684193

Katz, C. (1994). Playing the Field: Questions of Fieldwork in Geography. *The Professional Geographer*, *46*(1), 67–72. https://doi.org/10.1111/j.0033-0124.1994.00067.x

Kellett, J. and Caravani, A. (2013). *Financing Disaster Risk Reduction - A 20 year story of international aid*. Retrieved from https://www.alnap.org/help-library/financing-disaster-risk-reduction-a-20-year-story-of-international-aid

Kirchherr, J., & Charles, K. (2018). Enhancing the sample diversity of snowball samples: Recommendations from a research project on anti-dam movements in Southeast Asia. *PLOS ONE*, *13*(8), e0201710. https://doi.org/10.1371/JOURNAL.PONE.0201710

Knight, F. (2006). *Risk, Uncertainty and Profit* (4th Edition). Dover Publications. .

Krause, M. (2014a). Introduction. In *The Good Project: Humanitarian Relief NGOs and the Fragmentation of Reason* (pp. 1–13). Chicago: University of Chicago Press.

Krause, M. (2014b). The History of Humanitarian Authority and the Divisions of the Humanitarian Field. In *The Good Project: Humanitarian Relief NGOs and the Fragmentation of Reason* (pp. 92–125). Chicago: University of Chicago Press.

Kropótkin, P. (2008). *"The Conquest of Bread" and Other Writings* (M. Shatz, Ed.). Cambridge University Press.

Krüger, F., Bankoff, G., Cannon, T., Orlowski, B., & Schipper, L. (2015). *Cultures and disasters : understanding cultural framings in disaster risk reduction*. New York: Routledge.

Lane, S. N. (2019). Critical physical geography. *Geography*, *104*(1), 49–53. https://doi.org/10.1080/00167487.2019.12094062

Lash, S., Szerszynski, B., & Wynne, B. (1998). *Risk, Environment and Modernity: Towards a New Ecology*. Sage Publications, London.

Lautze, S., Bell, W., Alinovi, L., & Russo, L. (2012). Early warning, late response (again): The 2011 famine in Somalia. *Global Food Security*, *1*(1), 43–49. https://doi.org/10.1016/J.GFS.2012.07.006

Lave, R., Biermann, C., & Lane, S. N. (2018). The Palgrave handbook of critical physical geography. In *The Palgrave Handbook of Critical Physical Geography*. https://doi.org/10.1007/978-3-319-71461-5

Lave, R., Wilson, M. W., Barron, E. S., Biermann, C., Carey, M. A., Duvall, C. S., … Dyke, C. Van. (2014). Intervention: Critical physical geography. *The Canadian Geographer / Le Géographe Canadien*, *58*(1), 1–10. https://doi.org/10.1111/CAG.12061

Leach, M., Scoones, I., & Thompson, L. (2002). Citizenship, science and risk: conceptualising relationships across issues and settings. *IDS Bulletin*, *33*((2)), 1–12. https://doi.org/10.1111/j.1759-5436.2002.tb00019.x

Lemke, T. (2011). *Biopolitics : an Advanced Introduction.* NYU Press.

Levine, S., Crosskey, A., & Abdinoor, M. (2011). *System failure? Revisiting the problems of timely response to crises in the Horn of Africa*. Retrieved from https://resourcecentre.savethechildren.net/node/6351/pdf/6351.pdf

Lewis, S., & Russell, A. (2011). Being embedded: A way forward for ethnographic research. *Ethnography*, *12*(3), 398–416. https://doi.org/10.1177/1466138110393786

LiPuma, E., & Lee, B. (2004). *Financial Derivatives and the Globalization of Risk*. Durham & London: Duke University Press.

Littig, B. (2009). Interviewing the Elite — Interviewing Experts: Is There a Difference? In A. . Bogner, B. . Littig, & W. Menz (Eds.), *Interviewing Experts* (pp. 98–113). https://doi.org/10.1057/9780230244276_5

Livingstone, D. N. (1987). HUMAN ACCLIMATIZATION: PERSPECTIVES ON A CONTESTED FIELD OF INQUIRY IN SCIENCE, MEDICINE AND GEOGRAPHY. *Historical Science*, *25*(4), 359–394.

Livingstone, D. N. (1991). The moral discourse of climate: historical considerations on race, place and virtue. *Journal of Historical Geography*, *17*(4), 413–434. https://doi.org/10.1016/0305-7488(91)90025-Q

Livingstone, D. N. (2002). Race, space and moral climatology: notes toward a genealogy. *Journal of Historical Geography*, *28*(2), 159–180. https://doi.org/10.1006/JHGE.2001.0397

Lobo-Guerrero, L. (2010a). Insurance, climate change, and the creation of geographies of uncertainty in the Indian Ocean Region. *Journal of the Indian Ocean Region , 6:2*, *239–251*. https://doi.org/10.1080/19480881.2010.536671

Lobo-Guerrero, L. (2010b). Insuring Security: Biopolitics, Security and Risk. In *Insuring Security : Biopolitics, Security and Risk* (pp. 1–12). Routeledge.

Lowcock, M. (2018). *A Casement Lecture: Towards a Better System for Humanitarian Financing*. Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/Casement Lecture - Humanitarian Financing - Dublin 23.3.2018.docx.pdf

Lowcock, M. (2019). *Anticipation saves lives: How data and innovative financing can help improve the world's response to humanitarian crises*. Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/USG-ERC Mark Lowcock Casement lecture 02.12.19 London_FINAL1_0.pdf

Lung, F. (2020). *Being timely: creating good triggers and plans in disaster risk financing*. Retrieved from https://static1.squarespace.com/static/5c9d3c35ab1a62515124d7e9/t/5f8568bc15f15d2435834c75/1602578625547/Centre_DRF_Paper3_9Oct.pdf

Macleod, D., Kilavi, M., Mwangi, E., Ambani, M., Osunga, M., Robbins, J., … Todd, M. C. (2021). Are Kenya Meteorological Department heavy rainfall advisories useful for forecast-based early action and early preparedness for flooding? *Natural Hazards and Earth System Sciences*, *21*(1), 261–277. https://doi.org/10.5194/NHESS-21-261-2021

MacLeod, D., Kniveton, D. R., & Todd, M. C. (2021). Playing the long game: Anticipatory action based on seasonal forecasts. *Climate Risk Management*, *34*, 100375. https://doi.org/10.1016/J.CRM.2021.100375

Marks, D. (2019). Assembling the 2011 Thailand floods: Protecting farmers and inundating high-value industrial estates in a fragmented hydro-social territory. *Political Geography*, *68*, 66–76. https://doi.org/10.1016/j.polgeo.2018.10.002

Martinez-Diaz, L., Sidner, L., & Mcclamrock, J. (2019). *The Future of Disaster Risk Pooling for Developing Countries: Where Do We Go from Here?* Retrieved from http://www.wri.org/publication/disaster-risk-pooling.

Mawdsley, E. (2018). 'From billions to trillions': Financing the SDGs in a world 'beyond aid.' *Dialogues in Human Geography*, *8*(2), 191–195. https://doi.org/10.1177/2043820618780789

Maxwell, D., Haan, N., Gelsdorf, K., & Dawe, D. (2012). The 2011-12 Famine in Somalia: Introduction to the special edition. *Global Food Security*, Vol. 1, pp. 1–4. https://doi.org/10.1016/j.gfs.2012.07.007

Maxwell, D., Majid, N., Stobaugh, H., Kim, J. J., Lauer, J., & Paul, E. (2014). *Lessons Learned from the Somalia famine and the Greater Horn of Africa crisis 2011-2012: Desk Review of Literature*. Retrieved from http://fic.tufts.edu/assets/Desk-Review-Somalia-GHA-Crisis-2011-2012.pdf

McGowran, P., & Donovan, A. (2021). Assemblage theory and disaster risk management. *Progress in Human Geography*, *Vol 45*(6). https://doi.org/10.1177/03091325211003328

Meenan, C., Ward, J., & Muir-Wood, R. (2019). *Disaster Risk Finance - A Toolkit*. Retrieved from https://www.indexinsuranceforum.org/sites/default/files/Publikationen03_DRF_ACRI_DINA4_WEB_190617.pdf

Montier, E. ., Harris, C. , & Ranger, N. (2019). *Disaster Risk Financing in Concert*. Retrieved from https://www.preventionweb.net/publication/disaster-risk-financing-concert

Mwangi, E., Taylor, O., Todd, M. C., Visman, E., Kniveton, D., Kilavi, M., … Colman, A. (2021). Mainstreaming forecast based action into national disaster risk management systems: experience from drought risk management in Kenya. *Climate and Development* , 1–16. https://doi.org/10.1080/17565529.2021.1984194

Naess, L. O., Newell, P., Newsham, A., Phillips, J., Quan, J., & Tanner, T. (2015). Climate policy meets national development contexts: Insights from Kenya and Mozambique. *Global Environmental Change*, *35*, 534–544. https://doi.org/10.1016/J.GLOENVCHA.2015.08.015

National Audit Office. (2017). *Managing the Official Development Assistance target-a report on progress*. Retrieved from https://www.nao.org.uk/wp-content/uploads/2017/07/Managing-the-Official-development-Assistance-target-a-report-on-progress.pdf

Neal, M. D. (1997). Reconsidering the Phases of Disasters. *International Journal of Mass Emergencies and Disasters*, *15*(2), 239–264. Retrieved from http://www.safetylit.org/citations/index.php?fuseaction=citations.viewdetails&citationIds[]=citjournalarticle_56013_12

O'Keefe, P., Westgate, K., & Wisner, B. (1976). Taking the naturalness out of natural disasters. *Nature*, *260*(5552), 566–567. https://doi.org/10.1038/260566A0

O'Malley. (2003). Governable catastrophes: a comment on Bougen. *Economy and Society*, *32*(2), 275–279. https://doi.org/10.1080/0308514032000073437

O'Malley, P. (2000). Uncertain subjects: risks, liberalism and contract. *Economy and Society* , *29*(4), 460–484. https://doi.org/10.1080/03085140050174741

O'Malley, Pat. (2004). Risk, Uncertainty and Government. In *Risk, Uncertainty and Government* (pp. 1–28). London: Glasshouse.

Oels, A. (2013). Rendering climate change governable by risk: From probability to contingency. *Geoforum*, *45*, 17–29. https://doi.org/10.1016/j.geoforum.2011.09.007

Oulahen, G. (2021). Flood hazards, environmental rewards, and the social reproduction of risk. *Geoforum*, *119*, 43–51. https://doi.org/10.1016/j.geoforum.2020.12.021

Oxford Policy Management. (2017). *Independent Evaluation of the African Risk Capacity (ARC) Formative Phase 1 Report*. Retrieved from https://www.opml.co.uk/files/Publications/a0603-independent-evaluation-african-risk-capacity/arc-evaluation-report.pdf?noredirect=1

Patt, A., & Gwata, C. (2002). Effective seasonal climate forecast applications: examining constraints for subsistence farmers in Zimbabwe. *Global Environmental Change*, *12*(3), 185–195. https://doi.org/10.1016/S0959-3780(02)00013-4

Pelling, M., Müller-Mahn, D., & Mccloskey, J. (2020). DISASTERS, HUMANITARIANISM AND EMERGENCIES A politics of uncertainty. In Ian Scoones & A. Stirling (Eds.), *The Politics of Uncertainty: Challenges of Transformation*: *Vol. 1st edition*. Routeledge.

Pierce, R. (2008). Using Content Analysis. In R. Pierce (Ed.), *Research Methods in Politics* (1st Edition, pp. 263–279). https://doi.org/10.4135/9780857024589

Porter, T. M. (2020). *Trust in numbers : the pursuit of objectivity in science and public life*. Princeton University Press.

Quan, J., Otto Naess, L., Newsham, A., Sitoe, A., & Corral Fernandez, M. (2014). Carbon Forestry and Climate Compatible Development in Mozambique: A Political Economy Analysis. *IDS Working Paper;448*, 1–40. Retrieved from https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/4129

REAP Secretariat. (2021). *Partnership for Change: REAP Strategic Vision*. Retrieved from https://www.early-action-reap.org/sites/default/files/2021-06/20210627_Reap_StrategicVision.pdf

Red Cross Red Crescent Climate Centre. (2018a). *A guide to trigger methodology for forecast-based financing*. Retrieved from http://fbf.drk.de/fileadmin/user_upload/FbF_Manual_-_A_guide_to_trigger_methodology.pdf

Red Cross Red Crescent Climate Centre. (2018b). *Forecast-based financing: case studies from Togo and Uganda*. Retrieved from http://www.climatecentre.org/downloads/files/RCCC_FbF CS Togo and Uganda V2.pdf

Red Cross Red Crescent Climate Centre, German Red Cross, & the IFRC. (2021). *FbF Practitioners Manual: A step-by-step approach for FbF implementation*. Retrieved from https://manual.forecast-based-financing.org/en/

Reeves, J. (2017). *The wrong model for resilience: How G7-backed drought insurance failed Malawi, and what we must learn form it*. Retrieved from https://actionaid.org/sites/default/files/the_wrong_model_for_resilience_final_230517.pdf

Robbins, P. (2019). Chapter 2 A Tree with Deep Roots. In P. Robbins (Ed.), *Political Ecology : A Critical Introduction* (Third Edition, pp. 22–44). Wiley.

Robbins, P., & Monroe Bishop, K. (2008). There and back again: Epiphany, disillusionment, and rediscovery in political ecology. *Geoforum*, *39*(2), 747–755. https://doi.org/10.1016/j.geoforum.2006.12.013

Robertson, M. M. (2006). The Nature That Capital Can See: Science, State, and Market in the Commodification of Ecosystem Services. *Environment and Planning D: Society and Space*, *24*(3), 367–387. https://doi.org/10.1068/d3304

Rowley, H. (2014). Going beyond procedure: Engaging withthe ethical complexities of being anembedded researcher. *Management in Education*, *28*(1), 19–24. https://doi.org/10.1177/0892020613510119

Sandstrom, S., & Juhola, S. (2017). Continue to blame it on the rain? Conceptualization of drought and failure of food systems in the Greater Horn of Africa. *Environmental Hazards*, *16*(1), 71–91. https://doi.org/10.1080/17477891.2016.1229656

Scherer, N. (2020). *Insuring against climate change : the emergence of regional catastrophe risk pools*. Routeledge.

Scoones, I. (2019). *What is Uncertainty and Why Does it Matter?* Retrieved from https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/14470/STEPSWP_105_Scoones_final.pdf?sequence=1&isAllowed=y

Scoones, I., & Stirling, A. (2020). *The Politics of Uncertainty: Challenges of Transformation* (I. Scoones & A. Stirling, Eds.). Routeledge.

Scott, Z., & Clarke, D. (2021). *PREDICT AND PROTECT: G7 SOLUTIONS FOR A NEW APPROACH TO CRISIS RISK FINANCING*. Retrieved from https://static1.squarespace.com/static/5c9d3c35ab1a62515124d7e9/t/607856e19abc3368d276132e/1618499302881/Crisis_lookout_14Aprilv4.pdf

Sida, H., & J. Darcy. (2012). *East Africa Crisis Appeal Synthesis Report - Disasters Emergency Committee's (DEC)*. Retrieved from https://www.alnap.org/help-library/disasters-emergency-committees-dec-east-africa-crisis-appeal-synthesis-report

Smith, N. (1984). *Uneven Development: Nature, Capital, and the Production of Space* (1st Edition). Oxford: Basil Blackwell.

Smith, N. (2006). There's No Such Thing as a Natural Disaster. Retrieved January 13, 2021, from Understanding Katrina website: https://items.ssrc.org/understanding-katrina/theres-no-such-thing-as-a-natural-disaster/

Stanley, A. (2013). Natures of risk: Capital, rule, and production of difference. *Geoforum*, *45*, 5–16.

https://doi.org/10.1016/j.geoforum.2012.06.010

START Network. (2017). *Annual Report 2017 - Crisis Anticipation Window*. Retrieved from https://start-network.app.box.com/s/5dr4zhh0ng0sze2pdlvjfya4b594f1qf

START Network. (2019). *START Financing Facility Board Paper* . Retrieved from https://startprogrammes.app.box.com/s/hm2sq6pjqv3q0fxy0gm0j3lbxp4r7w6e

START Network. (2020a). Mongolia anticipation of harsh winter 2018-2019: Impact assessment. Retrieved June 22, 2021, from https://start-network.app.box.com/s/7zom9ofwdk3hg47m7tlm7wtmookbxq2u/file/607331025041

START Network. (2020b). *START Fund ARC Replica Pay-Out Senegal 2020 Internal Evaluation*. Retrieved from https://start-network.app.box.com/v/ARC-Replica-Evaluation-2020-EN

START Network. (2021). *START Ready* . Retrieved from https://www.anticipation-hub.org/Documents/Other/START_READY_-_2_pager.pdf

Stirling. (2009). Risk, uncertainty and power. Retrieved October 2, 2018, from India Seminar website: http://www.india-seminar.com/2009/597/597_andy_stirling.htm#top

Stirling, A. (2010, December 23). Keep it complex. *Nature*, Vol. 468, pp. 1029–1031. https://doi.org/10.1038/4681029a

Stirling, Andrew. (2007). Risk, precaution and science: Towards a more constructive policy debate. Talking point on the precautionary principle. *EMBO Reports*, *8*(4), 309–315. https://doi.org/10.1038/SJ.EMBOR.7400953

Stott, P. A., & Sullivan, S. (2000). *Political ecology: science, myth and power*. Arnold, London.

Südhoff, R., & Hövelmann, S. (2019). *WHERE DOES GERMAN HUMANITARIAN ASSISTANCE STAND?* Retrieved from https://www.chaberlin.org/wp-content/uploads/2019/04/2019-03-statement-humanitarian-assistance-cha-en-2.pdf

Swithern, S. (2018). *Underfunded appeals: Understanding the consequences, improving the system.* Retrieved from https://eba.se/wp-content/uploads/2019/02/Underfunded-appeals_WEB-FINAL.pdf

Talbot, T., Dercon, S., & Barder, O. (2017). *Payouts for Perils How Insurance Can Radically Improve Emergency Aid*. Retrieved from https://www.cgdev.org/sites/default/files/payouts-perils-final-web-1_1.pdf

Taleb, N. (2007). *The black swan: The impact of the highly improbable*. Random House.

Tanner, T., Mensah, A., Lawson, E. T., Gordon, C., Godfrey-Wood, R., & Cannon, T. (2014). Political Economy of Climate Compatible Development: Artisanal Fisheries and Climate Change in Ghana. *IDS Working Papers*, *2014*(446), 1–30. https://doi.org/10.1111/J.2040-0209.2014.00446.X

Taylor, M. (2014). Making a world of adaptation. In M. Taylor (Ed.), *The Political Ecology of Climate Change Adaptation* (pp. 50–72). Routeledge.

Taylor, M. (2016). Risky Ventures: Financial Inclusion, Risk Management and the Uncertain Rise of IndexBased Insurance. *Research in Political Economy*, *Volume 31*, 237–266. https://doi.org/10.1108/S0161-723020160000031013

Taylor, Visman, E., Todd, M., Kniveton, D., Rowhani, P., Waruru, S., … Macleod, D. (2020). *ForPAc: Co-producing Approaches to Forecast-based Early Action for Drought and Floods in Kenya*.

Retrieved from https://futureclimateafrica.org/coproduction-manual/downloads/WISER-FCFA-coproduction--case-study-20.pdf

Torry, W. I. (1979). Hazards, Hazes and Holes: a Critique of the Environment as Hazard* and General Reflections on Disaster Research. *Canadian Geographer / Le Géographe Canadien*, *23*(4), 368–383. https://doi.org/10.1111/J.1541-0064.1979.TB00672.X

Tozier de la Poterie, A., Clatworthy, Y., Easton-Calabria, E., Coughlan de Perez, E., Lux, S., & van Aalst, M. (2021). Managing multiple hazards: lessons from anticipatory humanitarian action for climate disasters during COVID-19. *Climate and Development*. https://doi.org/10.1080/17565529.2021.1927659

Tozier de la Poterie, Jjemba, W. E., Singh, R., Coughlan de Perez, E., Costella, C. V., & Arrighi, J. (2018). Understanding the use of 2015-2016 El Niño forecasts in shaping early humanitarian action in Eastern and Southern Africa. *International Journal of Disaster Risk Reduction*, *30*(February), 81–94. https://doi.org/10.1016/j.ijdrr.2018.02.025

Turnbull, M., Moriniere, L., Tozier de la Poterie, A., Gwaivangmin, A., Pathirathna, S. S., & Umar, A. (2020). *Start Fund: Evaluation of Crisis Anticipation FINAL REPORT*. Retrieved from https://startnetwork.org/resource/start-fund-evaluation-crisis-anticipation

Turner, M. D. (2016). Political ecology II: Engagements with ecology. *Progress in Human Geography*, *40*(3), 413–421. https://doi.org/10.1177/0309132515577025

UK Government Actuary's Department (GAD). (2020). *Start Financing Facility: Quantitative analysis of risk pooling | Start Network*. Retrieved from https://startnetwork.org/resource/start-financing-facility-quantitative-analysis-risk-pooling

UK Government Actuary's Department (GAD). (2021). *International Federation of Red Cross and Red Crescent Societies' Forecast-based Action by the DREF. Financing the forecast-based Early Action Protocols.* Retrieved from www.gov.uk/government/organisations/government-actuarys-department/about/terms-of-

UN OCHA. (2020a). *Global Humanitarian Overview* . Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/GHO-2020_v9.1.pdf

UN OCHA. (2020b). *OCHA Global Humanitarian Overview 2021*. Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/GHO2021_EN.pdf

UN OCHA. (2020c). *UN humanitarian chief to release up to $140M in CERF funds for anticipatory-action projects | OCHA*. Retrieved from https://www.unocha.org/story/un-humanitarian-chief-release-140m-cerf-funds-anticipatory-action-projects#:~:text=United Nations humanitarian chief Mark,with %2415 million in Somalia

UNICEF and WFP. (2015). *UNICEF/WFP Return on Investment for Emergency Preparedness Study*. Retrieved from https://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp272225.pdf?_ga=2.147115319.1262178186.1611229744-1863589797.1611229744

UNISDR. (2009). *Terminology on Disaster Risk Reduction*. Retrieved from https://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf

UNISDR. (2015). *Sendai Framework for Disaster Risk Reduction 2015 - 2030*. Retrieved from https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf

United Nations. (2003). *Monterrey Consensus on Financing for Development*. Retrieved from https://www.un.org/en/events/pastevents/pdfs/MonterreyConsensus.pdf

United Nations and the Governments of Germany and the United Kingdom. (2021). *Co-chairs' statement: Anticipatory Action High-Level Humanitarian Event* . Retrieved from https://www.unocha.org/sites/unocha/files/AnticipatoryActionHLE2021_CoChairsStatement.pdf

Venton, C. C. (2013). *Value for Money of Multi-year Approaches to Humanitarian Funding Executive Summary*. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/204946/Cost_Effectiveness_of_Multi-year_Humanitarian_Funding_-_Final_Report.pdf

Vogel, C., & O'Brien, K. (2006). Who can eat information? Examining the effectiveness of seasonal climate forecasts and regional climate-risk management strategies. *Clim Res*, *Vol. 33*, 111–122.

Walker, Harremoës, P., Rotmans, J., Sluijs, J. P. van der, Asselt, M. B. A. van, Janssen, P., & Krauss, M. P. K. von. (2010). Defining Uncertainty: A Conceptual Basis for Uncertainty Management in Model-Based Decision Support. *Integrated Assessment*, *4*(1), 5–17. https://doi.org/10.1076/IAIJ.4.1.5.16466

Walker, P. A. (2005). Political ecology: where is the ecology? *Progress in Human Geography*, *29*, 73–82. https://doi.org/https://doi.org/10.1191/0309132505ph530pr

Ward, P. J., Jongman, B., Salamon, P., Simpson, A., Bates, P., De Groeve, T., … Winsemius, H. C. (2015). Usefulness and limitations of global flood risk models. *Nature Climate Change 2015 5:8*, *5*(8), 712–715. https://doi.org/10.1038/nclimate2742

Watts, M. (1983). On the poverty of theory: natural hazards research in context. In K. Hewitt (Ed.), *Interpretations of Calamity From the Viewpoint of Human Ecology* (1st Edition, pp. 231–262). Routeledge.

Watts, M. (2015). Now and then: the origins of political ecology and the rebirth of adaptation as a form of thought. In T. Perreault, G. Bridge, & J. and McCarthy (Eds.), *The Routledge Handbook of Political Ecology* (1st Edition, pp. 41–72). https://doi.org/10.4324/9781315759289-11

Weingärtner, L., & Wilkinson, E. (2019). *Anticipatory crisis financing and action: concepts, initiatives and evidence*. Retrieved from https://static1.squarespace.com/static/5c9d3c35ab1a62515124d7e9/t/5d15b8b33e88310001540fb7/1561704641415/Evidence_review_Anticipatory_Crisis_Financing_Action.pdf

Weingärtner, Lena, Pforr, T., & Wilkinson, E. (2020). *The evidence base on Anticipatory Action*. Retrieved from https://docs.wfp.org/api/documents/WFP-0000110236/download/?_ga=2.243196546.1262178186.1611229744-1863589797.1611229744

Wernstedt, K., Roberts, P. S., Arvai, J., & Redmond, K. (2019). How emergency managers (mis?)interpret forecasts. *Disasters*, *43*(1), 88–109. https://doi.org/10.1111/DISA.12293

White, G. F. (1945). *Human Adjustment to Floods*. Chicago, IL: University of Chicago.

Wilkinson, E., Pforr, T., & Weingärtner, L. (2020). *Integrating "anticipatory action" in disaster risk management*. Retrieved from https://odi.org/en/publications/integrating-anticipatory-action-in-disaster-risk-management/

Wilkinson, E., Weingärtner, L., Choularton, R., Bailey, M., Todd, M., Kniveton, D., & Cabot Venton, C. (2018). *Forecasting hazards, averting disasters Implementing forecast-based early action at scale*. Retrieved from https://odi.org/en/publications/forecasting-hazards-averting-disasters-implementing-forecast-based-early-action-at-scale/

Willitts-King, B., Weingärtner, L., Pichon, F., & Spencer, A. (2020). *Risk-informed approaches to humanitarian funding Using risk finance tools to strengthen resilience*. Retrieved from https://odi.org/en/publications/risk-informed-approaches-to-humanitarian-funding-using-risk-finance-tools-to-strengthen-resilience/

Wolmer, W., Keeley, J., Leach, M., & Mehta, L., Scoones, I. and Waldman, L. (2006). *Understanding policy processes: A review of IDS research on the environment*. Retrieved from https://www.ids.ac.uk/files/Policy_Processes06.pdf

World Bank. (2009). *IMPLEMENTATION COMPLETION AND RESULTS REPORT(IBRD-7262 IDA-4001)ON ALOAN AND CREDITIN THE AMOUNT OF US$ 10 MILLION EQUIVALENTTO GRENADAFOR THE HURRICANE IVAN EMERGENCY RECOVERY PROJECT*. Retrieved from https://documents1.worldbank.org/curated/en/916021468030309165/pdf/ICR12870P092691C0Disclosed012130191.pdf

World Bank. (2017). *SOVEREIGN CLIMATE AND DISASTER RISK POOLING*. Retrieved from https://documents1.worldbank.org/curated/en/837001502870999632/pdf/118676-WP-v2-PUBLIC.pdf

World Bank and GFDRR. (2018). *Global Risk Financing Facility*. Retrieved from https://www.gfdrr.org/sites/default/files/GRiF Information Sheet.pdf

World Meterological Organisation. (2021). *WMO ATLAS OF MORTALITY AND ECONOMIC LOSSES FROM WEATHER, CLIMATE AND WATER EXTREMES (1970–2019)*. Retrieved from https://library.wmo.int/doc_num.php?explnum_id=10769

Wynne, B. (1992). Uncertainty and environmental learning. Reconceiving science and policy in the preventive paradigm. *Global Environmental Change*, *2*(2), 111–127. https://doi.org/10.1016/0959-3780(92)90017-2

Wynne, B. (1998). May the Sheep Safely Graze? A Reflexive View of the Expert–Lay Knowledge Divide. In S. Lash, B. Szerszynski, & B. Wynne (Eds.), *Risk, Environment and Modernity: Towards a New Ecology* (pp. 44–83). https://doi.org/10.4135/9781446221983.n3

9. Appendices

Annexe 1 – Table of conferences and events attended

Conference Name	Dates	Location	Notable sessions / side-events	Participatory sessions	Session Resources / Public Recordings
UR2018 - 5th Global UR forum (GFDRR conference)	May-18	Mexico City	Early Warning for Early Action: Forewarned and Forearmed	'Serious game' implementing FbF	Conference proceedings available online. Rules and guidance note for Early Warning for Early Action game available online.
			Communicating risk: Approaches for parametric insurance		
Red Cross 4th Global Dialogue Platform for FbF	Sep-18	Berlin	The glue that binds: Creating certainty in the unexpected with disaster risk financing		Conference report available online.
			Fundamentals of Disaster Risk Financing by Nicola Ranger, DFID		
			The FbF great debate: Integration or Independent?		
			Forecast based Financing Research Concepts and Progress (SHEAR research session)	Participatory timelining activity	
UNISDR Global Platform for Disaster Risk Reduction 2019	May-19	Geneva	Cracking the Nut: Unlocking the Dividends of Investments in Early Action		Session concept note available online.
			Unlocking the resilience dividend		Session concept note available online.
			What role financial instruments can and cannot play in disaster risk management		Session concept note available online.

Red Cross 5th Global Dialogue Platform for Anticipatory Humanitarian Action	Sep-19	Berlin	From ambition to action: new and upcoming initiatives to scale up anticipation		Conference report available online.
			Institutionalizing anticipatory action in national government-owned risk management and early warning systems (SHEAR research session)	Co-led participatory problem trees activity	
			More and better: scaling up anticipatory humanitarian action together		
			What can go wrong with anticipatory action?		
			Fundamentals of Disaster Risk Financing: What do they mean for humanitarian operations?		
			Panel Discussion Sustainability and scalability: integration of FbF in national DRM contexts		
UNFCCC CoP 25 2019	Dec-19	Madrid	Unlocking Climate Risk Insurance: Scaling up solutions through Smallholder Farmers Networks		
			Working group sessions / Warsaw mechanism on Loss and Damage 23rd – 27th December 2019		
Red Cross Virtual Global Dialogue Platform for Anticipatory Humanitarian Action	Dec-20	Virtual	Reaching more through synergies: Linking risk financing to anticipatory action by InsuResilience x Dialogue Platform		
			Mainstreaming into national systems: the key to long-term sustainability of anticipatory action	Hosted panel discussion	
Insurance Development Forum Virtual Summit	Jun-21	Virtual	Meeting the Moment: How Leaders can Build Back a Better Crisis Financing System at this years' G7'		
InsuResilience Sectoral Community Workshop: Linking Anticipatory Action to Risk Financing	Sep-21	Virtual	What is AA, how can it be linked to DRF? Exploring contexts, projects and case studies; Aligning AA and DRF – what are entry points, opportunities for alignment?		Session recording, slides and report available online.

GRiF Technical Talks Webinar	Sep-21	Virtual	Weekly webinar 4 - Start Financing Facility		Session recording, slides and resources available online.
COP26: Closing the Protection Gap: How Disaster Finance Partnerships Can Protect More People on the Frontline of the #ClimateCrisis	Nov-21	Virtual	Streamed event at CoP 26		Session recording available online.
COP 26: Welcome to 2025; Where Early Action is the Default	Nov-21	Virtual	Streamed event at CoP 26		Streamed recording available online.

Annexe 2 – NVivo Codebook

Name
Benefits of DRF
Capacity & national actors
Changes in private - insurance sector
Competition and or fragmentation
Concern - insurance specific
Concern - new approach general
Concern - over promising
Concern - particular contexts, hazards etc.
Concern - risk pooling specific
Covid-19 impacts
Definitional debates
Definitions of risk and uncertainty
Difference between humanitarianand finance approach
Drivers - 'risk society'

Name
Emergence
Emergence - 3x Different agendas of humanitarians, climate, world bank
Emergence – chance, encounter
Emergence - key moments
Emergence - risk pooling approaches
Finance as 'glue'
Frustration with existing systems
Frustration with politics of current system
Humanitarianism-development tensions
Key quotes
Knowledge - different languages
Knowledge politics
Knowledge politics - science
Links with climate and dev agendas
Making decisions, trade-offs explicit

Name
Mandates
Metrics of success, new metrics of success
Need for collaboration
Politics of risk
Predictability
Risk - different epistemologies
Risk as calculative practice - casting out
Risk as calculative practice - contingencies
Risk as calculative practice for decision making
Risk layering
Risk pooling - risk appetite, humanitarian application of DRF
Temporal challenges
Tensions between disciplines
Tensions between organisations
Thinking like an insurance company narrative

Name
Timeliness
Too big too fast – scaling issues
Too small - scaling issues
Two key narratives efficiency, predictability
Use of info for decision making
Use of 'science'
Useful for who - DRF for donors or recipients
Useful for who - DRF for governments
Useful for who - DRF for humanitarians
Useful for who - DRF for private sector

Annexe 3 – NVivo exploratory analysis: word cloud from all interview transcripts

Annexe 4 – Consent Form

UNIVERSITY OF SUSSEX

CONSENT FORM FOR PROJECT PARTICIPANTS

Title of Project: The political economy of disaster risk financing

Name of Researcher and School: Olivia Taylor, School of Global Studies[1]
C-REC Ref no: (ER/OT52/3)

Please fill box

	YES	NO
• I consent to being interviewed by the researcher	☐	☐
• I agree to allowing the interview to be audio-recorded	☐	☐
• I understand that I will be given a transcript of data concerning me for my approval before being included in the write up of the research	☐	☐
• I understand that information I provide will be kept anonymous, my name will be coded in any stored data and excluded in the published research material, nor will any information be included that could identify you.	☐	☐
• I understand that I have given my information to be used in research outputs, the PhD thesis and any further publications.	☐	☐
• I have read the information sheet, had the opportunity to ask questions and I understand the principles, procedures and possible risks involved.	☐	☐
• I consent to the processing of my personal information and data for the purposes of this research study. I understand that such information will be treated as strictly confidential and handled in accordance with the General Data Protection Regulation (GDPR) 2016.	☐	☐
• I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any time prior to a deadline of March 2020 and unless this data has already been used in material submitted for publication.	☐	☐
• I agree to take part in the above University of Sussex research project	☐	☐

Name:

Signature

Date:

Annexe 5 – Participant information sheet

UNIVERSITY OF SUSSEX

Participant Information Sheet

You are being invited to take part in a doctoral research study that is seeking to better understand the shift towards anticipatory action through disaster risk finance. This information sheet explains the objectives of the research what participation will involve.

PhD Title: The political economy of disaster risk financing

What is the purpose of the research?

Summary: Among the humanitarian & development there is a tendency to respond after disasters happen, instead of funding preparedness for climate events and disasters (Kellet and Caravani, 2013). However, recent years have seen a suite of new approaches being adopted by humanitarian agencies and donors aimed at acting in advance of hazards to improve slow and often fragmented responses to disasters. Disaster risk finance (DRF) is a term that spans the principal tools used to finance and plan acting in advance of disasters. This research focusses on the political economy of DRF, including policy processes and drivers, the conceptualisation of risk and uncertainty through particular mechanisms and the role of financial tools such as insurance. Most fundamentally the political economy of DRF is a study of the choices and trade-offs being made in order to shift towards an anticipatory, risk-based disaster response system.

Why have I been invited to participate?

I am interviewing a range (25+) of participants from across the humanitarian and development agencies, donors and government, research and academia and the private sector working on DRF. This includes interviews broad in nature and those that focus on particular mechanisms and challenges.

Do I have to take part?

There is no obligation to participate and you can withdraw at any time, including withdrawing your data from the research on the condition that this happens prior to August 2021 (3 months from submission deadline) and that it hasn't been included in material already submitted for publication.

What will happen if I choose to participate?

The interview will be semi-structured in nature, guided by some key questions but with room for participants to elaborate. The interview will be less than one hour long and will be recorded by dictaphone. Further details on anonymity, audio recording and the rights of participants are detailed in the consent form.

What are the possible disadvantage to taking part?

I understand that my participants are largely senior professionals and that there is a time cost to their participation.

UNIVERSITY OF SUSSEX

What are the possible advantages to taking part?

The benefits of taking part include furthering the mutual understanding of the disaster risk financing as well as the potential and constraints for this new approach.

Will my information in this study be kept confidential?

Yes – any information you provide will be treated as strictly confidential. To ensure this, the information collected about you will be anonymised and de-identified, your name will be coded in stored data and excluded in the published research material, nor will any information be included that could identify you such as institutional affiliations or job titles. Given the small and collaborative nature of the sector I am particularly careful to use non-identifiable categories when describing interview participants and using quotes. A central list of coded names will be stored separately from the interview transcript and will be password protected.

What should I do if I want to take part?

Please return a signed consent form to the researcher, either by email to Olivia Taylor, o.g.taylor@sussex.ac.uk or in person. I will arrange a mutually convenient time to conduct the interview.

What will happen to the results of the study?

The information you provide will be used (in anonymised and de-identified form) in research outputs, including the PhD thesis and any published journal articles or other outputs. Copies of published outputs can be shared with participants, and an electronic copy of the PhD thesis will be available on the University library website, unless embargoed for a particular reason (eg. to await other published outputs to be publicly available).

Who is organising and funding this study?

This interview is conducted as part of my PhD research, funded by the Department for International Development – Natural Environment Research Council 'Science for Humanitarian Emergencies & Resilience' studentship cohort and supervised by Professor Dom Kniveton, Professor Peter Newell & Dr Lars Otto Naess.

Contact for further information

If you have any further questions or concerns you can contact my lead supervisor, Professor Dom Kniveton on d.r.kniveton@sussex.ac.uk.
This research was approved by the University of Sussex ethical review: C-REC Ref no: (ER/OT52/3)

Insurance

The University of Sussex has insurance in place to cover its legal liabilities in respect of this study.

Thank you

Thank you for taking the time to consider participation in this study.