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Creating Resilient Futures

Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas

Edited by
Stephen Flood · Yairen Jerez Columbié
Martin Le Tissier · Barry O'Dwyer

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Creating Resilient Futures

"The global agreements of Paris, Sendai, and Agenda 2030 have created an opportunity to build coherence between interrelated policy agendas which have the potential to help identify and reduce systemic risks, promote sustainable development and successfully adapt to the impacts of a changing climate. This excellent text recognises that efforts towards improving development outcomes must work in concert with strategies which promote planetary health and support the transition to a sustainable and climate-resilient future. This book provides insights and clear examples of how best to work towards this goal."

—Rt Hon Helen Clark, *Patron, The Helen Clark Foundation, Auckland, New Zealand*

"Such is the interconnectedness of 'Our Common Home' that we cannot afford the luxury of solving our environmental problems piecemeal. This useful text offers an integrated approach, emphasising the unwelcome synergies that multiply risks and how frameworks to address these have developed. The threat multiplier of climate change is carefully used to examine best practice in a series of excellent case studies exploring the three related responses of disaster risk reduction, sustainable development and climate change adaptation."

—Emeritus Professor John Sweeney, *Irish Climate Analysis and Research UnitS (ICARUS), Department of Geography, Maynooth University, Ireland*

"The global climate change discourse calls for a strategic and systemic coalesce of three monumental treatises, namely the Paris Agreement, Sendai Framework and the Sustainable Development Goals (SDGs). Given the increasingly complex backdrop of a global pandemic, the impact of climate change is expected to be even more persistent, which calls for a synergy between the cross-cutting agendas of climate change adaptation, disaster risk reduction and sustainable development. The authors have therefore explored the potentials and subsequent challenges of integration of the aforementioned schemas, and conclusively recognised the need for a comprehensive, all-encompassing approach that takes into account dichotomies between diverse socioeconomic contexts."

—Prof. Dr Saleemul Huq, *Director, International Centre for Climate Change and Development, Bangladesh. Chair, Expert Advisory Group, Climate Vulnerable Forum (CVF)*

"There is a lot of talk about the need to integrate the agendas of the big agreements: Paris, Sendai and the SDGs. Most of this stops short of saying how to actually operationalise integration. The authors of this book however provide concrete examples through case studies from Ireland and around the world to help illustrate what it means to think and act simultaneously on development, disasters and climate. They ask how such integration can help achieve social resilience—because without this integration, not only is the chance of success of each of the individual agendas lower, but the prospect of a just and resilient future for everyone is severely diminished."

—Dr Lisa Schipper, *Environmental Social Science Research Fellow, Environmental Change Institute, University of Oxford, United Kingdom*

"Actionable insights and case studies come together in this timely and urgently needed collection. The book's linked-up approach helps connect the dots for researchers, policymakers and practitioners interested in delivering outcomes for disaster risk reduction, climate change and sustainability. There is a small window of opportunity to capitalise on global goodwill, scientific understanding of the problems and policy momentum. The case studies deliver useful, useable information that can be used to inform solutions to pressing challenges in the Anthropocene and showcase the value of science in mediating choices, identifying synergies and trade-offs, and highlighting options for better policies for inclusive social development and resilient livelihoods."

—Dr Nicholas Cradock-Henry, *Research Priority Area Leader, Social-Ecological Practice, Manaaki Whenua Landcare Research, New Zealand*

"Although discussion on integration across the three global 2015 frameworks is not new, this text offers fresh insight into the challenges and practical solutions to address resilience in a coherent, systematic and non-siloed manner. This book calls for much needed systems thinking and cleverly explores linking the global to the local level. As a practitioner, I welcome the importance of an integrated approach at community level, as distinctions on the ground are typically deemed irrelevant. Bravo – a great read!"

—Margot Curl, *Manager Innovative Engagement and Youth, Red Cross Red Crescent Climate Centre, The Hague, Netherlands*

Stephen Flood
Yairen Jerez Columbié
Martin Le Tissier • Barry O'Dwyer
Editors

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The Editorial Team

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Barry O'Dwyer has worked in the area of climate change science, policy and practice for over a decade. Barry is leading the development and delivery of the EPA/DCCAE-funded Climate Ireland Programme, recognised as Ireland's key national resource for climate change adaptation information. Barry also leads the Climate Change Impacts and Adaptation Group at MaREI. Barry acts as principal investigator on a wide range of nationally and internationally funded research projects which address the science of climate change and adaptation with a particular focus on developing fit-for-purpose decision-making tools and supports for adaptation planning. Barry has a wide range of experience working with local and sectoral decision-makers in Ireland and has supported the development of Local and Sectoral Guidelines for Planning for Climate Change Adaptation.

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Swee Kiong Wong is focused on research that employs bottom-up, community-driven development approaches for capacity building and socio-economic empowerment among the vulnerable riverine and coastal communities, as well as the rural communities who are more intensely impacted by climate change. Her extensive research experience has been centred on local indigenous communities, particularly among the Semai tribe in Peninsular Malaysia, and the Iban, Bidayuh and Malay communities in Sarawak, Malaysia, by linking the governance policies and capital assets and resource management. Her work is strongly motivated by her passion 'not to leave anyone behind' as promulgated by the UN 2030 Agenda.

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1

Introduction: Can the Sendai Framework, the Paris Agreement, and Agenda 2030 Provide a Path Towards Societal Resilience?

Stephen Flood, Yairen Jerez Columbié, Martin Le Tissier, and Barry O'Dwyer

The Problem

The scientific evidence indicates that the Earth's climate is changing, and without taking appropriate and early action, climate change will have severe impacts on our planet and society at large. Under high-end scenarios of climate change, impacts will include: run-away species and habitat loss, including damage to ecosystems and the support services they provide;

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damage to infrastructure, agricultural and trade systems; displacement of human populations, and substantial economic losses (IPCC, 2014, 2019). The 2006 landmark Stern Review emphasises that the benefits of strong early action on climate change outweigh the costs, valuing the cost of inaction at 5% of global GDP each year and for an indefinite period of time (Stern, 2006). The Intergovernmental Panel on Climate Change's (IPCC's) 2019 Special Report on Climate Change and Land states with high confidence that increasing impacts on land, ecosystems and biodiversity are projected under all greenhouse gas emission scenarios with cascading risks occurring across systems and sectors (IPCC, 2019). It also states with high confidence that near-term actions to promote sustainable land management will help reduce land and food-related vulnerabilities. Moreover, sustainable land management practices will provide both short-term positive economic returns and longer-term benefits for climate change adaptation[1] and mitigation,[2] biodiversity and ecosystem functions and services.

Arguably, systemic transformational change is called for to address the impacts of global climate change. The Covid-19 pandemic has generated unprecedented societal and economic challenges, upending conventional practices and behaviours (Singh & Singh, 2020). Due to the large-scale disruptions the pandemic has created, the challenge of 'building forward better' and transitioning to a resilient future is now considered an even greater priority at national, European and global scales (Martin & Mullen, 2021). This moment of societal flux can provide the conditions with which to think outside the status quo and catalyse action to address human activities that are detrimental to our environment, as well as act as a major force in shaping the future of the Earth system as a whole. At this current critical juncture, it is also vital to square up to the real and

[1] Climate change adaptation describes the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2014).

[2] Climate change mitigation refers to human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs) (IPCC, 2014).

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present dangers of both climate change impacts and living beyond the capacities of Earth's natural support systems (Folke et al., 2021).

The year 2015 saw the adoption of three interconnected international frameworks: the Sendai Framework for Disaster Risk Reduction 2015–2030, the Paris Agreement under the UN Framework Convention on Climate Change (UNFCCC), and the UN's 2030 Agenda and the Sustainable Development Goals (SDGs). Central to these agreements is the idea of sustainable and equitable economic, social and environmental development (UNCCS, 2017). As highlighted by the international research community (OECD, 2020; Challinor et al., 2018; Dzebo et al., 2017; UNCCS, 2017), these global agreements have created an opportunity to build coherence between interrelated policy agendas that have the potential to identify and reduce systematic risks, promote sustainable development and significantly affect the future of humanity. The theoretical perspectives emerging from empirical evidence of this integration call for greater attention in the international literature. This edited volume aims to address this gap by providing a carefully considered exposition and analysis of the practical basis, as well as limitations, of such an integration project, drawing on examples of both existing and potential integration between these three agendas.

The book includes eleven chapters, beginning with an introduction outlining the key themes, aims and objectives. The following chapters are then divided into three sections. Section I provides an overview of potential best practice approaches to framing and connecting the three agendas. Martin Le Tisser and Hester Whyte (2021) provide international best practice examples that identify how approaches to the Sustainable Development Goals, Disaster Risk Reduction and Management and Climate Change Adaptation are juxtaposed. Their chapter considers opportunities to address global challenges and develop resilience within the context of an integrated whole and as part of a development continuum, instead of as independent and isolated phenomena. It also identifies and characterises opportunities for synergies across the different domains with regards to community and sector vulnerability at local, national and international scales, by emphasising the need for integrated reporting across agreements. Dug Cubie and Tommaso Natoli (2021) focus on the role that international law can play in promoting national, regional and international actions to tackle the impacts on humans of climate change and disasters. They outline the increasing complexity and specialisation of different legal regimes that has

resulted in concerns regarding the confusing fragmentation of international law. The authors propose an 'hourglass' model of the legal relationships between the three different international frameworks based on: systemic coherence at the international level; vertical alignment between the international, regional and national levels and horizontal integration of international norms at the domestic level. Shona Paterson and Kristen Guida (2021) examine risk as a dynamic social construction that is reimagined and reinvented by society over time. Their chapter explores how a greater degree of cohesion between the three aforementioned frameworks might be achieved. The authors discuss how meeting the challenges posed by climate change requires strengthening capacities to respond to both extreme and slow-onset hazards, and continued investment in both adaptation and mitigation efforts. Furthermore, they identify how a concerted effort is required to increase alignment with disaster risk reduction efforts in order to make communities more resilient.

Section II provides case studies from the island of Ireland, the country where this book has been edited. Peter Medway et al. (2021) critically assess the integration of climate change adaptation and disaster risk reduction with a special focus on the Irish policy and governance context. Their chapter first presents a comprehensive overview of the Irish policy environment for these agendas' integration. Alignment with global drivers of integration is then considered, along with the special challenges of subsidiarity, across diverse governance levels and sectors. The chapter employs the SHIELD model, which outlines six pathways to enhance integration across the domains of climate change adaptation and disaster risk reduction. Glen Smith (2021) takes a governance perspective with regards to outlining the criticality of local governance networks engaging with a sustainable pathways approach, thereby encouraging broad input into decision points that support the selection of sustainable future trajectories. These pathways are based on an understanding of risk, vulnerability and opportunity. The coastal town of Youghal provides an Irish case study of a small coastal settlement (population: 9000) in which the value of local governance networks is expounded upon. Similarly, Cathy Burns et al. (2021) explore the potential of local government, in this case in Derry in Northern Ireland, to integrate local authority policy drivers such as disaster risk reduction, emergency planning, risk and assurance, and community resilience. Their chapter outlines the adaptation planning journey

within Derry City and Strabane District Council (DCSDC) in Northern Ireland, reflecting on how the prevailing policy context and level of organisational adaptive capacity can create the conditions for mainstreaming climate adaptation into planning and development.

Section III provides international case studies from South Africa (Sowman & Rebelo, 2021), the Caribbean (Jerez Columbié, 2021), Malaysia (Swee Kiong & Garai Abdullah, 2021), and the interregional (Rogers, 2021). Through the lens of small-scale fisheries (SSFs) in South Africa, Merle Sowman and Xavier Rebelo (2021) explore the vulnerability context of coastal fishing communities, including the various factors that shape their capacity to cope with and adapt in the face of poverty, and the increasing threats associated with climate change and natural and human-induced disasters. The chapter by Yairen Jerez Columbié (2021) focuses on South-South Cooperation between Caribbean SIDS on Climate Change Adaptation and Disaster Risk Management, and triangulation with the European Union and international organisations through the African, Caribbean and Pacific-European Union Natural Disaster Risk Reduction Program (ACP-EU NDRR). It critically analyses collaborations between regional platforms to show evidence of successful transferable adaptation strategies and tools that have emerged from disaster risk management experiences. The chapter by Wong Swee Kiong and Regina Garai Abdullah (2021) highlights the vulnerabilities faced by a resource-deprived riverine community in Borneo, Malaysia. In doing so, the chapter studies how a local community coping with economic and climatic stresses and shocks can increase disaster risk reduction capabilities and adapt to climate change. This research raises the question of how communities that are located in disadvantaged regions can adapt and strive to become more resilient. Finally, Adam Rogers (2021) examines the pivotal role of food in realising the ambitions of the global agendas of Climate Change Adaptation, Disaster Risk Reduction and the SDGs. Rogers advocates for a reduction in (mammal) meat consumption and illustrates the value of reduced meat consumption through the lens of seven of the 17 SDGs: Goal 2) Zero Hunger, Goal 3) Good Health and Wellbeing, Goal 6) Clean Water and Sanitation, Goal 12) Responsible Consumption and Production, Goal 13) Climate Action, Goal 14) Life Below Water, and Goal 15) Life on Land.

Lessons Learned

Overall, the edited volume's framing through resilience, legal and risk-based lenses, and the Irish and international case studies, demonstrates a number of parallel frameworks and approaches that help consider the value of, and ability to increase, resilience to climate change through integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation agendas. When considered collectively, these studies have revealed a number of important key lessons.

Individually, these global agendas address diverse challenges to human security and wellbeing, and collectively can contribute to the creation of a coherent framing for climate resilience, provided they are implemented in support of each other (Kelman, 2017). Each of the agendas recognises resilience as an integral feature of its implementation and success, and resilience provides a means of building linkages and coordination to increase their effectiveness, both individually and collectively (Le Tissier & Whyte, 2021). This recognition is leading to the development of tools – that could use shared targets and indicators across the three agendas. In practice, the use of transferable tools can align policies and management processes, thereby avoiding siloed approaches that have previously characterised the domains of climate change adaptation, disaster risk redcution and the Sustainable Development Goals.

'Just as sand flows from and into either half of an hourglass, the sharing of knowledge and expertise in the fields of climate change adaptation, disaster risk reduction and sustainable development flows from the local, to the national, regional and international, and back again' (Cubie & Natoli, 2021). Cubie and Natoli champion effective vertical alignment to ensure that there is bidirectional exchange of legal principles and operational experience, as well as monitoring of the actions taken at each level. Moreover, it is considered to acknowledge and promote the shared logic and consistencies between the Paris Agreement, Sendai Framework and 2030 Agenda for Sustainable Development, as well as any inconsistencies, to achieve such vertical alignment. Any such alignment will be highly challenging to achieve if there is not a coherent body of norms and practices at the international level. Cubie and Natoli also note the importance of regional organisations in supporting this interactive process of vertical alignment, as evident from the coordinated approach undertaken in the Pacific Region.

There is no one-size-fits-all solution to legal and policy integration at the national level. Full integration via the creation of a unitary governmental department or piece of legislation is not necessarily the best option, with each state needing to review its own domestic structures and context. As a simple visual representation of these processes, the hourglass model aims to promote understanding of the legal relationship between sustainable development, climate change adaptation and disaster risk reduction, and break down the regulatory silos which have hampered effective cross-cutting dialogue and action in the past.

Making decisions on whether risks are acceptable and, if necessary, obtaining reliable information on how these risks can be reduced for human and natural systems is fundamental to all three of the Sustainable Development Goals, Climate Change Adaptation and Distaster Risk Reduction frameworks (Paterson & Guida, 2021). Furthermore, identifying cross-cutting risk framings that can be used both as facilitators and benchmarks in the implementation of these agendas can provide avenues for increased cohesion and connectivity. The regional, national and local case studies discussed in this volume provide empirical evidence of the strategies and specific tools used by practitioners, researchers and governments to face the multifaceted challenges posed to the effective integration of these agendas across diverse territories.

Greenhouse gas emissions in the Republic of Ireland are among the highest in Europe (Burck et al., 2019), and the country's climate policy is often highly politically charged, with significant influence coming from strong, market-based lobbies (Devaney et al., 2020). In this context, the objective to integrate actions for climate change adaptation and disaster risk reduction in the Republic of Ireland is clearly articulated in policy, although the practical arrangements for who, what, when and how have been left open (Medway et al., 2021). Institutions are beginning to work with their peers and collaborators at different levels of government to determine the ways forward, overcome long-established silos and share information more effectively. By increasing the ability of systems to reduce, avoid and transfer new and existing risk, the result should be to reduce the impact of unmitigated residual risk. The Irish Government has set out a clear national governance framework for climate change but has perhaps

overlooked the potential of this local governance architecture (Smith, 2021). This architecture is not an obstacle in implementing change, but a potential asset. It could be mobilised (enticed) to deliver a lot more on climate action. It also shouldn't be assumed that towns and villages govern themselves well. Local projects can be ill-conceived. For example, further research might explore the potential for local focus groups to seek 'sustainable pathways' (IPCC, 2014). The sustainable pathways concept encourages broad input into decision points that support the selection of sustainable future trajectories, based on an understanding of risk, vulnerability and opportunity. The ability to communicate risks and solutions has been the most important tool when undertaking adaptation planning, particularly when discussing the process and securing input or support from colleagues (Burns et al., 2021). Moreover, a significant amount of engagement is required with local government agencies to increase understanding of the relevance of climate change and disaster risk reduction. The study of the Irish context provides insight on how embedding disaster risk reduction and climate change adaptation can enable a greater understanding of specific risks to local governments and act as a catalyst for further action. In the same vein, comparing and contrasting Irish policies with those of other territories has proved useful in identifying global challenges and opportunities for knowledge transfer across continents.

Like the Republic of Ireland, South Africa has an emission-intensive economy. Although facing different challenges, South Africa has developed an important suite of policies, strategies and laws to meet commitments for sustainable development and to address and manage climate change challenges and disaster risks. South Africa's economy has been built on an enduring legacy of colonisation, apartheid and a development model based on mining, agriculture and manufacturing (Chandrashekeran et al., 2017). This socio-historical context has shaped extreme levels of social inequality, which is exemplified by the fact that 8 million people lacked access to electricity in 2014 in a country where 40% of the electricity is consumed by the country's energy-intensive industrial users (IEA, 2016). In 1992, as climate change became part of a global agenda, the South African state began to develop specific administrative and knowledge-generation capabilities to address the challenge. South Africa's national policies, however, are not well aligned or implemented in a

coordinated and integrated manner (Sowman & Rebelo, 2021). Nor are they attuned to the realities facing local communities. Work in coastal communities in South Africa reveals the lack of policy alignment and limited coordination across government departments charged with oversight responsibilities for these endeavours. Incorporating local knowledge into local development and sector plans, as well as into sustainable development and sector-specific policies, strategies and plans at the national level, would enhance understanding of the realities on the ground and lead to harmonious policies, strategies and plans that are more likely to be supported and implemented.

By developing resilience in conditions of extreme geographic and economic vulnerability, SIDS have learned to 'share what works' for climate change adaptation and action. This is achieved through trans-local solidarity and a participatory approach, something which is particularly evident in the evolution of environmental management in the Caribbean (UNDP, 2016). Here, regional platforms are playing a key role in the development of strategies and policies, and in the advancement of knowledge and mutual learning at regional, local and international levels (Jerez Columbié, 2021). Within the context of global inequality, where the communities that were expropriated and enslaved are also the most affected by external debt and the most vulnerable to climate change, acknowledging the historical legacies of imperialism and colonialism is a pre-requisite for saving and improving lives. The forms of solidarity exemplified by Caribbean SIDS can contribute to decolonising the Climate Change Adaptation, Disaster Risk Reduction and Sustainable Development Goals agendas by integrating the knowledge that emerges from vulnerable communities whose survival to processes of colonisation and postcolonial reconstruction is already an example of resilience. A decolonised Global North – one that acknowledges the debt it acquired through slavery, colonialism and imperialism – could play an active role in shaping a new sustainable development model through reparations and climate justice (see Fanon, 2004; Jerez Columbié and Morrissey, 2020; Narayan, 2019).

The case study in Sadong Jaya, Sarawak, Malaysia shows how institutions can play a crucial role in assisting the local community to manage and reduce disaster risk (Swee Kiong & Garai Abdullah, 2021). Their study highlights that access to physical, social, human, natural as well as

financial capitals is crucial for reducing disaster risk among vulnerable riverine and coastal communities. In particular, strong social capital is critical for connecting the community with relevant government agencies and enabling them to access the right information and assistance. Physical transport infrastructure (through building roads) can help to prevent greater loss and damages suffered from the adverse effects of climate change, and also increase the accessibility of labour and produce markets for the local community. In turn, this will enable the local community to improve their resilience and socio-economic wellbeing, especially when they are threatened with depleting natural resources.

Finally, Rogers (2021) plots a path to increased global sustainability, underpinning societal resilience through changes in global food consumption choices. Rogers reports that altering diets to reduce mammal meat consumption is an important tool for countries in achieving the targets of the UN Sustainable Development Goals and the Paris Agreement with regards to climate change. Citing the Lancet Commission, he reports that government policies and subsidies will need to be redirected away from harmful agricultural practices and towards ones that are healthier for our bodies, the environment and the planet.

Challenges and Solutions

The chapters in this edited volume highlight a wide range of challenges to integrating the Climate Change Adaptation, Disaster Risk Reduction and Sustainable Development Goals frameworks/agendas, as well as potential solutions to overcome them.

Challenges

- Each framework (the Paris Agreement, 2030 Agenda for Sustainable Development and the Sendai Framework) has its own institutional arrangement that has established a thematic expertise over time. The challenge is how to balance autonomy with integration so as to lead to greater effectiveness in building resilience across societies (Le Tissier & Whyte, 2021).

- Each framework has built up its own independent knowledge base. An additional challenge is how best to establish data management that allows for interrogation across disciplines and topics, as well as resolution, thus leading to more informed policymaking which can build adaptive capacity and greater resilience in response to climate and disaster risk, and enable sustainable development (Le Tissier & Whyte, 2021).
- Each agenda has progressed along largely siloed lines which makes little sense given the short window of opportunity for tackling the interlinked challenges of climate change, ecosystem degradation, inequality rise and other social, economic and political challenges (Le Tissier & Whyte, 2021; Rogers, 2021).
- There are significant challenges associated with the language and terminology used in the Paris Agreement, Sendai Framework, and the 2030 Agenda (Cubie & Natoli, 2021; Paterson & Guida, 2021). There are references to the need for 'integrated approaches', 'policy coherence', 'policy integration' and 'stronger interlinkages', yet these phrases appear to be used interchangeably and lack proper definition.
- The vulnerability of the peoples from postcolonial territories is exacerbated by the social, political, economic and environmental consequences of a long history of colonisation, enslavement, imperialism and extractivism, which has fuelled industrialisation processes in the Global North and, in consequence, global warming (Jerez Columbié, 2021). Taking a climate justice approach to rightfully frame global warming as an ethical and political issue presents an additional challenge in realising the ambitions of the Climate Change Adaptation, Disaster RiskReduction and Sustainable Development Goals agendas.
- The challenge of so-called 'soft law' – a broad range of authoritative but non-binding sources (at both the domestic and international levels) – is clear in the implementation of the three global agendas (Cubie & Natoli, 2021).
- Policies and plans for the three agendas are often developed in an iterative but narrowly focused way, dealing with one issue at a time rather than attempting a holistic and integrated approach (Medway et al., 2021; Sowman & Rebelo, 2021). The result is a series of policies, plans and initiatives that, while individually reasonable, appropriate and

often benchmarked against international good practices, can be siloed and may miss opportunities for integration during implementation.
- There are also challenges in reconciling the differing definitions of criticality across different sectors and systems (Medway et al., 2021). This is the case with mapping the cascade of risks that cross the intersection of different critical infrastructure systems one example being the flood risk that threatens the critical access road for the electricity sub-station, hospital or fibre-optic cable.
- At a local government level, challenges can arise in maintaining support for planning for the three agendas with concerns around responsibilities and buy-in (Burns et al., 2021). The push-back is often associated with limited human and financial resources.

Potential Solutions

- A coherence of approach is needed in order to place the assessment of climate change and disaster risk reduction within a wider context of outcomes for sustainable development, framed by the goals and targets set out by the Sustainable Development Goals. This context recognises that Climate Change Adaptation, Disaster Risk Reduction and the Sustainable Development Goals, as drivers of change, represent a set of aspirational human rights around what constitutes future sustainability (Le Tissier & Whyte, 2021).
- It needs to be recognised that risks increasingly have interdependencies and cascading effects within and across multiple sectors that cannot be addressed through any one of the agreements (Le Tissier & Whyte, 2021; Paterson & Guida, 2021).
- While there is no one-size-fits-all solution to legal and policy integration at the national level, full integration via the creation of a unitary governmental department or piece of legislation is not necessarily the best option, and each state will need to review their own domestic structures and context (Cubie & Natoli, 2021). However, emerging practice is based on the expectation that enhancing integration at the domestic level can reduce duplication and optimise the use of limited resources and the sharing of technical expertise, as well as reflecting and supporting coherence at the international level.

- Meeting the challenges posed by climate change requires not only strengthening capacities to respond to both extreme and slow-onset hazards as and when they occur, and continued investment in both adaptation and mitigation efforts, but also a concerted effort to increase alignment with disaster risk refuction efforts in order to make communities more resilient (Paterson & Guida, 2021; Swee Kiong & Garai Abdullah, 2021). This reality increases the urgency to (i) understand the nature and variability of current and emerging risks, and (ii) increase the capability of assessing climate risks and resiliency opportunities as they evolve.
- Another potential avenue for connectivity includes increased understanding of the root causes of disasters, and how this practice can be reframed by the no-natural disasters movement (Gould et al., 2016; Kelman, 2020; Oliver-Smith, 2002; Paterson & Guida, 2021). Defining a disaster as a social construction that 'does not happen unless people and cities are vulnerable due to marginalisation, discrimination and inequitable access to resources, knowledge and support' (Chmutina et al., 2017) centres both climate change adaptation and disaster risk reduction on matters of equity and social justice as well as long-term time frames with a collective outcome. This frame also recognises that the most effective way of addressing the risks posed by climate change, hazards and disasters is to lessen the underlying factors causing vulnerability (Schipper & Pelling, 2006).
- Regular renewal of the political consensus on the need for long-term investment in the three agendas is needed (Medway et al., 2021). This helps to sustain the commitment to long-term change beyond the typically short-term planning horizons of any government and gives confidence to planners, implementers, the public and other critical stakeholders in transitioning to a low-carbon and highly adapted economy. The consensus should set out the reciprocal responsibilities of the state and its citizens, detailing when, how and where the state will step in to deal with the consequences of climate change, and when individuals and communities must take responsibility. Long-term financing solutions can then be developed based upon the agreed responsibilities.

- The 'sustainable pathways' concept encourages broad input into decision points that support the selection of sustainable future trajectories, based on an understanding of risk, vulnerability and opportunity (Smith, 2021). The process could be overseen by local 'climate action officers' who would be employed to work full time on mitigation and adaptation solutions.
- Under the banner of 'increasing resilience' there is potential to embed the three agendas across local government functions (Burns et al., 2021). For example, in the Northern Irish case study, the district council has committed to embedding climate adaptation within the heritage and culture functions of the organisation, by identifying and addressing the impacts, risks and opportunities of climate change for local heritage assets, collections, cultural programmes, festivals and events.
- Local communities working in partnership with NGOs and other social partners can contribute considerable knowledge and experience, as they are experiencing the effects of climate change and disasters first-hand, and have practical proposals for dealing with and adapting to climate change and promoting sustainable livelihoods (Smith, 2021; Sowman & Rebelo, 2021). Although their experience and knowledge are based on their local environmental context, the ideas generated at this level are likely to produce proposals for local socio-economic development, climate adaptation and disaster risk reduction that are locally appropriate and supported. Incorporating this local knowledge into local development and sector plans, as well as sustainable development and sector-specific policies, strategies and plans at the national level, has the potential to enhance understanding of the realities on the ground and lead to policies, strategies and plans that are more harmonious and therefore likely to be supported and implemented.
- Transdisciplinary and decolonising approaches to the three agendas offer opportunities for addressing climate justice challenges through the integration of the knowledge of early adaptors in the Global South. This will result in research and action for more coherent, inclusive and effective theory, policy and praxis responses to environmental challenges (Jerez Columbié, 2021).

- Social capital can play an important role in increasing community resilience (Swee Kiong & Garai Abdullah, 2021; Rogers, 2021). Supportive human and physical infrastructure can increase educational and employment opportunities as well as access to markets, and facilitate coordination and communication with government agencies.

This edited volume presents a rich array of practical lessons and frameworks for engaged research that consider the integration of the agendas of Climate Change Adaptation, Disaster Risk Reduction and the Sustainable Development Goals. What is striking in all the chapters is the complexity of how to take meaningful action to address what are truly global challenges (with cascading transboundary impacts), largely experienced at a national to local level. However, the findings also indicate the significant potential of integration as a means of breaking out of disciplinary silos, sharing and expanding on existing synergies between agendas, and moving towards more holistic approaches of recognising and addressing the complexities of socio-ecological systems. In doing so, vulnerabilities can be reduced and resilience enhanced. As highlighted by most chapter authors, subsidiarity and community participation efforts should be considered key factors in striving towards increased resilience. Moreover, the pivotal role of values, ethics and climate justice in creating a vision of societal resilience is also evident.

References

Burck, J., Hagen, U., Marten, F., Höhne, N., & Bals, C. (2019). *The Climate Change Performance Index 2019*. Germanwatch. Available at: https://germanwatch.org/en/16073. Accessed 9 May 2021.

Burns, C., Flood, S., & O'Dwyer, B. (2021). Mainstreaming Climate Change Adaptation into Planning and Development: A Case Study Example from Northern Ireland. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Challinor, A. J., Adger, W. N., Benton, T. G., Conway, D., Joshi, M., & Frame, D. (2018). Transmission of Climate Risks Across Sectors and Borders.

Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 376, 2121. https://doi.org/10.1098/rsta.2017.0301

Chandrashekeran, S., Morgan, B., Coetzee, K., & Christoff, P. (2017). Rethinking the Green State Beyond the Global North: A South African Climate Change Case Study. *WIREs Climate Change, 8*(6), e473. https://doi.org/10.1002/wcc.473

Chmutina, K., von Meding, J., Gaillard, J. C., & Bosher, L. (2017). Why Natural Disasters Aren't All That Natural. Available at: https://www.opendemocracy.net/ksenia-chmutina-jason-von-meding-jc-gaillard-lee-bosher/why-natural-disasters-arent-all-that-natural. Accessed 13 Aug 2020.

Cubie, D., & Natoli, T. (2021). Coherence, Alignment and Integration: Understanding the Legal Relationship Between Sustainable Development, Climate Change Adaptation and Disaster Risk Reduction. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Devaney, L., Torney, D., Brereton, P., & Coleman, M. (2020). Ireland's Citizens' Assembly on Climate Change: Lessons for Deliberative Public Engagement and Communication. *Environmental Communication, 14*(2), 141–146. https://doi.org/10.1080/17524032.2019.1708429

Dzebo, A., Brandi, C., Janetschek, H., Savvidou, G., Adams, K., Chan, S., … SEI. (2017). Exploring Connections Between the Paris Agreement and the 2030 Agenda for Sustainable Development. Available at: http://unfccc.int/focus/ndc_registry/items/9433.php. Accessed 9 May 2021.

Fanon, F. (2004/1961). *The Wretched of the Earth*. Grove Press.

Folke, C., Polasky, S., Rockström, J., Galaz, V., Westley, F., Lamont, M., Scheffer, M., Österblom, H., Carperter, S. R., Chapin, F. S., Seto, K. C., Weber, E. U., Crona, B. I., Daily, G. C., Dasgupta, P., Gaffney, O., Gordon, L. J., Hoff, H., Levin, S. A., … Walker, B. H. (2021). Our Future in the Anthropocene Biosphere. *Ambio, 50*, 834–869. https://doi.org/10.1007/s13280-021-01544-8

Gould, K. A., Garcia, M. M., & Remes, J. A. C. (2016). Beyond "Natural-Disasters-Are-Not-Natural": The Work of State and Nature After the 2010 Earthquake in Chile. *Journal of Political Ecology, 23*, 93–114.

Intergovernmental Panel on Climate Change (IPCC). (2014). *Climate Change 2014: Impacts, Adaptations and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC.

Intergovernmental Panel on Climate Change (IPCC). (2019). Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems [P. R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)].

International Energy Agency (IEA). (2016). *World Energy Outlook*. IEA Publications.

Jerez Columbié, Y. (2021). Adapting to Climate Change Through Disaster Risk Reduction in the Caribbean: Lessons from the Global South in Tackling the Sustainable Development Goals. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Jerez Columbié, Y., & Morrissey, J. (2020). Subaltern Learning: Climate Resilience and Human Security in the Caribbean. *Territory, Politics, Governance*.

Kelman, I. (2017). Linking Disaster Risk Reduction, Climate Change, and the Sustainable Development Goals. *Disaster Prevention and Management, 26*(3), 254–258. https://doi.org/10.1108/DPM-02-2017-0043

Kelman, I. (2020). *Disaster by Choice: How Our Actions Turn Natural Hazards into Catastrophes*. Oxford University Press.

Le Tissier, M., & Whyte, H. (2021). Why Making Connections Through Resilience Indicators Matters? In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Martin, K., & Mullen, Z. (2021). Building Forward Better. *The Lancet: Global Health*. https://doi.org/10.1016/S2214-109X(21)00106-6

Medway, P., Flood, S., Cubie, D., & Le Tissier, M. (2021). Enhancing Integration of Disaster Risk and Climate Change Adaptation into Irish Emergency Planning. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Narayan, J. (2019). Fanon's Decolonized Europe: The Double Promise of Coloured Cosmopolitanism in the Age of Austerity. In *European Cosmopolitanism: Colonial Histories and Postcolonial Societies*. Routledge.

OECD. (2020). *Common Ground Between the Paris Agreement and the Sendai Framework: Climate Change Adaptation and Disaster Risk Reduction*. OECD Publishing.

Oliver-Smith, A. (2002). Theorizing Disasters: Nature, Power, and Culture. In S. Hoffman & A. Oliver-Smith (Eds.), *Catastrophe and Culture: The Anthropology of Disaster* (pp. 23–47). School of American Research Press.

Paterson, S., & Guida, K. (2021). Bridging Gaps: Connecting Climate Change Risk Assessments with Disaster Risk Reduction and Climate Change Adaptation Agendas. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Rogers, A. (2021). Reimagining Our Menu for Sustainable Development. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Schipper, L., & Pelling, M. (2006). Disaster Risk, Climate Change and International Development: Scope for, and Challenges to, Integration. *Disasters, 30*, 19–38. https://doi.org/10.1111/j.1467-9523.2006.00304.x

Singh, J., & Singh, J. (2020). COVID-19 and Its Impact on Society. *Electronic Research Journal of Social Sciences and Humanities, 2*(I). Available at SSRN: https://ssrn.com/abstract=3567837

Smith, G. (2021). Supporting National Climate Change Action in Ireland Through Local Governance Networks. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Sowman, M., & Rebelo, X. (2021). Sustainability, Disaster Risk Reduction and Climate Change Adaptation: Building from the Bottom Up – A South African Perspective from the Small-Scale Fisheries Sector. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Stern, N. (2006). *Stern Review on the Economics of Climate Change*. HM Treasury.
Swee Kiong, W., & Garai Abdullah, R. (2021). Towards a Resilient Riverine Community: A Case Study in Sadong Jaya, Sarawak, Malaysia. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.
United Nations Climate Change Secretariat (UNCCS). (2017). Opportunities and Options for Integrating Climate Change Adaptation with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015–2030. Technical Paper. Available at: https://unfccc.int/sites/default/files/resource/techpaper_adaptation.pdf. Accessed 28 Apr 2021.
United Nations Development Programme (UNDP). (2016). *Sharing What Works: South-South Cooperation for Disaster Risk Reduction in the Caribbean*. UNDP.
World Economic Forum (WEF) (2021) *The Global Risks Report 2021* (16th ed.). ISBN: 978-2-940631-24-7. http://wef.ch/risks2021

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Section I

Best Practice Approaches

2

Why Does Making Connections Through Resilience Indicators Matter?

Martin Le Tissier and Hester Whyte

Introduction

The year 2015 signalled a rare yet significant development in evolving global responses to global challenges, resulting in the adoption of a series of UN agreements, including the Sendai Framework for Disaster Risk Reduction (SFDRR), the 2030 Agenda and its Sustainable Development Goals (SDGs) and the Paris Agreement (Murray et al., 2017; UN, 2015; UNFCCC, 2015; UNISDR, 2015b). All three agreements were, in part, evolutions from previous instruments and signalled recognition that responses to change needed to alter from a reactive and reduction focus

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to one that builds resilience before, during and after change (Tozier de la Poterie & Baudoin, 2015). Research over the past decades has identified global challenges arising from mankind's development pathways that are increasingly impacting and superseding earth's natural systems, and are unsustainable (ICSU & ISSC, 2010; Mizutori, 2019). As a result, countries are faced with the growing challenge of managing increasing risks from climate change and climate variability, addressing increasing frequency and intensity of extreme events, and achieving the Sustainable Development Goals (Handmer et al., 2019; OECD, 2020).

The three agreements differ in structure, legal context and implementation mechanisms but share a common timeline running to 2030, as well as many parallels, particularly in the sense of their overall objectives (Dazé et al., 2018; Kelman, 2017a; UNFCCC, 2017). None of the frameworks engage with the full range of risk drivers of global environmental change, yet their interconnectedness provides an urgent basis for coherent implementation in keeping with the expectations and aspirations of modern world societies (Handmer et al., 2019; Ochs et al., 2020; OECD, 2020; UNISDR, 2015a; Paterson & Guida, this volume). The 2030 Agenda and the SDGs outline targets for a holistic plan of action for people, planet, prosperity, peace and partnerships to which the Paris Agreement and Sendai Framework pose specific drivers of change, as well as pressures that challenge the future achievement of these goals. However, even though they address pressures that are at variance with each other in time and space, ultimately, all of these agendas are about protecting the future of humanity on our planet, building resilience for individuals and communities at all scales and localities, and proactively mitigating their risk (Benzie et al., 2018; Challinor et al., 2018; Murphy, 2019; Murray et al., 2017).

A coherent response to and implementation of the three agendas are necessary because, for instance, extreme events are a fact of life in many areas of the world, but their frequency and magnitude can be increased by climate change, as can unsustainable practices that are the focus of the Sustainable Development Goals, thus acting as risk multipliers and altering the vulnerability and exposure profile of societies. Although it was recognised from the onset that these frameworks crossed existing policy areas and institutional arrangements (Dazé et al., 2018), coherence in their implementation has largely not materialised because of:

- Institutional arrangements—there are a wide range of organisations responsible for managing hazard exposures and reducing vulnerability that often miss potential synergies and duplicate efforts (OECD, 2020).
- Scales and spheres of concern—while the Paris Agreement addresses a largely global driver (climate change) that requires action starting from a national context, the Sendai Framework addresses more local impacts originating from short-term, high-magnitude, man-made disasters and natural hazards that usually originate from elsewhere. The Sustainable Development Goals are more outcome-focused on protecting the planet and the peace and prosperity of mankind whatever the source of disturbance, man-made or natural (PLACARD, 2019; UNDP et al., 2013; UNISDR, 2015a).

The danger of not realising synergies and coherence across the three frameworks is to risk systemic and cascading impacts that will have a long-lasting negative effect on the livelihoods and wellbeing of people, economies and countries, undermining sustainable development. Although international opinion has emphasised incorporating both climate change action and disaster risk reduction needs into development mechanisms, in practice, national-to-local implementation has remained largely sectoral and topic-focused. Building coherence across the three frameworks needs to overcome a range of challenges, as outlined below:

- As each framework has its own institutional arrangement that has established a thematic expertise over time, the question is how to balance autonomy with integration that could lead to greater effectiveness in building resilience across societies.
- Moreover, as each framework has built up its own independent knowledge base, challenges surround how to establish data management that allows for interrogation across disciplines and topics, as well as resolution for more informed policymaking, thereby building adaptive capacity for greater resilience across climate and disaster risk and enabling sustainable development.

Overcoming these challenges requires a coherence of approache that will build partnerships and place the assessment of climate change

and disaster risk reduction within a wider context of outcomes for sustainable development, framed by the goals and targets set out by the Sustainable Development Goals. This context recognises that the Sustainable Development Goals, climate change adaptation and disaster risk reduction as drivers of change represent a set of aspirational human rights around societal choices for what constitutes future sustainability. Coherence provides an opportunity to merge technical information that assesses risk from changes identified under each agenda with strategic and operational approaches to climate change adaptation and disaster risk reduction in sustainable development. This can be done horizontally across sectors, vertically at different levels of government, and, generally, through collaboration across stakeholder groups (Handmer et al., 2019; Murphy, 2019; OECD, 2020).

Such an approach recognises that exposure to risks increasingly has interdependencies and cascading effects within and across multiple sectors that cannot be addressed through any one of the agreements (GIZ, 2017; Kelman, 2017a). How this might be achieved is a sensitive issue because each agenda has its own procedural and technical requirements, especially in the context of measuring and reporting progress. Coherence should not be seen as a replacement for some areas of monitoring under each agenda but, rather, an opportunity for monitoring, reporting, verifying and evaluating their implementation across agendas for holistic, evidence-based, political decision-making (Murphy, 2019; Ochs et al., 2020; OECD, 2020).

Resilience as an Integrating Concept

None of the agendas address the full spectrum of challenges that global changes present and, to a degree, each agenda has a focus on describing the elements that constitute risk through a particular lens, using different time frames, scales, sectors and hazards (Paterson & Guida, this volume). A way to take a unifying approach across the three agendas is through a focus that centres on outcomes, and moves from describing risk to describing resilience to risk, whatever its source; resilience is a concept common to all three agreements and is seen increasingly in other agreements and

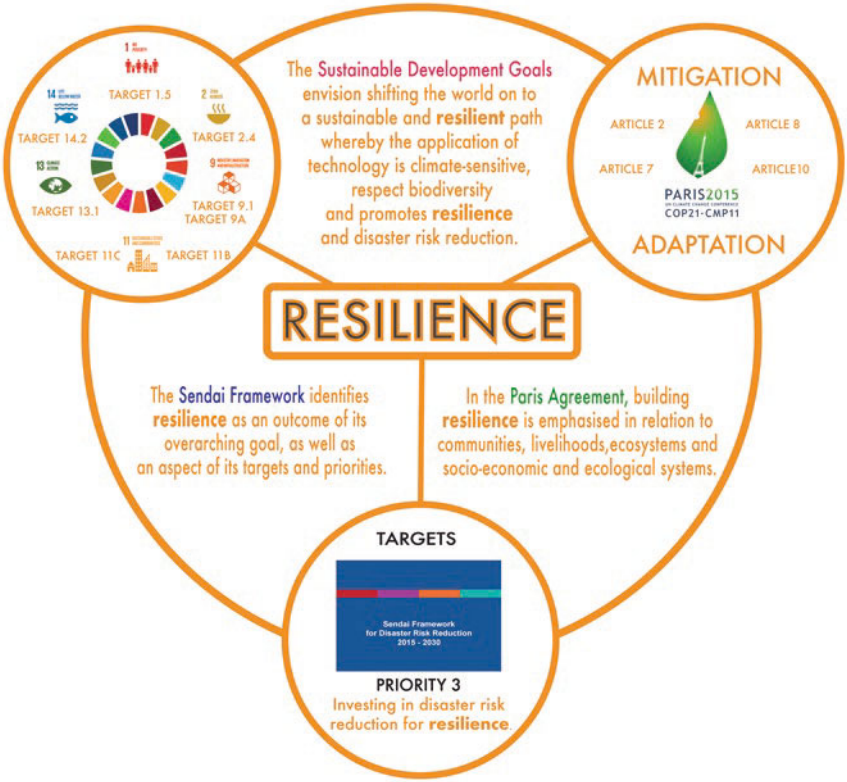


Fig. 2.1 While each agenda has its own set of objectives and aligned indicators, the sustainability of each depends on the successful implementation of the others. Otherwise, this could potentially lead to conflictory and contradictory outcomes. The application of a resilience lens provides a means of connecting all three agendas that have measures relating to resilient development. (Source: Adapted from Peters et al. (2016), Alcántara-ayala et al. (2017), OECD (2020). Image: Hester Whyte)

national strategies (Handmer et al., 2019). Resilience recognises societies' choices to address constituent elements that increase their exposure and vulnerability to change over short- and long-term horizons (Fig. 2.1), and provides a conceptual approach that engages with the full spectrum of shocks, stresses, disturbances and risk drivers to better reflect the range of risks that might affect a system (Carr, 2019; Lovell et al., 2016; Peters et al., 2016). Taken together, under the construct of the Sustainable

Development Goals, the different approaches of climate change and frameworks make for a more complete 'resilience agenda' that spans the development, humanitarian, climate and disaster risk reduction arenas (Dovers & Handmer, 1992; Handmer et al., 2019; Opitz-stapleton et al., 2019; UNFCCC, 2017; UNISDR, 2017a). Alignment across the three Agendas provides the opportunity to realise development that is resilient not only to current but to future risk.

'Measuring' Resilience

Synergies in monitoring and reporting provide opportunities for coherence through the interconnections between addressing climate change and disaster risk reduction, and achieving sustainable development (GIZ, 2017; UNFCCC, 2017). However, exploiting synergies is not without its own challenges:

- The Paris Agreement, although not without global ambition, is primarily implemented at national scales and focusses on one driver of change, whereas the Sustainable Development Goals and Sendai Framework include other drivers of change and scales leading to different monitoring and reporting requirements (Table 2.1).
- Although there are synergies between indicators for the Sustainable Development Goals and Sendai Framework, and the Sustainable Development Goals have one goal specifically addressing climate change, this intersection is absent between the Sendai Framework and the Paris Agreement, even though climate change will have significant impacts on the frequency and intensity of some disaster events.

In practical terms, this means that reporting under one framework cannot be assumed to cover the requirements of the other two frameworks, further supporting the notion that, while reporting requirements under all three agendas focus on input and output metrics, a focus on outcome metrics that address mankind's resilience to change offers opportunity for coherence across the frameworks.

Table 2.1 Comparison of the monitoring frameworks of the three agreements

	2030 Agenda for Sustainable Development and its SDGs	Sendai Framework for Disaster Risk Reduction	Paris Agreement
Objective of the agreement	To contribute to the achievement of sustainable development and serve as a driver for implementation and mainstreaming	To substantially reduce disaster risk and losses in lives, livelihoods and health, and in economic, physical, social, cultural and environmental assets	To achieve agreement on the global response to climate change, adaptation, mitigation and finance, and climate-resilient development
Quantitative goals or targets at global level	17 global goals with several targets each. Countries may define additional national targets	7 global targets. Countries may define additional national targets	Mitigation (below 2°C and pursuing efforts to 1.5°C). The global goal on adaptation is qualitative. Countries define their own targets (NDCs)
Purpose of monitoring	To measure global progress towards achievement of the SDG goals and targets	To measure global progress in implementation of the 7 Sendai targets	To conduct a global stocktake, i.e. 'assess the collective progress towards achieving the purpose of the Agreement.'

Source: Adapted from GIZ (2017), OECD (2020)

All three agendas include aspects that track across the other agendas (Fig. 2.1) with indicators to monitor progress towards defined targets at regional, national and local levels that address elements of 'resilience', and which encourage a shift from input and output indicators to outcome-based indicators (Adaptation Committee, 2018; UNDP, 2019; UNECE, 2020). Resilience as a core theme that unifies concepts across

all three agendas provides an opportunity to develop solutions that address global challenges in the short to longer term, on local and international scales, and balances environmental, social and economic considerations. Achieving such coherency across agendas requires inconsistencies and contradictions to be identified between them, as well as synergies, and this, in turn, requires targets and indicators that measure progress and contribute to multiple outcomes (UNFCCC, 2017).

In practice, each agenda has progressed along largely siloed lines which makes little sense given the short window of opportunity for tackling the interlinked challenges of climate change, ecosystem degradation, inequality and other social, economic and political challenges (GIZ, 2018), thereby missing opportunities for coherence building. Studies that have compared and contrasted indicators between the agendas have tended to focus on how indicators from one agenda can contribute to achieving targets from other agendas (e.g. Adaptation Committee, 2018). This has led to calls for greater development of metrics that allow for alignment of indicators across the three agendas (UNISDR, 2017a), requiring collaboration to collect relevant data and information, and shared national indicators (Adaptation Committee, 2018; Peters et al., 2016). Using the concept of resilience as a unifying characteristic provides an opportunity to fulfil technical objectives under each agenda whilst developing coherence in outcomes that contribute to sustainable development through country commitments under each agenda. Strategies for achieving the SDGs, Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs) and National DRR strategies.

Bhamra (2015) proposes a set of economic, social, environmental and governance indicators for resilience, but these are not directly aligned to the architecture of the three agendas. Peters et al. (2016) have recognised that there is variance in the way that resilience is addressed in each agenda (Table 2.2). ODI (2016) and Schipper and Langston (2015) have assessed resilience in the context of resilient development and recommended exactly how each of the goals, targets and indicators across the agendas relates to one another and how they should be mapped, including points of coalescence and difference.

Table 2.2 'Resilience' within the targets and priorities of the SDG, Paris and Sendai agendas

Sustainable Development Goals	Resilience is not defined but is explicitly included in 2 goals and 8 targets with the objective to reduce exposure to risk and vulnerability. Resilience is linked to a range of sectors and objectives, including reducing the impact of disasters on the poor and those in vulnerable situations (Target 1.5), increasing food security (Target 2.4) and protecting marine ecosystems (Target 14.2), as well as combatting climate-related hazards and natural disasters (Target 13.1)
Paris Agreement	Resilience is not defined, but is referred to as part of adaptation, and is linked with DRR to reduce vulnerability to climate change. Building resilience is emphasised in relation to communities, livelihoods, ecosystems and socioeconomic and ecological systems
Sendai Framework	Resilience is explicitly defined as 'the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions', and is included in one of the seven global targets and one of the four priorities of action, as well as being firmly incorporated within the actions required at all levels

Source: Adapted from Peters et al. (2016)

Developing Synergies Among Indicators

To date, synergies across the three agendas in the context of resilience have identified resilience-related indicators from one agenda that can be aligned with those in the other two agendas (Alcántara-ayala et al., 2017; Peters et al., 2016), but there is no common indicator set based on indicators shared across all three agendas. However, opportunities that connect the Sustainable Development Goals with the Sendai Framework (Fig. 2.2) and/or the Paris Agreement (Table 2.3) could lead to outcomes addressing the complex and interconnected social, economic and environmental elements that challenge resilience to societal and planetary risks (Lenton, 2020; Rockström et al., 2009).

All three agendas include common ground that contributes towards building the resilience of people, economies and natural resources. Disaster



Fig. 2.2 Correlation between Sendai Framework global targets and SDG global targets through common indicators. (Source: Adapted from: https://www.preventionweb.net/sendai-framework/sendai-framework-monitor/common-indicators)

risk reduction cuts across different aspects and sectors of development. There are 25 targets related to disaster risk reduction in 10 of the 17 Sustainable Development Goals, firmly establishing the role of disaster risk reduction as a core development strategy with connections to resilience (PreventionWeb, 2019; UNISDR, 2015a). Equally synergies exist between climate action and the SDGs for resilience (UNDESA, 2019). For example, energy transitions envisaged in SDG 7, sustainable industrialisation under SDG 9, sustainable food production systems and resilient agricultural practices under SDG 2, and changing patterns of consumption and production in line with SDG 12 can all contribute towards resilience. However, in the case of climate adaptation, synergies with other agendas have tended to be oriented towards specific sectors.

Literature has emphasised the potential benefits of synergies in developing Monitoring and Evaluation frameworks in order to enhance societal and environmental resilience to change. Perhaps because of the stronger institutional structures addressing climate change, coordinated through the UNFCCC processes, many of these have been undertaken

Table 2.3 Examples of correlation between the SDGs and National Adaption Planning as a component of the Paris Agreement

Goal	Target	NAP
	1.b To create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, and to support accelerated investment in poverty eradication actions	To create policy frameworks to support investments for CCA and resilience
	2.4 By 2030, to ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, and that help maintain ecosystems, strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and progressively improve land and soil quality	To mainstream CCA in agriculture and prioritise agriculture adaptation options in development to increase food security
	3.d To strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks	To get a better understanding of the health impacts of climate change and the building capacities required to address these risks through NAP

Table 2.3 (continued)

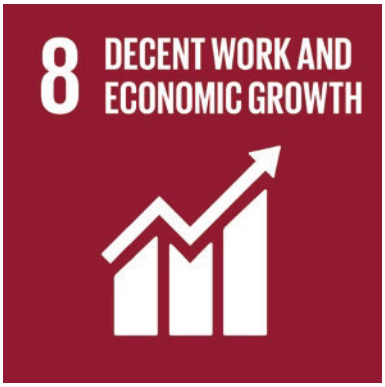
Goal	Target	NAP
	4.7 By 2030, to ensure that all learners acquire the knowledge and skills needed to promote sustainable development	To engage primary, secondary and higher education institutions in building capacities on CCA
	5.c To adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels	To promote gender-responsive and gender-transformative policies with regard to CCA
	8.3 To promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation	To promote innovation and engagement of the private sector in CCA planning

Table 2.3 (continued)

Goal	Target	NAP
	16.6 To develop effective, accountable and transparent institutions at all levels	To strengthen institutional capacity for CCA coordination including M&E and stakeholder inclusion

Source: Adapted from Dzebo et al. (2019), Murphy (2019) and Module 1: Global policy context for climate change adaptation accessed on 12 April, 2021 from https://www.adaptation-undp.org/sites/default/files/uploaded-images/module_1_global_policy_context_for_me_of_adaptation.pdf

under the umbrella of climate change adaptation (Dzebo et al., 2017; GIZ, 2017; OECD, 2020; UNFCCC, 2017). In this context, resilience complements adaptation, in the sense that it invokes processes that secure flexibility in societal response, not only to current changes, but also to future changes, and as a way to embed these terms in wider notions of interconnected social, economic and environmental development expectations/aspirations (see Nelson, 2011; Osbahr, 2007; UNEP, 2017; Vasseur & Jones, 2015). Whereas the Sustainable Development Goals and the Sendai Framework have indicator sets, the Paris Agreement does not. Measuring resilience is conceptually difficult as it is relative to the nature of the shock and the desired societal outcome (Levine, 2014; Nelson, 2011). However, a review of literature reveals a set of indicators from the Sustainable Development Goals and Sendai Framework that link adaptation to change and address vulnerabilities in order to strengthen resilience (Table 2.4), thus leading to outcomes that demonstrate capacity to adapt to stresses and changes, and to transform to more sustainable futures.

Table 2.4 Indicators relevant to adaptation and resilience included in the SDGs and/or SFDRR

Nr.	Indicators relevant for resilience	Covered in SDG	Covered in SFDRR
1.	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	1.5.1 11.5.1 13.1.1	A-1
2.	Number of directly affected people attributed to disasters per 100,000 population (including population injured or ill, whose dwelling is damaged or destroyed, and whose livelihood is disrupted or destroyed)		B-1
3.	Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services attributed to disasters	11.5.2	
4.	Damage to critical infrastructure attributed to disasters (including health and educational facilities damaged or destroyed, and critical infrastructure units and facilities)		D-1
5.	Direct economic loss attributed to disasters in relation to global GDP (including losses in agriculture, housing, productive assets and critical infrastructure, and cultural heritage damaged or destroyed)		C-1
6.	Direct economic loss attributed to disasters in relation to GDP	1.5.2	
7.	Number of disruptions to basic services attributed to disasters (including educational, health and other basic services)		D-5
8.	Number of countries that adopt and implement national DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030	13.1.2	E-1
9.	Proportion of local governments that adopt and implement local DRR strategies in line with national DRR	13.1.3	
10.	Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)	13.2.1	

(*continued*)

Table 2.4 (continued)

Nr.	Indicators relevant for resilience	Covered in SDG	Covered in SFDRR
11.	Total official international support (official development assistance (ODA) plus other official flows) for national DRR actions		F-1
12.	Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation, technology transfer and development actions	13.3.2	
13.	Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula	13.3.1	
14.	Number of countries that have multi-hazard early warning systems		G-1
15.	Proportion of agricultural area under productive and sustainable agriculture	2.4.1	
16.	Change in water-use efficiency over time	6.4.1	
17.	Degree of integrated water resources management implementation (0–100)	6.5.1	
18.	Red List Index	15.5.1	
19.	Percentage of cities implementing risk reduction and resilience strategies aligned with accepted international frameworks (such as the Sendai Framework)	11.b.1	
20.	Proportion of government recurrent and capital spending on sectors that offer fewer benefits to women, the poor and vulnerable groups	1.b.1	
21.	International Health Regulations (IHR) capacity and health emergency preparedness	3.d.1	
22.	Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment	4.7.1	
23.	Primary government expenditures (as a proportion of original approved budget) by sector (or by budget codes or similar)	16.6.1	
24.	Number of countries with mechanisms in place to enhance policy coherence of sustainable development	17.14.1	

Source: Adapted from Makinen et al. (2018), OECD (2020), UNEP (2017), UNISDR (2015a, 2017a)

Tools for Revealing Links Across Agendas

In order for resilience to be an integrating measure across all three agendas, reflecting the goals and objectives of each of them individually, as well as collectively, tools are required to enable the analysis needed to support and realise the conceptual evaluation that has been described here. To date, tools have been developed that provide a degree of analysis and evaluation across pairs of agendas. For instance, the Sendai Monitor Framework tracks implementation of the Sendai Framework targets with related SDG Goals and Targets (see https://sdg.iisd.org/news/unisdr-launches-online-tool-to-track-progress-on-achieving-sendai-framework-sdgs/ and UNISDR (2017b); Poljanšek et al. (2019)); and both the SCAN tool (Gonzales-Zuñiga, 2018) and the NDC-SDG Connections tool (Dzebo et al., 2019) identify links between climate mitigation actions and the Sustainable Development Goals. There are currently no specific tools that identify links between climate change adaptation and the Sustainable Development Goals. The majority of the tools available visualise connections between agendas based on academic and grey literature, and do not afford a facility for an interactive and iterative interrogation of the linkages that allow practitioners to explore 'what-if' questions around how actions and/or changes in policy/management decisions in one agenda might affect another agenda. Interlinkages across the Sustainable Development Goals and their targets have been recognised (ICSU, 2017; Le Blanc, 2015; Miola et al., 2019) and recently, tools have been developed that allow for interactive engagement between stakeholders in order to ask 'what-if' questions on how progress in one area of development affects other areas (Weitz et al., 2018). This approach has been further developed to include additional elements other than the Sustainable Development Goals in the analysis, such as specific policy instruments (Le Tissier et al., 2020). This tool, for instance, (https://knowsdgs.jrc.ec.europa.eu/enablingsdgs) could be used to explore how the resilience elements within the three agendas connect and interlink with each other.

Conclusion

The adoption of the UN agreements of the Sendai Framework for Disaster Risk Reduction, the 2030 Agenda for Sustainable Development and its SDGs, and the Paris Agreement created an opportunity to build coherence between overlapping policy agendas that significantly affect the future of humanity. Although each addresses aspects for the future security and wellbeing of humanity – mankind's ability to adapt to shocks that will materialise over varying scales in time and space – together, they provide a framing for resilience to risk, provided they can be implemented in support of each other (Kelman, 2017b). Each agenda recognises resilience as an integral feature for its implementation and success, and provides a means of building linkages and coordination to increase their effectiveness individually and collectively. This recognition is leading to the development of tools that could use shared targets and indicators across the three agendas and allow for alignment of policy and management processes in practice, thereby avoiding siloed approaches that have previously characterised the domains of climate change, disaster risk reduction and sustainable development.

References

Adaptation Committee. (2018). Expert Meeting on National Adaptation Goals/Indicators and Their Relationship with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction. Available at: https://unfccc.int/node/180267. Accessed 7 Sep 2021.

Alcántara-ayala, I., Murray, V., Daniels, P., & Mcbean, G. (2017). Advancing Culture of Living with Landslides. *Advancing Culture of Living with Landslides*. https://doi.org/10.1007/978-3-319-59469-9

Benzie, M., Adams, K. M., Roberts, E., Magnan, A. K., Persson, Å., Nadin, R., … Kirbyshire, A. (2018). Meeting the Global Challenge of Adaptation by Addressing Transboundary Climate Risk. *SEI Briefs* (April), 1–10. Available at: https://www.sei.org/publications/transboundary-climate-risk/. Accessed 9 May 2021.

Bhamra, A. S. (2015). *Resilience Framework for Measuring Development*. 1–4.

Carr, E. R. (2019). Properties and Projects: Reconciling Resilience and Transformation for Adaptation and Development. *World Development, 122*, 70–84. https://doi.org/10.1016/j.worlddev.2019.05.011

Challinor, A. J., Adger, W. N., Benton, T. G., Conway, D., Joshi, M., & Frame, D. (2018). Transmission of Climate Risks Across Sectors and Borders. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 376*(2121). https://doi.org/10.1098/rsta.2017.0301

Dazé, A., Terton, A., & Maass, M. (2018). *Alignment to Advance Climate-Resilient Development*. Retrieved from NAP Global Network website: http://napglobalnetwork.org/themes/ndc-nap-linkages/. Accessed 9 May 2021.

Dovers, S. R., & Handmer, J. W. (1992). Uncertainty, Sustainability and Change. *Global Environmental Change, 2*(4), 262–276. https://doi.org/10.1016/0959-3780(92)90044-8

Dzebo, A., Brandi, C., Janetschek, H., Savvidou, G., Adams, K., Chan, S., … SEI. (2017). *Exploring Connections Between the Paris Agreement and the 2030 Agenda for Sustainable Development*. Retrieved from Stockholm Environment Institute website: http://unfccc.int/focus/ndc_registry/items/9433.php. Accessed 9 May 2021.

Dzebo, A., Janetschek, H., Brandi, C., & Iacobuta, G. (2019). *Connections Between the Paris Agreement and the 2030 Agenda*. Stockholm Environment Institute.

GIZ. (2017). *Climate Change Policy Brief: Synergies in Monitoring the Implementation of the Paris Agreement, the SDGs and the Sendai Framework*. Available at: http://www.adaptationcommunity.net/wp-content/uploads/2017/11/giz2017-en-cc-policy-brief-synergies-PA_SDG_SF.pdf. Accessed 9 May 2021.

GIZ. (2018). *Connecting the Dots: Elements for a Joined-Up Implementation of the 2030 Agenda and Paris Agreement*. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Gonzales-Zuñiga, S. (2018). *SCAN-Tool for Linking Climate Action and the SDGs the SDG Climate Action Nexus (SCAN) Tool: Mitigation Actions*. NewClimate Institute.

Handmer, J., Stevance, A.-S., Rickards, L., & Nalau, J. (2019). *Policy Brief: Achieving Risk Reduction Across Sendai, Paris and the SDGs*. International Science Council.

ICSU. (2017). *A Guide to SDG Interactions: From Science to Implementation*. https://doi.org/10.24948/2017.01

ICSU & ISSC. (2010). *Earth System Science for Global Sustainability. The Grand Challenges*. International Council for Science (ICSU).

Kelman, I. (2017a). *Linking Disaster Risk Reduction, Climate Change, and the Sustainable Development Goals*. https://doi.org/10.1145/3132847.3132886

Kelman, I. (2017b). Linking Disaster Risk Reduction, Climate Change, and the Sustainable Development Goals. *Disaster Prevention and Management, 26*(3), 254–258. https://doi.org/10.1108/DPM-02-2017-0043

Le Blanc, D. (2015). Towards Integration at Last? The Sustainable Development Goals as a Network of Targets. *Sustainable Development, 23*(3), 176–187. https://doi.org/10.1002/sd.1582

Le Tissier, M., Whyte, H., & Stevance, A. (2020). Identifying Interactions for SDG Implementation in Ireland. *GlobalGoals2020*, 1–20. Available at: https://globalgoalsproject.eu/globalgoals2020/. Accessed 9 May 2021.

Lenton, T. M. (2020). Tipping Positive Change. *Philosophical Transactions of the Royal Society B, 375*, 20190123. https://doi.org/10.1098/rstb.2019.0123

Levine, S. (2014). *Assessing Resilience: Why Quantification Misses the Point*. Overseas Development Institute.

Lovell, E., Bahadur, A., Tanner, T., & Morsi, H. (2016). *Resilience – The Big Picture: Top Themes and Trends*. https://doi.org/10.13140/RG.2.1.2415.5767

Makinen, K., Prutsch, A., Karali, E., Leitner, M., Voller, S., Lyytimaki, J., … Vanneuville, W. (2018). *Indicators for Adaptation to Climate Change at National Level – Lessons from Emerging Practice in Europe*. https://doi.org/10.25424/CMCC/CLIMATE

Miola, A., Borchardt, S., Neher, F., & Buscaglia, D. (2019). *Interlinkages and Policy Coherence for the Sustainable Development Goals Implementation: An Operational Method to Identify Trade-Offs and Co-Benefits in a Systemic Way*. https://doi.org/10.2760/472928

Mizutori, M. (2019). From Risk to Resilience: Pathways for Sustainable Development. *Progress in Disaster Science, 2*, 100011. https://doi.org/10.1016/j.pdisas.2019.100011

Murphy, D. (2019). *Alignment of Country Efforts Under the 2030 Agenda, Paris Agreement and Sendai Framework*. NAP Global Network.

Murray, V., Maini, R., Clarke, L., & Eltinay, N. (2017). *Coherence Between the Sendai Framework, the SDGs, the Climate Agreement, New Urban Agenda and World Humanitarian Summit, and the Role of Science in Their Implementation*. Retrieved from International Council for Science & Integrated Research on Disaster Risks website: https://council.science/cms/2017/05/DRR-policy-brief-5-coherence.pdf. Accessed 9 May 2021.

Nelson, D. R. (2011). Adaptation and Resilience: Responding to a Changing Climate. *Wiley Interdisciplinary Reviews: Climate Change, 2*(1), 113–120. https://doi.org/10.1002/wcc.91

Ochs, A., Indriunaite, L., & Engstroem, S. (2020). *Towards Policy Coherence: An Assessment of Tools Linking the Climate, Environment and Sustainable Development Agendas*. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

ODI. (2016). *Analysis of Resilience Measurement Frameworks and Approaches*. Retrieved from Overseas Development Institute website: https://www.fsnnetwork.org/sites/default/files/analysis_of_resilience_measurement_frameworks_and_approaches.pdf. Accessed 9 May 2021.

OECD. (2020). *Common Ground Between the Paris Agreement and the Sendai Framework: Climate Change Adaptation and Disaster Risk Reduction*.

Opitz-stapleton, S., Nadin, R., Kellett, J., Calderone, M., Quevedo, A., Peters, K., & Mayhew, L. (2019). *Risk-Informed Development from Crisis to Resilience*. United Nations Development Programme.

Osbahr, H. (2007). Building Resilience: Adaptation Mechanisms and Mainstreaming for the Poor. In *Human Development Report Occasional Paper*. Retrieved from Background Paper for UNDP Human Development Report website: http://hdr.undp.org/en/reports/global/hdr2007-2008/papers/Osbahr_Henny.pdf. Accessed 9 May 2021.

Peters, K., Langston, L., Tanner, T., & Bahadur, A. (2016). *'Resilience' Across the Post-2015 Frameworks: Towards Coherence?* Retrieved from Overseas Development Institute website: https://www.odi.org/sites/odi.org.uk/files/resource-documents/11085.pdf. Accessed 9 May 2021.

PLACARD. (2019). *Paris Agreement Through a DRR Lens*. PLAtform for Climate Adaptation and Risk reDuction.

Poljanšek, K., Marin-Ferrer, M., Vernaccini, L., Marzi, S., & Messina, L. (2019). *Review of the Sendai Framework Monitor and Sustainable Development Goals Indicators for Inclusion in the INFORM Global Risk Index, EUR 29753 EN*. https://doi.org/10.2760/54937

PreventionWeb. (2019). *Integrated Monitoring of the Global Targets of the Sendai Framework and the Sustainable Development Goals*. Available at: https://www.preventionweb.net/sendai-framework/sendai-framework-monitor//common-indicators. Accessed 8 May 2021.

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., … Foley, J. A. (2009). A Safe Operating Space for Humanity. *Nature, 461*, 472–475.

Schipper, E. L. F., & Langston, L. (2015). *A Comparative Overview of Resilience Measurement Frameworks: Analysing Indicators and Approaches*. https://doi.org/10.1515/9789048526819-003

Tozier de la Poterie, A., & Baudoin, M. A. (2015). From Yokohama to Sendai: Approaches to Participation in International Disaster Risk Reduction Frameworks. *International Journal of Disaster Risk Science, 6*(2), 128–139. https://doi.org/10.1007/s13753-015-0053-6

UN. (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. Retrieved from United Nations website: https://sustainabledevelopment.un.org/content/documents/7891Transforming%20Our%20World.pdf. Accessed 9 May 2021.

UNDESA. (2019). *Global Conference on Strengthening Synergies Between the Paris Agreement on Climate Change and the 2030 Agenda for Sustainable Development*. Retrieved from United Nations website: https://sustainabledevelopment.un.org/content/documents/25256WEB_version.pdf. Accessed 9 May 2021.

UNDP. (2019). *Summary of Main Findings from SDG Mainstreaming, Acceleration and Policy Support Mission Reports*. United Nations Development Programme.

UNDP, UNEP, UN_ESCAP, UNFCCC, UNISDR, & WMO. (2013). *TST Issues Brief: Climate Change and Disaster Risk Reduction*. Available at: https://sustainabledevelopment.un.org/content/documents/2301TST%20Issue%20Brief_CC&DRR_Final_4_Nov_final%20final.pdf. Accessed 9 May 2021.

UNECE. (2020). *Towards Achieving the Sustainable Development Goals in the UNECE Region. A Statistical Portrait of Progress and Challenges*. United Nations.

UNEP. (2017). *The Adaptation Gap Report 2017*. Retrieved from United Nations Environment Programme (UNEP), Nairobi, Kenya website: https://www.unenvironment.org/resources/adaptation-gap-report-2017. Accessed 9 May 2021.

UNFCCC. (2015). *Adoption of the Paris Agreement*. Available at: https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf. Accessed 10 May 2021.

UNFCCC. (2017). Opportunities and Options for Integrating Climate Change Adaptation with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015–2030. *Fccc/Tp/2017/3*, *GE.17-1846* (October), 1–29. Available at: http://unfccc.int/resource/docs/2017/tp/03.pdf. Accessed 10 May 2021.

UNISDR. (2015a). *Disaster Risk Reduction and Resilience in the 2030 Agenda for Sustainable Development*. A Reflection Paper Prepared by the UN Office for Disaster Risk Reduction.

UNISDR. (2015b). *Sendai Framework for Disaster Risk Reduction 2015–2030*. Available at: https://doi.org/A/CONF.224/CRP.1. Accessed 9 May 2021.

UNISDR. (2017a). *Coherence Between the Sendai Framework, the 2030 Agenda for Sustainable Development and Climate Change*. Available at: https://www.unisdr.org/files/globalplatform/592361be6e1b3Issue_Brief_-_Global_Platform_Plenary_on_Coherence_30.pdf. Accessed 9 May 2021.

UNISDR. (2017b). *Technical Guidance for Monitoring and Reporting on Progress in Achieving the Global Targets of the Sendai Framework for Disaster Risk Reduction: Collection of Technical Notes on Data and Methodology*. United Nations International Strategy for Disaster Reduction Secretariat (UNISDR).

Vasseur, L., & Jones, M. (2015). *Adaptation and Resilience in the Face of Climate Change: Protecting the Conditions of Emergence Through Good Governance*. Retrieved from Brief for GSDR 2015 website: https://sustainabledevelopment.un.org/content/documents/6579124-Vasseur-Adaptation%20and%20resilience%20in%20the%20face%20of%20climate%20change.pdf. Accessed 9 May 2021.

Weitz, N., Carlsen, H., Nilsson, M., & Skånberg, K. (2018). Towards Systemic and Contextual Priority Setting for Implementing the 2030 Agenda. *Sustainability Science, 13*(2), 531–548. https://doi.org/10.1007/s11625-017-0470-0

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3

Coherence, Alignment and Integration: Understanding the Legal Relationship Between Sustainable Development, Climate Change Adaptation and Disaster Risk Reduction

Dug Cubie and Tommaso Natoli

Introduction

International law can play an important role in promoting national, regional and international actions to tackle the human impacts of climate change and disasters. Of note, 2015 saw the adoption of three interconnected normative frameworks: the Sendai Framework for Disaster Risk Reduction 2015–2030, the Paris Agreement under the UN Framework Convention on Climate Change (UNFCCC), and the UN's 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs). This was no small achievement, as the different evolutionary pathways and siloed nature of these topics had meant that they had remained 'stubbornly separate' up until that point (Melamed et al.,

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S. Flood et al. (eds.), *Creating Resilient Futures*,
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2012).[1] The UN's 2030 Agenda was constructed as the centrepiece of global efforts to eradicate poverty and its stated aim is to provide an all-encompassing approach to sustainable development in all its dimensions (economic, social and environmental). In addition to reiterating the importance of full respect for international law and human rights, the Agenda reaffirms the interrelated nature of international commitments made by states and the challenges that they face, while simultaneously highlighting the need for 'integrated solutions'. (UNGA, 2015, paras. 10–13).

One may therefore be tempted to view this body of international norms, rules and standards as a comprehensive and unified system. To an extent, this is correct, with states and the various components of the United Nations system[2] proposing, debating, interpreting and implementing a multitude of international instruments and institutional arrangements. However, conversely, the range of actors and thematic areas of international regulation has grown exponentially since 1945, leading to a real risk of overlap, gaps and siloed regimes. The increasing complexity and specialisation of different legal regimes have consequently led to concerns regarding a confusing fragmentation of international law (Koskenniemi, 2007; Peters, 2017; Young, 2012). The problem from a legal perspective, as set out in a key report from the International Law Commission, is that:

> such specialized law-making and institution-building tends to take place with relative ignorance of legislative and institutional activities in the adjoining fields and of the general principles and practices of international law. The result is conflicts between rules or rule-systems, deviating institutional practices and, possibly, the loss of an overall perspective on the law. (UNGA, 2006, para. 8)

The counterbalance to this fragmentation is set out in Article 31(3)(c) of the Vienna Convention on the Law of Treaties which requires that 'any relevant rules of international law applicable in the relations between the parties' are considered during the interpretation of a specific treaty. This

[1] As discussed further below, the 2012 Outcome Statement from the Rio+20 World Summit provided one of the first strong calls by states for greater connections to be made between these frameworks as they were being developed.

[2] Including the General Assembly, Security Council, International Court of Justice, and the Economic and Social Council. For an overview, see: https://www.un.org/en/about-un/

'systemic integration' of competing international legal obligations was introduced so as to avoid contradictions between different international instruments (McLachlan, 2005). While this integrative imperative applies to conflicting binding international norms, to resolve contradictory articles in two different international treaties, however, questions remain as to the role played by internationally adopted non-binding norms or instruments (so-called 'soft law') and whether one can even talk of systemic integration between binding and non-binding texts. For example, while the UNFCCC and Paris Agreement are binding international legal instruments,[3] both the Sendai Framework and the SDGs were adopted as authoritative policy frameworks rather than enforceable legal obligations. So, as we shall see in Sect. Relationship between International Law and Soft Law below, while the close connection in subject matter and required actions between these three instruments is well recognised and highlighted by their partially overlapping goals (Melamed et al., 2012; Natoli, 2019), the legal relationship between them is far from clear. The challenge becomes even more acute when one reviews the language used in these different documents. There are references to the need for 'integrated approaches,' 'policy coherence,' 'policy integration' and 'stronger interlinkages,' yet these phrases appear to be used interchangeably and nowhere are they properly defined (Natoli, 2020b).

Despite this legal indeterminacy, the normative impact that social structures and institutions have on hazard prevention, preparation and response is undeniable (de Leon & Pittock, 2017).[4] Therefore, our analysis draws on insights from disaster risk management theory and practice. As argued by Albis, Lauta and Raju: 'Disasters … have social roots. Thus the management of disasters today is dependent on the organisation of society, and hence on our ability to integrate relevant knowledge into the institutional arrangements and policies that underpin our ability to address disaster risk' (Albis et al., 2020). Multi-level understanding and sharing of knowledge regarding the organisation of legal and policy

[3] While the Paris Agreement is an international treaty which contains legal obligations for state parties, the enforceability of these obligations has been questioned: Daniel Bodansky, 'The Legal Character of the Paris Agreement' (2016) 25(2) *Review of European, Comparative and International Environmental Law* 142–150.

[4] For general discussion of the social function of law: Philip Allott, 'The Concept of International Law' (1999) 10 *European Journal of International Law* 31–50.

frameworks can therefore assist in promoting connected thinking and the destruction of disciplinary silos.[5]

As with other contributions in this book, a key theme running throughout this chapter is the need to understand specific aspects of the relationship between sustainable development, climate change adaptation (CCA) and disaster risk reduction (DRR). From our legal perspective, we hope to provide an overview of the interactions between legal and policy frameworks at the international, regional and national levels, while drawing on empirical observations of the law in practice. The chapter commences with discussion of the legal status of different international instruments, before providing a textual analysis of the language used by states, the UN and other actors in the relevant documents. We then propose an 'hourglass' model of the legal relationships between the different frameworks for sustainable development, CCA and DRR based on: (a) systemic coherence at the international level; (b) vertical alignment between the international, regional and national levels; and (c) horizontal integration of international norms at the domestic level.

Methodology

As noted by Christopher McCrudden, a key form of academic legal research is that which focuses on the understanding and internal coherence of legal concepts and legal reasoning. McCrudden highlights that this type of research addresses questions such as 'how legal concepts fit together, the consistence of the use of concepts in different areas of law,

[5] While existing synergies and potential solutions to overcome the siloed nature of these frameworks have been examined in several previous research and technical analysis, our analysis focuses specifically on the content of respective legal instruments and the need for linguistic clarity. Examples of other relevant papers include: Lisa Schipper & Mark Pelling, 'Disaster Risk, Climate Change and International Development: Scope for, and challenges to, integration' (2006) 30/1 *Disasters*, 19–38; Tom Mitchell, Maarten van Aalst & Paula Silvia Villanueva, 'Assessing Progress on Integrating Disaster Risk Reduction and Climate Change Adaptation' in *Development Processes, Strengthening Climate Resilience Discussion Paper 2* (2010); Ilan Kelman, 'Linking Disaster Risk Reduction, Climate Change, and the Sustainable Development Goals' (2017) 26/3 *Disaster Prevention and Management*; UN FCCC/TP/2017/3, 'Opportunities and Options for Integrating Climate Change Adaptation with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015–2030', Technical paper by the Secretariat (2017).

[and] the extent to which general principles can be extracted from legal reasoning that can be used to predict or guide future legal decision-making' (McCrudden, 2006, p. 632). In researching the coherence of the international normative frameworks addressing sustainable development, CCA and DRR, we have utilised a doctrinal legal analysis, namely a textual analysis of the relevant international instruments.

However, doctrinal legal analysis also requires an understanding of how the law works in practice (Ibid., p. 633), so this chapter also draws on empirical research undertaken in the Pacific Island Countries (PICs) by Dr Natoli through the IRC-MSCA CAROLINE project, 'Leave No One Behind: Developing Climate-Smart/Disaster Risk Management Laws that Protect People in Vulnerable Situations for a Comprehensive Implementation of the UN Agenda 2030.'[6]

Results and Discussion

Sources and Enforcement of International Law

In domestic legal systems, to understand whether a particular action or omission is required by law, one must first identify whether there is a binding and enforceable rule regulating particular behaviour. For example, in some countries a pedestrian crossing a road on a red light might be committing a criminal or administrative offence, while in others jaywalking may not be prohibited by law and is viewed simply as a risk that the individual takes upon themselves. To find out what the law is, you need to examine the sources of law for that particular country, such as legislation, case law, administrative orders, etc. There are likewise rules setting out the sources of international law. For an international lawyer, the first point of reference is Article 38(1) of the Statute of the International Court of Justice (ICJ), which sets out four sources upon which the ICJ can rely, namely: (a) international conventions; (b) international custom; (c) general principles of law; and (d) judicial decisions and highly

[6] For more details on the project, see: https://media.ifrc.org/ifrc/what-we-do/disaster-law/leave-no-one-behind/

qualified publications as a subsidiary means of determination (Wolfrum, 2011). The binding legal status of international conventions, such as the UN Framework Convention on Climate Change, is therefore fairly clear. The challenges arise when one starts examining other internationally authoritative texts, which may or may not have the force of international law. For example, UN General Assembly Resolutions are generally held not to have the force of international law but may influence the behaviour of states, which in turn might come to be recognised as binding international custom.[7] The most famous example is the Universal Declaration of Human Rights which was initially adopted as a General Assembly Resolution on 8th December 1948 but has subsequently been recognised as binding on all states via customary international law (Hannum, 1996). Other influential texts can include recommendations adopted by international conferences, decisions by international organisations and even guidelines or plans of action developed by non-governmental actors, academics or practitioners (Blutman, 2010, pp. 607–608).

This broad range of authoritative but non-binding sources (at both the domestic and international levels) is often called 'soft law.' Debate rages regarding this apparent misnomer – for how can something be 'law' if it is not legally enforceable?[8] While it is outwith the scope of this chapter to engage in depth with this debate, it is nonetheless of direct relevance as two of the three frameworks under consideration, namely the Sendai Framework and the SDGs, fall squarely within the soft law definition (Siders, 2016). Moreover, within the purview of all three frameworks are a series of important non-binding guidance documents, such as the Cancún Adaptation Framework adopted by the UNFCCC Conference of the Parties (CoP16) in 2011.[9] Both the Sendai Framework and the SDGs were adopted at global diplomatic conferences, following extensive

[7] UN General Assembly Resolutions can also, in certain cases, be accepted as "highly qualified publications" under Article 38(1)(d), i.e. as *opinio juris*.

[8] For differing perspectives, see: Jean d'Aspremont, 'Softness in International Law: A Self-Serving Quest for New Legal Materials' (2008) 19(5) *European Journal of International Law* 1075–1093; Arnold N. Pronto, 'Understanding the Hard/Soft Distinction in International Law' (2015) 48 *Vanderbilt Journal of Transnational Law* 941–956.

[9] The Conference of the Parties mechanism was established by Article 7 of the UNFCCC as the "supreme body of this Convention."

state and non-state actor engagement, and so represent authoritative statements of policy, although not of law.[10] This in turn raises questions as to their legal relationship with the UNFCCC and Paris Agreement, which contain binding international legal obligations.

Relationship Between International Law and Soft Law

As noted in the Introduction, while the risk of fragmentation of international legal regimes is well recognised, the legal requirement of systemic integration set out in the Vienna Convention on the Law of Treaties only applies to binding international law – in other words, sources of international law corresponding to Article 38(1) of the ICJ Statute, but not soft law sources.[11] It is therefore difficult to talk of 'systemic integration' in the strictly legal sense in regard to the frameworks for CCA, DRR and the SDGs. Yet, it has long been recognised that soft law sources may have normative impact – as far back as 1980, Richard Baxter, while serving as a judge on the ICJ, argued that: 'I intend to use the term ['international agreements'] in a much wider sense as comprehending all those norms of conduct which States or persons acting on behalf of States have subscribed to, without regard to their being binding, or enforceable, or subject to an obligation of performance in good faith' (Baxter, 1980, p. 550). Baxter continues by developing the concept of 'political treaties' which are 'merely joint statements of policy' (Ibid., p. 551). Using this analogy, states cannot 'violate' the Sendai Framework or SDGs, or indeed the Cancún Adaptation Framework, and so there is no legal recourse to enforce states' compliance.[12]

[10] For analysis of the legal status of the Hyogo Framework for Action, precursor to the Sendai Framework, see: Luca Corredig, 'Effectiveness and Accountability of Disaster Risk Reduction Practices: An Analysis through the Lens of IN-LAW' in: Ayelet Berman et al (eds.), *Informal International Lawmaking: Case Studies* (Torkel Opsahl Academic EPublisher, 2012).

[11] Koskenniemi is clear that Art 31(3)(c) VCLT only refers to 'rules of international law' and so "thus emphasising that the reference for interpretation purposes must be to rules of law, and not to broader principles or considerations which may not be firmly established as rules." UNGA, 2006, para. 426.

[12] This 'informality' in international law-making is not unique, as was extensively documented by the 'IN-LAW' project: Joost Pauwelyn, Ramses A. Wessel and Jan Wouters (eds.), *Informal*

Yet, if soft law texts cannot be enforced, what is the legal relationship between a binding source of international law such as the Paris Agreement and non-binding texts such as the Sendai Framework and the SDGs? At the simplest level, there is no relationship, since a breach of the Paris Agreement by a state party would need to be adjudicated solely based on the legal obligations set out within the UNFCCC framework.[13] Conversely, it is not possible for a state to legally violate a non-binding policy document such as the Sendai Framework or the SDGs, so no legal consequences flow from it and it would therefore not trigger that state's legal obligations in a separate binding text such as the Paris Agreement.

However, when one examines the language used by states in these legal and policy frameworks, it is clear that they have acknowledged the close connections between their substantive content and objectives. The Preamble to the UNFCCC, adopted in 1992, specifically notes that: 'Responses to climate change should be coordinated with social and economic development in an integrated manner.'[14] More recently, the final Outcome Statement of the Rio+20 World Summit in 2012 was a key intergovernmental acknowledgement of the need to move away from a fragmented and siloed approach. In particular, at the Rio+20 summit, heads of state called for: 'disaster risk reduction and the building of resilience to disasters to be addressed with a renewed sense of urgency in the context of sustainable development and poverty eradication and, as appropriate, to be integrated into policies, plans, programmes and budgets at all levels' (UNGA, 2012, para. 186). Moreover, the Outcome Statement continued to stress:

> the importance of stronger interlinkages among disaster risk reduction, recovery and long-term development planning, and call for more coordinated and comprehensive strategies that integrate disaster risk reduction and climate change adaptation considerations into public and private investment, decision-making and the planning of humanitarian and devel-

International Lawmaking (Oxford University Press, 2012); and Berman et al, *Informal International Lawmaking* (n.10).

[13] Article 14 UNFCCC sets out the mechanisms for the settlement of disputes between state parties to the Convention, namely negotiation, arbitration or submission to the International Court of Justice.

[14] Preamble, UNFCCC.

> opment actions, in order to reduce risk, increase resilience and provide a smoother transition between relief, recovery and development. (Ibid., para. 188)

This requirement was solidified three years later when the UN 2030 Agenda reaffirmed 'the outcomes of all major United Nations conferences and summits which have laid a solid foundation for sustainable development and helped to shape the new Agenda.' (UNGA, 2015, para. 11). Yet, a semantic examination of the relevant documents shows that key terminology is used in an inconsistent manner. The final section of this chapter will therefore attempt to rationalise the plethora of phrases used to describe the linkages and relationship between these three legal and policy frameworks into a clear structure based on 'coherence,' 'alignment' and 'integration'. Considering the diversity of national and regional contexts, this should not be seen as a one-size-fits-all formula but hopefully will provide an overarching mechanism for understanding the (legal) relationships between the three topics.

The 'Hourglass' Model: Coherence, Alignment and Integration

Certain words and phrases have a specific legal definition or understanding, both at the domestic level and in international law. So, for example, the 'principle of integration' in international environmental law[15] relates to a legal obligation on the part of states to integrate environmental considerations into the planning and implementation of development activities (McIntyre, 2013). Yet, as noted by McIntyre, even within the EU's advanced regional legal system the precise normative character and substantive content of the principle are far from clear (Ibid., p. 105). In a similar manner, the extensive recourse to the concept of 'resilience' in the Sendai Framework, Paris Agreement and 2030 Agenda means that one can view it as a 'semantic cement' holding the three frameworks together. However, there has been valid criticism of the differential understandings of the way the

[15] It should be noted that international environmental law, which encompasses issues such as biodiversity and pollution, is not synonymous with climate change law.

concept is employed across the three instruments (Siders, 2016, pp. 114–120). Therefore, for the purposes of this analysis and reflecting the uncertain legal relationships between the different texts under consideration, we will utilise standard dictionary definitions of the relevant words rather than relying upon specific legal definitions.

Due to the multidimensional relationships between the three frameworks at the international, regional and national levels, we will commence with a discussion of systemic coherence at the international level (a), followed by vertical alignment between the international, regional and national/sub-national levels (b), and finally horizontal integration at the domestic level (c). As set out in Fig. 3.1 below, the dynamic nature of these relationships can be visualised in a unified model represented by the classic image of an hourglass.

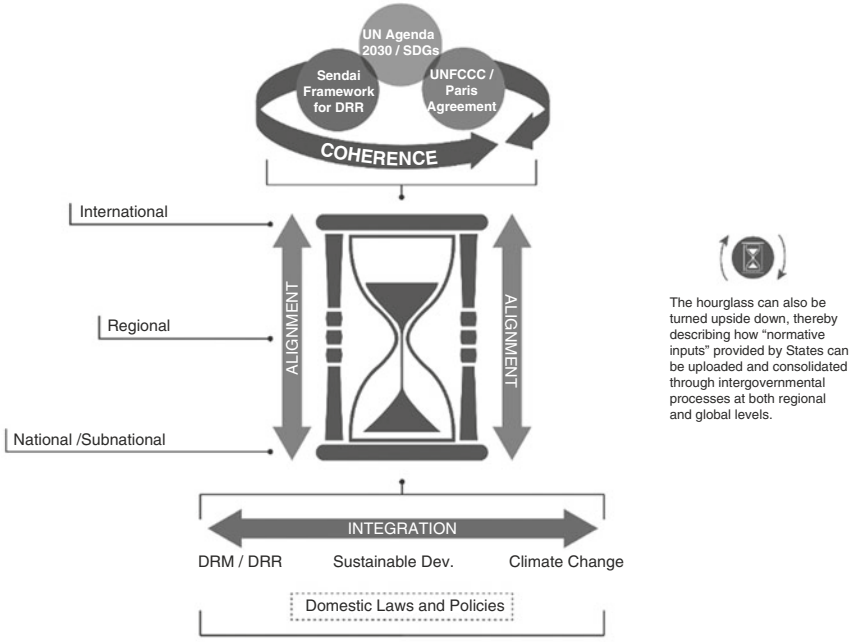


Fig. 3.1 Hourglass model

Systemic Coherence: The Need for Consistency

Starting from the consideration that 'coherence' is defined as any 'logical and consistent' argument or theory (Soanes & Stevenson, 2006, p. 278), ensuring the effective coexistence of the three global frameworks analysed in this study is facilitated by the extent to which they share the same principles/criteria in their respective normative reasoning and purposes (i.e. logic) and exert a simultaneous regulatory effect without discrepancies and in compatible forms (i.e. consistency).[16] Both 'logic' and 'consistency' elements are detectable in the text of the three instruments, albeit in different forms.

The 2030 Agenda /SDGs is the framework where the two elements emerge most vividly. Described as 'universal' in nature and based on the idea of a 'collective journey', one can consider 'coherence' as one of the Agenda's inherent features, as demonstrated by the recurrent use of this term throughout the document. The Agenda's overarching purpose of unifying the multifaceted dimensions of sustainability entails humanity living 'in harmony with nature' (para. 9), while also being able to cope with the adverse impacts of climate change (para. 14) and related disaster risks (para. 33). This idea is enshrined in the wording of the SDGs, such as Goal 1.5 ('[B]uild the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events') and Goal 13.1 ('Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries'). With the clear intention to prevent overlaps or conflicts, the Agenda includes two 'coherence clauses' – the first recognising the UNFCCC is the 'primary international, intergovernmental forum for negotiating the global response to climate change' (para. 31, plus SDG 13) and the second clarifying that cities and human settlements should develop and implement holistic disaster risk management at all levels 'in line with the Sendai Framework for Disaster Risk Reduction 2015–2030' (SDG 11.b).

Likewise, by acknowledging climate change as a key source of disaster risk and a serious impediment to sustainable development, the various intergovernmental negotiations of 2015 were recognised in the Sendai

[16] For discussion of coherence across the three frameworks, see: Siders, 2016.

Framework as a 'unique opportunity to enhance coherence' across interrelated processes, while 'respecting' the role of the UNFCCC 'within its mandate'.[17] It is no surprise, therefore, that the Sendai Framework's guiding principles and priorities openly recognise the need for coherence across the SDG, CCA and DRR agendas in the development and implementation of all relevant policies, plans, practices and mechanisms.[18]

A similar aim can be detected in the Paris Agreement, although through more cautiously diplomatic language. Both the Preamble and certain operative provisions include elements highlighting the intrinsic relationship between climate change, risk reduction and sustainable development – not least the prominent placement of the official acknowledgement of the UN 2030 Agenda and SDG Goal 13 in particular, and the Sendai Framework on the first page of the Agreement. This is followed by Article 2(1) which states that among the Agreement's objectives is the consolidation of 'the global response to the threat of climate change, in the context of sustainable development', including by '[i]ncreasing the ability to adapt to the adverse impacts of climate change and foster climate resilience.' This objective is bolstered by Article 7(1) establishing a 'global goal on adaptation' which entails 'enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response.' Furthermore, in the context of a state's nationally determined contributions, Article 6(8) notes 'the importance of integrated, holistic and balanced non-market approaches' and continues by stating that such approaches shall aim to '… (c) Enable opportunities for coordination across instruments and relevant institutional arrangements.' These provisions clearly aim to highlight the cross-cutting relationship between a state's adaptive capacity, climate resilience and sustainable development objectives. However, while the promotion of coherence between the three legal and policy frameworks is a worthwhile goal by

[17] Sendai Framework, paras. 4, 6, 11 and 13.

[18] See paras. 19(h), 28(b), 31(a), 48(c) and 49. See also para.50, addressing the intention to develop a mechanism to measure global progress in the implementation of the Sendai Framework in conjunction with the work of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators.

itself, it is insufficient. Therefore, we next turn to the processes whereby international normative instruments can influence regional and national approaches, and vice versa.

Vertical Alignment: From International to National/ Sub-National (and Back)

Having discussed how the three frameworks are horizontally interlinked at the international level, we will now consider them through the lens of multilevel governance, namely the vertical relationship between global, regional/sub-regional and national/sub-national decision-making bodies and institutions (Lane & Hesselman, 2017). While the three frameworks under consideration do not explicitly refer to it, the concept of normative 'alignment' appears as particularly fit-for-purpose, considering that the verb 'align' defines any act of placing or arranging items 'in a straight line or into correct relative positions' (Soanes & Stevenson, 2006, p. 33.).

There are a wide variety of differing institutional and legal approaches adopted by regional organisations, and the hourglass model recognises that regional structures and initiatives may act as a central fulcrum to facilitate the two-way flow of knowledge, experience and norms between the national and international levels. For instance, interesting and up-to-date findings on vertical alignment in climate-risk governance can be found by exploring relevant practice within the Pacific Island region which hosts five of the ten most at-risk countries in the world and is where climate change is causing serious consequences at a growing rate (IFRC, 2020). Over the last few years, many Pacific Island Countries (PICs) have been reforming their institutional and normative systems in order to pursue a holistic approach to disaster and climate resilience, and this process has been closely tied to the regional and international advancements from 2015 onwards (Hopkins, 2019). For example, the Government of Fiji has undertaken detailed analysis of how to align their domestic adaptation policies with the Sendai Framework and the SDGs. So, when launching their National Adaptation Plan in 2018, the Fijian Government noted: 'This NAP has been aligned to support these international

agreements as one of many national processes through which these agreements should be achieved'(Republic of Fiji, 2018, p. 37; Natoli, 2020a).

A critical role in this alignment process has been played by regional organisations such as the Pacific Community (SPC), the Secretariat of the Pacific Regional Environment Programme (SPREP) and the Pacific Islands Forum Secretariat (PIFS). These organisations have supported and channelled national efforts to build common positions, promoting the most relevant initiatives and providing the necessary technical expertise. A key outcome of this dynamic is the 'Framework for Resilient Development in the Pacific (FRDP)', a high-level strategic document adopted in 2016 to guide different stakeholder groups on how to enhance resilience to climate change and disasters, 'in ways that contribute to and are embedded in sustainable development' (SPC et al., 2016).

The FRDP drafting process incorporated the contribution of global bodies such as the UN Development Programme (UNDP) and UN Office for Disaster Risk Reduction (UNDRR). It is not surprising, then, that a clear link with the three instruments of reference is evident throughout the text, where the intention to contribute to and complement their implementation is repeatedly stated (SPC et al., 2016, pp. 3, 5, 10–11). This also provides evidence of PICs' intention to opt for a coordinated regional implementation of the Post-2015 Agenda on climate-risk governance and feed into global intergovernmental processes with 'a single voice'.

Of note, the FRDP was the result of an '[e]xtensive and inclusive engagement process with stakeholders, from national and communities to regional and international levels' (SPC et al., 2016, p. 1). In light of this, the vertical 'positioning' that inspired the document should not be considered as unidirectional (i.e. only going from the global to the local), as it can also build on the capacity to collect and transmit inputs from communities/civil society to the national, regional and intergovernmental levels. The dynamic nature of this shifting relationship from top-down to bottom-up is represented in the hourglass model proposed here by the simple fact that an hourglass is equally effective whichever way it is turned (see Fig. 3.1).

Horizontal Integration: Mainstreaming into Domestic Law and Policy

Following our discussion of systemic coherence at the international level and vertical alignment between the international, regional/sub-regional and national/sub-national levels, the third component of the hourglass model focuses specifically on national law and policy. Considering that the dictionary definition of 'integration' is 'to combine or be combined to form a whole' (Soanes & Stevenson, 2006, p. 738), it is perhaps surprising that this phrase is used across so many of the documents cited above. It is clear from the fact that the three relevant frameworks were negotiated in separate parallel mechanisms that states did not intend for them to be combined to form a single instrument. However, the word 'integration' is used in a more specific context when discussing the domestic level. For example, SDG Goal 13.2 sets out the need to 'integrate climate change measures into national policies, strategies and planning.'[19] Likewise, the Paris Agreement calls on parties to integrate climate adaptation 'into relevant socioeconomic and environmental policies and actions, where appropriate.'[20] While the Sendai Framework urges states to 'mainstream and integrate disaster risk reduction within and across all sectors' and to address DRR and build resilience to disasters 'with a renewed sense of urgency in the context of sustainable development and poverty eradication and, as appropriate, to be integrated into policies, plans, programmes, and budget at all levels and considered within relevant frameworks' (para. 2).

One can therefore deduce that a key objective of drafters in using the word 'integration' is not to create a single international framework but to encourage states to take a holistic view across all policy areas at the domestic level. The normative reform process currently underway in the Republic of Fiji represents an instructive example of how this perspective can effectively be pursued. A consistent and integrated approach between CCA and DRR can be observed in the relevant policies adopted by the Fijian authorities since 2015, aligning at the same time with regional and

[19] SDG 13.2.

[20] Paris 7.5.

global commitments (Natoli, 2020a, pp. 36–45). As clearly set out in the Fiji National Adaptation Plan (NAP): 'Horizontal integration refers to the mainstreaming of climate change issues into national-level development planning processes so that they are suitably climate-informed' (Republic of Fiji, 2018, p. 46).

From an institutional point of view, a clear example of integration is given by the new National Climate Change Policy (NCCP), which encompasses a careful articulation of Fiji's priorities in reducing present and future climate risks through a 'woven approach' to resilient development (Republic of Fiji, 2019, p. 8). Interestingly, among its main structural reforms are the creation of a Cabinet Committee on Climate and Disaster Risk (CCCDR) and the re-establishment of the National Climate Change Coordination Committee (NCCCC). The updated mandate of the NCCCC includes a requirement to provide '[c]lear guidance for interactions with the National Disaster Management Committee on issues that cross-cut the adaptation and disaster risk reduction objectives to improve the ability to coordinate resources and improve the accuracy of risk reduction reporting and planning' (Republic of Fiji, 2019, pp. 47, 78).

This domestic integration is also reflected in the current text of the Fijian Climate Change Bill, which was published in late 2019. Drafted in close synergy with the NCCP, the Bill aims to 'integrate the consideration of climate change projections, articulation of risk reduction responsibilities and formulation of resilience-building objectives across all sector plans and strategies.'[21] Once enacted, the Bill is expected to provide the necessary legal basis for establishing clear responsibilities and obligations, so as to ensure overall consistency across governmental structures and promote the harmonisation and integration of the entire normative system. Of note, the judiciary may be called on to play an important role: as per the current draft Bill, the Fijian High Court will be endowed with the power to set aside and order the remake of any specific legislative act that does not adequately take account of climate change.[22]

[21] Fiji, *Climate Change Bill* (Draft) 2019, art.4(f).

[22] Ibid. art.16.

Conclusions

Just as sand flows from and into either half of an hourglass, the sharing of knowledge and expertise in the fields of CCA, DRR and sustainable development flows from the local to the national, the regional to the international, and back again. This vertical alignment helps to ensure that there is bidirectional exchange of legal principles and operational experience, as well as monitoring of the actions taken at each level.[23] As Harold Koh has observed, 'Twenty-first century international lawmaking has become a swirling interactive process whereby norms get 'uploaded' from one country into the international system, and then 'downloaded' elsewhere into another country's laws or even a private actor's internal rules' (Koh, 2012). The importance of regional organisations in supporting this interactive process of vertical alignment is evident from the coordinated approach undertaken in the Pacific Region.

However, vertical alignment will be hard to achieve if there is not a coherent body of norms and practice at the international level. Therefore, acknowledging and promoting the shared logic and consistency between the Paris Agreement, Sendai Framework and 2030 Agenda, as well as any inconsistencies, are essential. In other words, while the limited scope of Article 31(1)(c) of the Vienna Convention on the Law of Treaties does not allow us to talk about 'systemic integration' of the post-2015 global agenda on climate-risk governance from a legal perspective, one can identify 'systemic coherence' between the relevant frameworks. Nevertheless, as research from the Pacific region indicates, there is no one-size-fits-all solution to legal and policy integration at the national level. Full integration via the creation of a unitary governmental department or piece of legislation is not necessarily the best option, and each state will need to review their own domestic structures and context.[24] However, emerging practice is based on the expectation that enhancing integration at the domestic level can reduce duplication and optimise the use of limited

[23] Each of the three global frameworks has internal monitoring and reporting mechanisms, which state parties are expected to comply with.

[24] See for instance the Fijian Disaster Risk Reduction Policy 2018–2030 (NDRRP) noting that the degree of integration will "vary based on the needs and priorities" (para. 115).

resources and the sharing of technical expertise, as well as reflect and support coherence at the international level. As a simple visual representation of these processes, the hourglass model aims to promote understanding of the legal relationship between sustainable development, climate change adaptation and disaster risk reduction, and break down the regulatory silos which have hampered effective cross-cutting dialogue and action in the past.

References

Albis, K., Cedervall Lauta, K., & Raju, E. (2020). Disaster Knowledge Gaps: Exploring the Interface Between Science and Policy for Disaster Risk Reduction in Europe. *International Journal of Disaster Risk Science, 11*, 1–12.

Baxter, R. R. (1980). International Law in 'Her Infinite Variety'. *International and Comparative Law Quarterly, 29*, 549–566.

Blutman, L. (2010). In the Trap of a Legal Metaphor: International Soft Law. *International and Comparative Law Quarterly, 59*, 605–624.

de Leon, E. G., & Pittock, J. (2017). Integrating Climate Change Adaptation and Climate-Related Disaster Risk-Reduction Policy in Developing Countries: A Case Study in the Philippines. *Climate & Development, 9*(5), 471–478.

Hannum, H. (1996). The Status of the Universal Declaration of Human Rights in National and International Law. *Georgia Journal of International and Comparative Law, 25*, 287–397.

Hopkins, W. J. (2019). Pacific (2018). *Yearbook of International Disaster Law, 1*, 366–372.

IFRC (International Federation of Red Cross and Red Crescent Societies). (2020). *Risk Governance for Resilient Development in the Pacific, Reports from Legislating and Policy Making for Climate Smart DRM Workshop – Fiji*, October 2019, 3.

Koh, H. (2012). Twenty-First Century International Lawmaking. Speech at Georgetown University Law Center, Washington, DC (17 October 2012) 14.

Koskenniemi, M. (2007). The Fate of Public International Law: Between Technique and Politics. *Modern Law Review, 70*(1), 1–30.

Lane, L., & Hesselman, M. (2017). Governing Disasters: Embracing Human Rights in a Multi-Level Multi-Duty Bearer, Disaster Governance Landscape. *Politics and Governance, 5*(2), 93–104.

McCrudden, C. (2006). Legal Research and the Social Sciences. *Law Quarterly Review, 122*, 632–650.

McIntyre, O. (2013). The Principle of Environmental Integration in Sustainable Development Law: Sobering Lessons from EU Law. In L. Western, P. Taylor, & A. Michelot (Eds.), *Confronting Ecological and Economic Collapse: Ecological Integrity for Law, Policy and Human Rights* (pp. 104–110). Earthscan/Taylor & Francis.

McLachlan, C. (2005). The Principle of Systemic Integration and Article 31(3)(c) of the Vienna Convention. *International and Comparative Law Quarterly, 54*, 279–320.

Melamed, C, Scott, A., & Mitchell, T. (2012). *Separated at Birth, Reunited at Rio? A Roadmap to Bring Environment and Development Back Together* (May 2012) Background Note, Overseas Development Institute.

Natoli, T. (2019). *Literature Review on Aligning Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR)*. IFRC/UCC.

Natoli, T. (2020a). *Law and Policies That Protect the Most Vulnerable Against Climate-Related Disaster Risks: Findings and Lessons Learned from Pacific Island Countries*. IFRC|UCC.

Natoli, T. (2020b). *Compendium on the Post-2015 Global Agenda on Climate-Risk Governance*, UCC Centre for Criminal Justice & Human Rights (CCJHR), Research Projects (May 2020). Available at: https://www.ucc.ie/en/ccjhr/publications/. Accessed 30 Aug 2021.

Peters, A. (2017). The Refinement of International Law: From Fragmentation to Regime Interaction and Politicization. *International Journal of Constitutional Law, 15*(3), 671–704.

Republic of Fiji. (2018). *National Adaptation Plan: A Pathway Towards Climate Resilience*.

Republic of Fiji. (2019). *National Climate Change Policy 2018–2030.*

Siders, A. (2016). Resilient Incoherence – Seeking Common Language for Climate Change Adaptation, Disaster Risk Reduction, and Sustainable Development. In J. Peel & D. Fisher (Eds.), *The Role of International Environmental Law in Disaster Risk Reduction* (pp. 110–112). Brill.

Soanes, C., & Stevenson, A. (Eds.). (2006). *Concise Oxford English Dictionary* (11 revised ed.). Oxford University Press.

SPC, SPREP, PIFS, UNDP, UNISDR, & USP. (2016). *Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management (FRDP) 2017–2030*, 4.

UNGA (United Nations General Assembly). (2006). *Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law*. Report of the Study Group of the International Law Commission, Finalized by Martti Koskenniemi, UN Doc: A/CN.4/L.682 (13 April 2006).

UNGA (United Nations General Assembly). (2012). *The Future We Want*. UN Doc: A/RES/66/288 (11 September 2012).

UNGA (United Nations General Assembly). (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*, UN Doc: A/Res/70/1 (21 October 2015).

Wolfrum, R. (2011). Sources of International Law. In R. Wolfrum (ed.), *Max Planck Encyclopedia of Public International Law* [Online]. Oxford University Press. Available at: https://opil.ouplaw.com/home/mpil. Accessed 30 Aug 2021.

Young, M. A. (Ed.). (2012). *Regime Interaction in International Law: Facing Fragmentation*. Cambridge University Press.

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4

Bridging Gaps: Connecting Climate Change Risk Assessments with Disaster Risk Reduction and Climate Change Adaptation Agendas

Shona K. Paterson and Kristen Guida

Introduction

Climate change, and associated variability, is having a transformative effect on both our human and biophysical systems (IPCC, 2018, 2019; Lenton et al., 2019). Significant impacts are already evident, posing increasing risks to vulnerable populations and societal and planetary security (Lenton et al., 2019; Rockstrom et al., 2009). Society continues to face immediate and persistent choices about how to reduce these risks despite documented and acknowledged uncertainties associated with the

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response capabilities and adaptive capacity of both social and natural systems (Adger et al., 2017; Patterson et al., 2018; Thomas et al., 2019).

Meeting the challenges posed by climate change requires not only strengthening capacities to respond to both extreme and slow-onset hazards as and when they occur, and continued investment in both adaptation and mitigation efforts, but also a concerted effort to increase alignment with disaster risk reduction (DRR) efforts in order to make communities more resilient. This reality increases the urgency associated with continued needs to (i) understand the nature and variability of current and emerging risks, and (ii) increase the capability of assessing climate risks and resiliency opportunities as they evolve. This chapter examines the concept of risk and the possibility of integrating and enhancing policy and practice linkages between climate change risk assessments (CCRA), climate change adaptation (CCA) and disaster risk reduction to address all three of these critical policy spaces.

Conceptualising Current and Emergent Risks

The IPCC derives risk from the sum of the magnitude of the hazard, the relative 'value'/importance/ quantity of what is exposed to the hazard (i.e. people, infrastructure, etc.) and the vulnerability of what is exposed (the ability or lack thereof to cope and adapt to the hazard) (IPCC, 2013, 2014; UNISDR, 2009). This forms the basis of the definition that risk amounts to 'potential for consequences where something of value is at stake and where the outcome is uncertain' (Humphrey & Murphy, 2016). Measured as a function of probability and consequence (King et al., 2015), future climate risks introduce a large amount of uncertainty in evaluation and management (Shortridge et al., 2017; Viner et al., 2020).

Associating a particular likelihood with specific risks is challenging because risk is a dynamic and ever-moving social construction that is reimagined and reinvented by society over time as values and norms change (Adger et al., 2018; Viner et al., 2020). These shifts, often stochastic and non-linear, are governed by people's perceptions of risk, which are in turn based on different values and knowledge (Adger et al., 2009) as well as shifts in exacerbating physical conditions (IPCC, 2018).

While climate change is an accelerator of natural and anthropogenically derived variance in physical conditions (Lawrence, 2016), social processes act as risk modifiers in the face of the documented uncertainty (Thomas et al., 2019). Social functioning, health and wellbeing, and human rights/governance factors (e.g. equity) all influence the acceptability of risk (Adger et al., 2018; Fellenor et al., 2020; Kasperson et al., 1988) whereby responses to perceived outcomes, either in anticipation or in reaction, ultimately change the landscape of likelihood or the distribution of consequences in society. This means that risk is iterative (Fig. 4.1) and must not be considered neutral or fixed, and instead remains a 'relative concept regarding the ambiguity and uncertainty related to the knowledge of the outcomes, and the likelihood of the hazard with respect to the values of the risk perceiver' (Käyhkö, 2019, pg1).

The complexities of risk are such that while some are observable and others emergent in the physical world (Rockstrom et al., 2009; Steffen et al., 2015), many are 'indirect, systemic ones or related to collective and political systems rather than to individuals' (Adger et al., 2018, pg2.). Increased global interdependence in the form of economic, social and cultural integration makes it inevitable that impacts in one country or

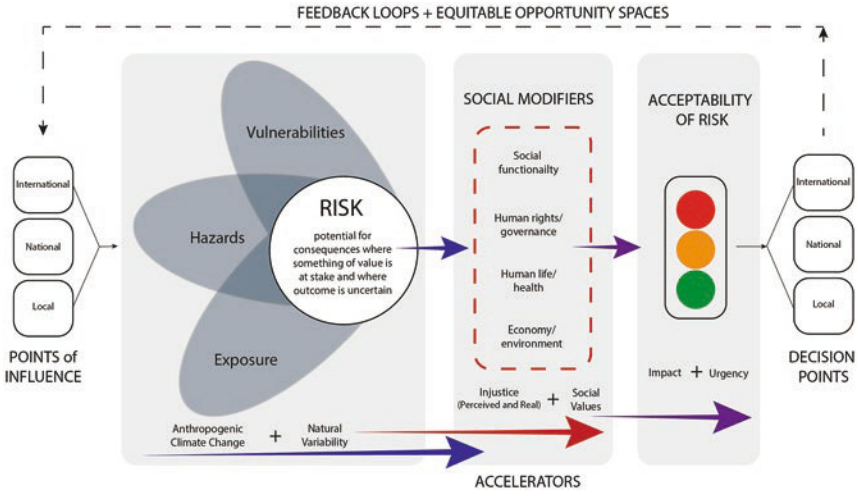


Fig. 4.1 Illustration of social modifiers and accelerators of an iterative risk cycle

region will be transferred elsewhere across the globe (Foresight and Government Office for Science, 2011; IPCC, 2018), whether considering physical impacts (e.g. Nicholls & Kebede, 2012) or social implications (e.g. Levermann, 2014). This ensures that scale, both in terms of pre-risk (influence) and post-risk (decision points) identification, has a critical role to play in risk reduction efforts (Mechler et al., 2019).

Assessing Risk

Failure to plan for and manage future climate risks will result in significant damage to infrastructure, economies and society in general. An effective CCRA provides a sound basis for making decisions on whether risks, and the level of those risks, are acceptable to society or specific communities. Achieved by obtaining, collating and analysing information on how risks deemed unacceptable can be reduced to sub-threshold levels of acceptability, CCRAs have traditionally been based on historic causal chains and event analysis data from past events and failure reporting (Aven, 2016), often in isolation from influencing or cascading events (ASC, 2016). The interlinkages between existing risks, vulnerability to those risks and the adaptations developed to manage those risks are often neglected in methodologies (Jones & Boer, 2003) and CCRAs have previously assessed potential impacts of climate change without taking account of ongoing adaptation plans and activity (ASC, 2016). Interdependencies and cascading risks are also often under-represented because of reductionist processes (Lawrence et al., 2020) and there is strong evidence to suggest that in times of rapid and non-linear global change these approaches are no longer adequate to capture future risks (Centeno et al., 2015; Stirling, 2010; Zscheischler et al., 2018).

Nonetheless, risk assessments have long been considered a more appropriate basis for developing adaptation strategies to manage future risks than simply collecting baseline climate data and using that data in change scenarios (Palutikof et al., 2019). This has resulted in a shift away from the linear 'top-down' approaches that begin with observed and modelled climate data, then evaluate the impacts and select appropriate adaptation options. Instead, more 'bottom-up' or context-based approaches, focussed

on co-produced evaluations of exposure and vulnerability as the assessment component to identify adaptation options, are being employed (Aven, 2016; Howarth et al., 2018). Context-based adaptation enables the development of CCRAs that are more focussed on understanding the social and physical limits of a system (thresholds) as well as the determination of probabilities of breaching the thresholds, now and in the future (Reeder & Ranger, 2011). Co-considering options with stakeholders and plotting out options with timelines and potential impacts allow for greater flexibility in decision-making and facilitate learning over time. This 'change-through-learning' is a critical element for dealing with the inherent uncertainties as well as creating pathways to adaptation decision-making (King et al., 2015).

Connecting Existing Frameworks

The integration of CCRAs and CCA and DRR agendas is seen as a key step in dealing with the complexity associated with current and future climate variability and change, and reducing the negative impacts of extreme events. There is a growing body of literature that discusses the importance of building these linkages, especially in the context of sustainable development (e.g. UNISDR, 2015; United Nations Climate Change Secretariat, 2017). Not all areas of work in DRR and CCA overlap or should be integrated, however, both agendas have similar scope to convene diverse stakeholders across sectors and scales to strategically plan and enable action with the aim of supporting vulnerable communities. Using a socialised context-based concept of risk (Fig. 4.1) as a starting point for integration encourages an acknowledgement of the overlap of process as well as the existence of multiple feedback loops within the policy system (Fig. 4.2). It also places CCRAs as an initial focal point for CCA and DRR efforts over time.

Cohesion between operational and technical aspects is essential to ensure a robust approach to dealing with climate risks (Banwell et al., 2018; Birkmann & von Teichman, 2010; IPCC, 2018; Mastrandrea et al., 2010). Operationally, increased integration could maximise efficiency by reducing human, technical and financial resource-use across

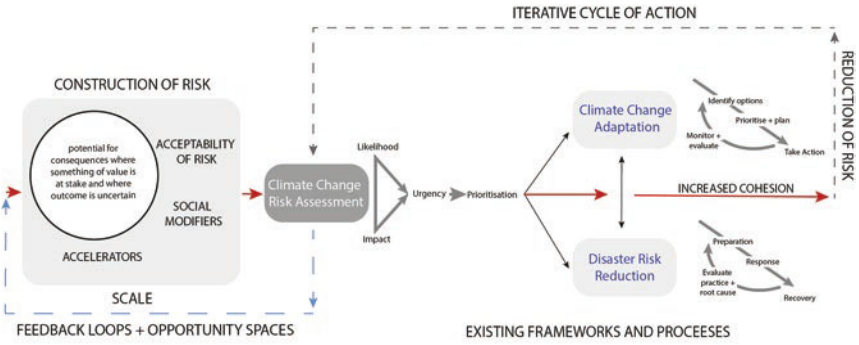


Fig. 4.2 Model of potential integration for CCRAs with DRR and CCA agendas

duplicated institutional structures and implementation efforts (Schipper & Pelling, 2006; Thomalla et al., 2006). Technical integration would enable the sharing of expertise, knowledge, lessons and tools, increasing the efficiency and effectiveness of risk reduction (Birkmann & von Teichman, 2010). However, this oversimplifies the complexity associated with integrating different assessment methods, stakeholders and timescales. Often treated as separate issues with critical disconnects between policies and efforts, these agendas are habitually centred in different departments with little or no coordination (Chmutina, Jiygasu, & Bosher, 2017; Mastrandrea et al., 2010; Papathoma-Köhle et al., 2016). While there continues to be an operational shift toward more proactive and preemptive approaches to DRR, it remains highly influenced by reactive emergency management practices (UNDRR, 2019; UNISDR, 2015). In contrast, CCA has typically fallen into the domain of environmental agencies and departments. At present, many countries have ministries dedicated to disaster management, but climate change is often omitted from the scope of considerations in DRR policies, plans and programmes. Similarly, at the level of implementation and action, climate scientists and adaptation practitioners often do not interact with the disaster risk community and associated humanitarian actors.

In addition, technical language and framing have played a large part in the separation over time of these agendas. Historically, the climate change adaptation community used 'vulnerability' as the frame for

understanding and responding to climate change whereas disaster communities focussed on 'risk' (Forino et al., 2015; Mastrandrea et al., 2010; Roberts et al., 2015), demonstrating differences of origin in both research and practice. To enable a greater degree of harmonisation, the IPCC actively reframed its AR5 report to focus on risk (Connelly et al., 2018; Pelling, 2011). However, it must be recognised that when AR5 was published, climate change policy was based on a specialised UN convention that required global cooperation in order to function, whereas DRR was guided by an international framework but enacted at the national or subnational level (Roberts et al., 2015; Schipper & Pelling, 2006). These discrepancies in terms of language, scale, scope and legal status posed, and continue to pose, a considerable challenge to the evolution of an integrated approach to climate risk management.

A key opportunity for improving the links between DRR and CCA arose in 2015. The Sendai Framework for Disaster Risk Reduction, the Paris Agreement, the UN 2030 Agenda for Sustainable Development, and the New Urban Agenda were created as increasing attention was paid to coherence between international policies (Murray, 2014; Roberts et al., 2015). However, there are still disconnects between the agreements as well as a gap in the current conceptualisation and implementation of these conventions at scale (e.g. Stafford-Smith et al., 2017). This gap can partly be explained in the measurements of attainment for these policies (Le Tissier & Whyte, this volume).

However, there is scope for optimism with cross-cutting areas where integration, at least in theory, could occur, opening up the scope for improved cooperation alongside action. For example, the post-extreme-event reconstruction and recovery processes offer catalysts for change through climate-proofing infrastructure or improved social conditions. Attempts to use insurance incentives in post-event rebuilding through resilience bonds (Vaijhala & Rhodes, 2018), or green bonds (Gianfrate & Peri, 2019), have had limited success, although they remain in their infancy within the market. Covid-19 has seen a large swell of interest in 'building back better' strategies, although it remains to be seen how this interest will manifest itself at the national and subnational level (Clark & Gruending, 2020; Iyengar, 2020). While powerful debate still exists around who defines trajectories of 'build back better' strategies (Collodi

et al., 2019; Mittul & Irina, 2019; Su & Le Dé, 2020), the use of adaptation planning and processes to increase an understanding of underlying risk and uncertainties, and address increasing vulnerability, thereby reducing the potential for maladaptation, provides an excellent potential example of CCRA, CCR and DRR integration. By employing long-term socio-technological solutions that allow improved urban planning, increased access to health care systems, sustainable investment plans and co-design/participatory societal planning, CCA and DRR agendas can create increased cohesion between pre- and post-extreme-event impacts.

Another potential avenue for connectivity includes increased understanding of the root causes of disasters and how this practice can be reframed by the no-natural disasters movement (Gould et al., 2016; Kelman, 2020; Oliver-Smith, 2002). Defining a disaster as a social construction that 'does not happen unless people and cities are vulnerable due to marginalisation, discrimination, and inequitable access to resources, knowledge and support' (Chmutina, von Meding, et al., 2017) centres both CCA and DRR on equity and social justice as well as long-term time frames with a collective outcome. This frame also recognises that the most effective way of addressing the risks posed by climate change, hazards and disasters is to lessen the underlying factors causing vulnerability (Schipper & Pelling, 2006).

Both of these examples highlight the importance of stakeholders and co-production as a key component of increased integration. Traditionally, DRR has largely been a task for local actors, with critical support from national and international organisations, particularly humanitarian action, whereas CCA is primarily driven by the 1992 UNFCCC international agreement and enacted by principal actors at the national level (Schipper & Pelling, 2006). However, increased efforts, primarily at the city-scale, through initiatives such as the Rockefeller/Global Resilient Cities initiative, have created a strong CCA focus at the subnational level (Johnson, 2018) that offers an entry point for scaled integration. Whilst city-scale CCA initiatives have created an impetus for change locally, they have also been used as an argument to justify the withdrawal of national-scale support in favour of a localism agenda (Kythreotis et al., 2020; Lobao et al., 2018). Overall, this may enable a deeper connection between all three policy spaces but reduce the effectiveness of action

when considering global interdependence and broader resilience goals. Downscaling and enhancing CCA activity at local scales and broadening stakeholder engagement in CCRA efforts to increase connectivity with the DRR agenda, therefore, must not be at the expense of national-scale efforts.

Discussion/Conclusion

More and more, there is an underlying acceptance that current responses to extreme events and subsequent disaster situations will no longer be sufficient in a more variable climate where changes are already being seen across the globe. Current responses to extreme events and climate risk are not sufficient. Considerable social, ecological and biophysical impacts and losses that have both direct and indirect short- and long-term effects are being felt, especially in the most vulnerable populations. Making decisions on whether risks are acceptable and, if necessary, obtaining reliable information how those risks can be reduced for human and natural systems is a fundamental foundation for all three of the CCRA, CCA and DDR frameworks. Identifying cross-cutting frames such as equity, that can be used both as facilitators as well as benchmarks in the implementation of these agendas, can provide an important avenue for increased cohesion and connectivity to enable this necessary integration.

References

#NoNaturalDisasters #No Natural Disasters. Available at: https://www.nonaturaldisasters.com/. Accessed 13 Aug 2020.

Adger, W. N., Brown, I., & Surminski, S. (2018). Advances in Risk Assessment for Climate Change Adaptation Policy. *Philosophical Transactions of the Royal Society A – Mathematical Physical and Engineering Sciences, 376*, 20180106. https://doi.org/10.1098/rsta.2018.0106

Adger, W. N., Butler, C., & Walker-Springett, K. (2017). Moral Reasoning in Adaptation to Climate Change. *Environmental Politics, 26*, 371–390. https://doi.org/10.1080/09644016.2017.1287624

Adger, N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D. R., et al. (2009). Are There Social Limits to Adaptation to Climate Change? *Climatic Change, 93*, 335–354. https://doi.org/10.1007/s10584-008-9520-z

ASC. (2016). *UK Climate Change Risk Assessment 2017 Synthesis Report: Priorities for the Next Five Years*. Adaptation Sub-Committee of the Committee on Climate Change.

Aven, T. (2016). Risk Assessment and Risk Management: Review of Recent Advances on Their Foundation. *European Journal of Operational Research, 253*, 1–13. https://doi.org/10.1016/j.ejor.2015.12.023

Banwell, N., Rutherford, S., Mackey, B., & Chu, C. (2018). Towards Improved Linkage of Disaster Risk Reduction and Climate Change Adaptation in Health: A Review. *International Journal of Environmental Research and Public Health, 15*, 793. https://doi.org/10.3390/ijerph15040793

Birkmann, J., & von Teichman, K. (2010). Integrating Disaster Risk Reduction and Climate Change Adaptation: Key Challenges—Scales, Knowledge, and Norms. *Sustainability Science, 5*, 171–184. https://doi.org/10.1007/s11625-010-0108-y

Centeno, M. A., Nag, M., Patterson, T. S., Shaver, A., & Windawi, A. J. (2015). The Emergence of Global Systemic Risk. *Annual Review of Sociology, 41*, 65–85. https://doi.org/10.1146/annurev-soc-073014-112317

Chmutina, K., Jiygasu, R., & Bosher, L. (2017). Integrating Disaster Risk Reduction Including Climate Change Adaptation into the Delivery and Management of the Built Environment. In I. Kelman, J. Mercer, & J. C. Gaillard (Eds.), *The Routledge Handbook of Disaster Risk Reduction Including Climate Change Adaptation*. Routledge.

Chmutina, K., von Meding, J., Gaillard, J. C., & Bosher, L. (2017). Why Natural Disasters Aren't All That Natural. Available at: https://www.opendemocracy.net/ksenia-chmutina-jason-von-meding-jc-gaillard-lee-bosher/why-natural-disasters-arent-all-that-natural. Accessed 13 Aug 2020.

Clark, H., & Gruending, A. (2020). Invest in Health and Uphold Rights to "Build Back Better" After COVID-19. *Sexual and Reproductive Health Matters, 28*, 1781583. https://doi.org/10.1080/26410397.2020.1781583

Collodi, J., Pelling, M., Fraser, A., Borie, M., & Di Vicenz, S. (2019). How Do You Build Back Better So No One Is Left Behind? Lessons from Sint Maarten, Dutch Caribbean, Following Hurricane Irma. *Disasters*. https://doi.org/10.1111/disa.12423

Connelly, A., Carter, J., Handley, J., & Hincks, S. (2018). Enhancing the Practical Utility of Risk Assessments in Climate Change Adaptation. *Sustainability, 10*, 1399. https://doi.org/10.3390/su10051399

Fellenor, J., Barnett, J., Potter, C., Urquhart, J., Mumford, J. D., & Quine, C. P. (2020). 'Real Without Being Concrete': The Ontology of Public Concern and Its Significance for the Social Amplification of Risk Framework (SARF). *Journal of Risk Research, 23*, 20–34. https://doi.org/10.1080/13669877.2018.1501598

Foresight and Government Office for Science. (2011). *Foresight International Dimensions of Climate Change 2011* (Final Project Report). Government Office for Science.

Forino, G., von Meding, J., & Brewer, G. J. (2015). A Conceptual Governance Framework for Climate Change Adaptation and Disaster Risk Reduction Integration. *International Journal of Disaster Risk Science, 6*, 372–384. https://doi.org/10.1007/s13753-015-0076-z

Gianfrate, G., & Peri, M. (2019). The Green Advantage: Exploring the Convenience of Issuing Green Bonds. *Journal of Cleaner Production, 219*, 127–135. https://doi.org/10.1016/j.jclepro.2019.02.022

Gould, K. A., Garcia, M. M., & Remes, J. A. C. (2016). Beyond "Natural-Disasters-Are-Not-Natural": The Work of State and Nature After the 2010 Earthquake in Chile. *Journal of Political Ecology, 23*, 93–114.

Howarth, C., Morse-Jones, S., Brooks, K., & Kythreotis, A. P. (2018). Co-Producing UK Climate Change Adaptation Policy: An Analysis of the 2012 and 2017 UK Climate Change Risk Assessments. *Environmental Science & Policy, 89*, 412–420. https://doi.org/10.1016/j.envsci.2018.09.010

Humphrey, K., & Murphy, J. (2016). UK Climate Change Risk Assessment Evidence Report: Chapter 1, Introduction. Contributing authors: Harris, G., Brown, S., Lowe, J., McCarthy, M., Jevrejeva, S., Watts, G., Johns, D. and Bell, M. Report prepared for the Adaptation Sub-Committee of the Committee on Climate Change, London.

IPCC. (2013). Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

IPCC. (2014). In Core Writing Team, R. K. Pachauri, & L. A. Meyer (Eds.), *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC.

IPCC. (2018). Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

IPCC. (2019). Technical Summary [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, E. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In press.

Iyengar, R. (2020). Education as the Path to a Sustainable Recovery from COVID-19. *Prospects*. https://doi.org/10.1007/s11125-020-09488-9

Johnson, C. A. (2018). Resilient Cities? The Global Politics of Urban Climate Adaptation. In *The Power of Cities in Global Climate Politics. Cities and the Global Politics of the Environment*. Palgrave Macmillan. https://doi.org/10.1057/978-1-137-59469-3_4

Jones, R., & Boer, R. (2003). *Assessing Current Climate Risks. Adaptation Policy Framework: A Guide for Policies to Facilitate Adaptation to Climate Change*. UNDP. Available at: http://www.undp.org/cc/apf.htm. Accessed 10 May 2021.

Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., et al. (1988). The Social Amplification of Risk: A Conceptual Framework. *Risk Analysis, 8*, 177–187. https://doi.org/10.1111/j.1539-6924.1988.tb01168.x

Käyhkö, J. (2019). Climate Risk Perceptions and Adaptation Decision-Making at Nordic Farm Scale – A Typology of Risk Responses. *International Journal of Agricultural Sustainability, 17*, 431–444. https://doi.org/10.1080/14735903.2019.1689062

Kelman, I. (2020). *Disaster by Choice: How Our Actions Turn Natural Hazards into Catastrophes*. Oxford University Press.

King, D., Schrag, D., Dadi, Z., Ye, Q., & Ghosh, A. (2015). *Climate Change: A Risk Assessment*. Centre for Science and Policy, University of Cambridge. Available at: http://www.csap.cam.ac.uk/projects/climate-change-risk-assessment/. Accessed 10 May 2021.

Kythreotis, A. P., Jonas, A. E. G., Mercer, T. G., & Marsden, T. K. (2020). Rethinking Urban Adaptation as a Scalar Geopolitics of Climate Governance: Climate Policy in the Devolved Territories of the UK. *Territory, Politics, Governance*, 1–21. https://doi.org/10.1080/21622671.2020.1837220

Lawrence, J. (2016). Implications of Climate Change for New Zealand's Natural Hazards Risk Management. *Policy Quarterly, 12*(3). https://doi.org/10.26686/pq.v12i3.4605

Lawrence, J., Blackett, P., & Cradock-Henry, N. A. (2020). Cascading Climate Change Impacts and Implications. *Climate Risk Management, 29*, 100234. https://doi.org/10.1016/j.crm.2020.100234

Lenton, T. M., Rockström, J., Gaffney, O., Rahmstorf, S., Richardson, K., Steffen, W., et al. (2019). Climate Tipping Points – Too Risky to Bet against. *Nature, 575*, 592–595. https://doi.org/10.1038/d41586-019-03595-0

Levermann, A. (2014). Make Supply Chains Climate-Smart. *Nature, 506*, 27–29.

Lobao, L., Gray, M., Cox, K., & Kitson, M. (2018). The Shrinking State? Understanding the Assault on the Public Sector. *Cambridge Journal of Regions, Economy and Society, 11*, 389–408. https://doi.org/10.1093/cjres/rsy026

Mastrandrea, M. D., Heller, N. E., Root, T. L., & Schneider, S. H. (2010). Bridging the Gap: Linking Climate-Impacts Research with Adaptation Planning and Management. *Climatic Change, 100*, 87–101. https://doi.org/10.1007/s10584-010-9827-4

Mechler, R., McQuistan, C., McCallum, I., Liu, W., Keating, A., Magnuszewski, P., et al. (2019). Supporting Climate Risk Management at Scale. Insights from the Zurich Flood Resilience Alliance Partnership Model Applied in Peru & Nepal BT – Loss and Damage from Climate Change: Concepts, Methods and Policy Options. In R. Mechler, L. M. Bouwer, T. Schinko, S. Surminski, & J. Linnerooth-Bayer (Eds.), (pp. 393–424). Springer International Publishing. https://doi.org/10.1007/978-3-319-72026-5_17

Mittul, V., & Irina, R. (2019). Reliability of Build Back Better at Enhancing Resilience of Communities. *International Journal of Disaster Resilience in the Built Environment, 10*, 208–221. https://doi.org/10.1108/IJDRBE-05-2019-0025

Murray, V. (2014). Disaster Risk Reduction, Health, and the Post-2015 United Nations Landmark Agreements. *Disaster Medicine and Public Health Preparedness, 8*, 283–287. https://doi.org/10.1017/dmp.2014.75

Nicholls, R. J., & Kebede, A. S. (2012). Indirect Impacts of Coastal Climate Change and Sea-Level Rise: The UK Example. *Climate Policy, 12*, S28–S52. https://doi.org/10.1080/14693062.2012.728792

Oliver-Smith, A. (2002). Theorizing Disasters: Nature, Power, and Culture. In S. Hoffman & A. Oliver-Smith (Eds.), *Catastrophe and Culture: The Anthropology of Disaster* (pp. 23–47). School of American Research Press.

Palutikof, J. P., Street, R. B., & Gardiner, E. P. (2019). Decision Support Platforms for Climate Change Adaptation: An Overview and Introduction. *Climatic Change, 153*, 459–476. https://doi.org/10.1007/s10584-019-02445-2

Papathoma-Köhle, M., Promper, C., & Glade, T. (2016). A Common Methodology for Risk Assessment and Mapping of Climate Change Related Hazards—Implications for Climate Change Adaptation Policies. *Climate, 4*, 8. https://doi.org/10.3390/cli4010008

Patterson, J., Thaler, T., Hoffmann, M., Hughes, S., Oels, A., Chu, E., et al. (2018). Political Feasibility of 1.5°C Societal Transformations: The Role of Social Justice. *Current Opinion in Environment Sustainability, 31*, 1–9. https://doi.org/10.1016/j.cosust.2017.11.002

Pelling, M. (2011). *Adaptation to Climate Change: From Resilience to Transformation*. Routledge.

Reeder, T., & Ranger, N. (2011). How Do You Adapt in an Uncertain World?: Lessons from the Thames Estuary 2100 Project. World Resources Report Uncertainty Series. Washington, DC. Available at: http://www.worldresourcesreport.org/. Accessed 9 May 2021.

Roberts, E., Andrei, S., Huq, S., & Flint, L. (2015). Resilience Synergies in the Post-2015 Development Agenda. *Nature Climate Change, 5*, 1024–1025. https://doi.org/10.1038/nclimate2776

Rockstrom, J., Steffen, W., Noone, K., Persson, A., Chapin, F. S. I. I. I., Lambin, E., et al. (2009). Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecology and Society, 14*. https://doi.org/10.5751/ES-03180-140232

Schipper, L., & Pelling, M. (2006). Disaster Risk, Climate Change and International Development: Scope for, and Challenges to, Integration. *Disasters, 30*, 19–38. https://doi.org/10.1111/j.1467-9523.2006.00304.x

Shortridge, J., Aven, T., & Guikema, S. (2017). Risk Assessment Under Deep Uncertainty: A Methodological Comparison. *Reliability Engineering and System Safety, 159*, 12–23. https://doi.org/10.1016/j.ress.2016.10.017

Stafford-Smith, M., Griggs, D., Gaffney, O., Ullah, F., Reyers, B., Kanie, N., et al. (2017). Integration: The Key to Implementing the Sustainable Development Goals. *Sustainability Science, 12*, 911–919. https://doi.org/10.1007/s11625-016-0383-3

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., et al. (2015). Planetary Boundaries: Guiding Human Development on a Changing Planet. *Science, 347*. https://doi.org/10.1126/science.1259855

Stirling, A. (2010). Keep It Complex. *Nature, 468*, 1029–1031. https://doi.org/10.1038/4681029a

Su, Y., & Le Dé, L. (2020). Whose Views Matter in Post-Disaster Recovery? A Case Study of "Build Back Better" in Tacloban City After Typhoon Haiyan. *International Journal of Disaster Risk Reduction, 51*, 101786. https://doi.org/10.1016/j.ijdrr.2020.101786

Thomalla, F., Downing, T., Spanger-Siegfried, E., Han, G., & Rockström, J. (2006). Reducing Hazard Vulnerability: Towards a Common Approach Between Disaster Risk Reduction and Climate Adaptation. *Disasters, 30*, 39–48. https://doi.org/10.1111/j.1467-9523.2006.00305.x

Thomas, K., Hardy, R. D., Lazrus, H., Mendez, M., Orlove, B., Rivera-Collazo, I., et al. (2019). Explaining Differential Vulnerability to Climate Change: A Social Science Review. *Wiley Interdisciplinary Reviews: Climate Change, 10*, e565–e565. https://doi.org/10.1002/wcc.565

UNDRR. (2019). *Global Assessment Report on Disaster Risk Reduction*. United Nations.

UNISDR. (2009). *Global Assessment Report on Disaster Risk Reduction: Risk and poverty in a changing climate*. United Nations.

UNISDR. (2015). *Global Assessment Report on Disaster Risk Reduction: Making Development Sustainable: The Future of Disaster Risk Management*. United Nations.

United Nations Climate Change Secretariat. (2017). Opportunities and Options for Integrating Climate Change Adaptation with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015–2030. Available at: https://unfccc.int/sites/default/files/resource/techpaper_adaptation.pdf. Accessed 9 May 2021.

Vaijhala, S., & Rhodes, J. (2018). Resilience Bonds: A Business-Model for Resilient Infrastructure. *Field Actions Science Reports [Online]* Special Is. Available at: http://journals.openedition.org/factsreports/4910. Accessed 9 May 2021.

Viner, D., Ekstrom, M., Hulbert, M., Warner, N. K., Wreford, A., & Zommers, Z. (2020). Understanding the Dynamic Nature of Risk in Climate Change Assessments—A New Starting Point for Discussion. *Atmospheric Science Letters, 21*, e958. https://doi.org/10.1002/asl.958

Zscheischler, J., Westra, S., van den Hurk, B. J. J. M., Seneviratne, S. I., Ward, P. J., Pitman, A., et al. (2018). Future Climate Risk from Compound Events. *Nature Climate Change, 8*, 469–477. https://doi.org/10.1038/s41558-018-0156-3

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Section II

Irish Case Studies

5

Enhancing Integration of Disaster Risk and Climate Change Adaptation into Irish Emergency Planning

Peter Medway, Stephen Flood, Dug Cubie, and Martin Le Tissier

Introduction

Globally, and in Ireland, there are clear policy drivers that recommend the integration of climate change adaptation and disaster risk reduction. The European Environment Agency has stated that 'the impacts of weather- and climate-related hazards on the economy, human health and ecosystems are amplified by socio-economic changes and environmental

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changes. Efforts to reduce disaster risk and at the same time adapt to a changing climate have become a global and European priority' (European Environment Agency, 2017). The EU's new Strategy on Adaptation to Climate Change (European Commission, 2021) highlights both how the importance of adaptation is increasingly recognised globally and the lack of preparedness for it. The strategy highlights that climate adaptation action must better leverage synergies with actions for disaster risk prevention and reduction through better coherence in practices, standards, guidance, targets, resources and knowledge, and closer coordination at the national level, at the EU level and, internationally, under the Sendai Framework for Disaster Risk Reduction (UNISDR, 2015). Ireland's National Adaptation Framework (NAF), published in 2018, notes that 'there is a growing recognition at EU/international level of the need for greater integration of emergency planning (particularly disaster risk reduction) and climate change adaptation … [T]his has already begun in Ireland. Under this Framework, it is foreseen that these relationships will continue to strengthen over time' (Department of Communications, Climate Action and Environment, 2018a). Ireland's recently published Strategic Emergency Management (SEM) Guideline 4 on Climate Change Adaptation (Office of Emergency Planning, Department of Defence, 2020) adds that this policy goal is 'consistent with EU and International promotion of greater integration and coherence between stakeholders involved in emergency planning (particularly disaster risk reduction) and climate change adaptation.' However, the desired alignment tends to be informal, ad hoc and inconsistently articulated in national-level policy and planning documents, either as an overarching objective, or as clear operational guidance to achieve integration. It must be noted that Ireland's progress towards integration of climate change adaptation and disaster risk reduction is still at an early stage. The draft fiche for Ireland in the European Commission's Directorate General for Climate Action Preparedness Scoreboard finds that 'There is not an integration of [disaster risk reduction] and [climate change adaptation] policies in Ireland, although there are plans to promote it' (Shine, 2018). The

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question, therefore, is not: should climate change adaptation and disaster risk reduction be better integrated; but how should it be done in Ireland?

Methodology

The research was implemented primarily as a desk study but also sought to engage directly with practitioners to understand the actual and potential role played, both in climate change adaptation and emergency planning and response, by individuals and organisations outside of government systems.[1]

The research hypothesis assumes that: 'The State has primary responsibility to prevent and reduce disaster risk, including that which is exacerbated or caused by climate change.' It also has a corresponding responsibility to manage the residual disaster risk which cannot be prevented or reduced through feasible, affordable actions (Fig. 5.1).



Fig. 5.1 Disaster risk management responsibilities

[1] This chapter provides a high-level summary of the research report: Peter Medway, Dug Cubie, and Martin Le Tissier, *Enhancing Integration of Disaster Risk and Climate Change Adaptation into Irish Emergency Planning* (2020). A literature review was also published as an initial output of the research project: Shannon Greene, Peter Medway, Dug Cubie & Martin Le Tissier, *Literature Review on Enhancing Integration of Disaster Risk and Climate Change Adaptation in Irish Emergency Planning* (July 2020).



Fig. 5.2 SHIELD Model for integration of climate change adaptation and disaster risk reduction. The SHIELD pathways are relevant to all the critical responsibilities of disaster risk management, illustrated at the centre of the diagram

The EU-funded Horizon 2020 ESPREssO Project Enhancing Risk Management Capabilities Guidelines (ERCG) (Lauta et al., 2018) proposes the SHIELD Model as a set of general recommendations for how to optimise risk management capabilities through disaster risk governance (Fig. 5.2). The pathways to integration proposed by the SHIELD Model do not necessarily include every way to enhance or achieve integration, but they summarise the most important areas for action that will contribute to a robust and effective risk governance mechanism. The research also draws on Cubie and Natoli's 'hourglass' model, as presented in Chap. 3 of this volume, on the relationship between the different frameworks for sustainable development, CCA and DRR, namely:

systemic coherence at the international level; vertical alignment between the international, regional and national levels; and horizontal integration of international norms at the domestic level (Cubie & Natoli, 2021). By drawing from examples of European and international good practice, the research aims to highlight their potential applicability in the Irish context, as well as the lessons which can be learned for other countries from the development of integrated approaches in Ireland.

Integration of Climate Change Adaptation and Disaster Risk in Irish Policy and Planning

Ireland has made progress on the production of policies and plans for emergencies and for climate change adaptation over the past 15 years, and herein lies one of the main challenges to integration. Policies and plans have been developed in an iterative but narrowly focused way, dealing with one issue at a time rather than attempting a holistic and integrated approach across climate and disaster domains. The consequence is a series of policies, plans and initiatives that, while individually reasonable, appropriate and often benchmarked against international good practices, can be siloed and may miss opportunities for integration during implementation. This is, in large part, because of the timing of their development and the task or priority-driven focus of the instruments. Coordination opportunities can be missed if the timing of publication of potentially interlinking plans and policies is not well aligned. The Major Emergency Management Framework from 2006 (National Directorate of Fire and Emergency Management, 2006) is an example of this.

The Strategic Emergency Management National Structures and Framework document itself makes very little mention of climate change or its effect on disaster risk. The approval of SEM Guideline 4 on climate change adaptation in December 2020 is a significant step forward, providing an introductory summary in the context of emergency planning. The guideline does not, though, provide any detailed guidance on how to integrate adaptation and risk reduction despite reiterating the need to achieve integration. Detailed guidance has been explicitly left for future iterations and further research. Conversely, the Climate Action Plan's

principal focus is on mitigation of greenhouse gas emissions, with only three of 183 actions focusing on adaptation (including the preparation of sectoral and local adaptation strategies), while connections to disaster risk reduction or management are largely absent. Adaptation is expected to be more prominent in the next iteration of the Climate Action Plan to be published in 2021.

Alignment with Global and Regional Drivers of Integration

Building on the foundational Climate Action and Low Carbon Development Act 2015 and the National Adaptation Framework 2018, the Climate Action Plan 2019 to Tackle Climate Breakdown (Department of Communications, Climate Action and Environment, 2019a) notes that 'the most immediate risks to Ireland which can be influenced by climate change are predominantly those associated with changes in extremes, such as floods, precipitation and storms.' The plan describes the cross-departmental ambition to achieving climate resilience and reiterates its commitment to ensuring the permanent provision of accurate and authoritative information and expertise through Climate Ireland (https://www.climateireland.ie). By the end of 2021, the country's first set of sectoral and local authority adaptation strategies will have been completed. These policies, plans and operational actions represent real, measurable and relatively immediate action for climate change adaptation. As work is in progress, real-time learning and problem-solving is inevitably required to resolve emerging challenges of integration.

Ireland's policy and planning frameworks for emergency planning and climate change adaptation are broadly coherent with global policy and planning frameworks. The climate change instruments in Ireland are aligned with the Paris Agreement to the UN Framework Convention on Climate Change and with the UN Sustainable Development Goals (SDGs), and so include a clear shared logic and regulatory effect. However, implementation may be lagging behind in climate action, with the Sustainable Development Report for 2020 noting that significant

challenges to achievement of the goals remain (Sachs, 2020). The Strategic Emergency Management National Structures and Frameworks describes Ireland's participation in various international areas for emergency management processes, mentioning the United Nations (UN), the European Union (EU), the Organisation for Economic Cooperation and Development (OECD), and the NATO Partnership for Peace (PfP). For example, the SEM Guideline 4 on Climate Change Adaptation is both coherent with global drivers and is well aligned with regional policy and guidance, sharing definitions and categorisation of actions, such as using the 'soft', 'green' and 'grey' categories of adaptation actions as described in the European Environment Agency's report on adaptation in Europe (European Environment Agency (EEA), 2013), among others.

The absence of references to the UN Sendai Framework for Disaster Risk Reduction (UNISDR, 2015) is notable in Irish policy and planning documents. This is despite Ireland's engagement in the negotiation of the framework and on-going promotion of it at the international level via Irish Aid's policies and programmes. Moreover, the concept of DRR as defined in the Sendai Framework goes beyond the definition of mitigation in the SEM National Structures and Framework as it includes reference to the desired outcomes from DRR, namely the need to manage residual, in addition to preventing new and reducing existing, risk (Table 5.1). It also specifically reminds us of the importance of targeting the different components of risk: exposure to the risk, the relative strength and likelihood of the hazard, and the vulnerability of people and assets exposed to the risk. DRR is explicitly connected to wider efforts to strengthen resilience and to achieve sustainable development.

Table 5.1 Comparison of definitions of DRR and mitigation

UNDRR/IPCC	SEM Framework, DoD
Disaster risk reduction is aimed at preventing new and reducing existing disaster risk (exposure, hazard or vulnerability), and managing residual risk, all of which contributes to strengthening resilience and achieving sustainable development	Mitigation as a risk treatment process involves reducing or eliminating the likelihood and/or the impact of an identified hazard. This phase of the emergency management cycle seeks to treat the hazard such that it impacts society to a lesser degree

The broader and better integrated definition of DRR provides important direction towards a more holistic treatment of risk in Ireland, which is helpful for breaking down institutional, technical and thematic silos, even if some of these connections may be implicit in the SEM's definition of mitigation.

It is well established that an individual's vulnerability is affected by socio-economic characteristics such as age, income, gender, housing and health status, among others. Those with low socio-economic characteristics and an associated low adaptive capacity are likely to be less resilient to the impacts of a disaster and to be more profoundly impacted by its negative effects. Analysis shows that approximately 772,000 individuals (23% of the population) or 437,000 households (26% of all households) have levels of social vulnerability to climate hazards above the national average (Climate Ireland, 2020). To date, risk assessment in Ireland has primarily focused on the expected economic cost of disasters as the main driver for identifying relative merits of risk reduction projects, without considering a wider set of socio-economic drivers of vulnerability. Often, risk reduction projects target areas of relatively lower social vulnerability, potentially with a greater value of exposed assets, even though the residents of those areas of higher social vulnerability will benefit less and be disproportionately affected. To achieve equitable resilience and a just transition to a low-carbon, well-adapted society, considering integration of vulnerability indices is merited.

Planning for Climate Change Adaptation and Emergency Management at Sectoral and Local Authority Levels

The planning guidelines set out by government for the design of sectoral and local authority adaptation strategies required the development of a common framework with six steps (Fig. 5.3). These steps were intended to standardise the planning approach taken, provide a rigorous process to identify and prioritise vulnerabilities, and ensure robust implementation, monitoring and learning measures in the strategies.

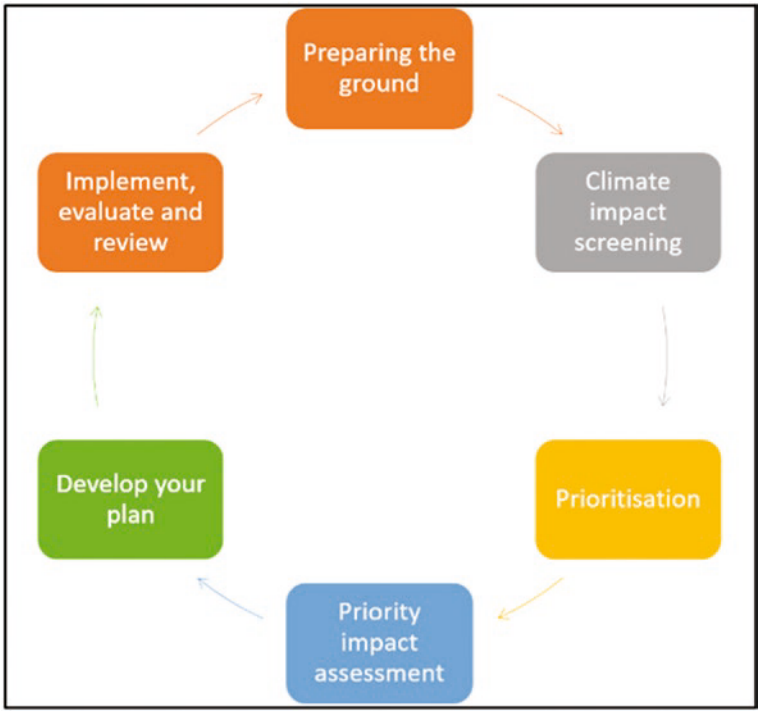


Fig. 5.3 Sectoral and local authority adaptation planning process

However, there are some variations of approach and, consequently, proposed actions taken across the different adaptation strategies. This mostly reflects the different sectoral and local authority assessments and understandings of vulnerability, as well as its prioritisation and treatment. There are also a range of approaches to integration with emergency planning and interaction in the three principal response agencies (An Garda Síochána, Health Services Executive and local authorities). The actions to prevent and reduce new and existing risk are typically quite explicit. Those for the management of residual risk are, more often, implicit. The link between organisations responsible for prevention and reduction of new and existing risk, and those responsible for response to residual risk and planning recovery from events to reduce future risk, are usually not articulated in detail and, in some cases, are entirely absent.

Sector Adaptation Planning

Sectors that have a critical infrastructure and service provision mandate, including transport (Department of Transport, Tourism and Sport, 2019), communication (Department of Communications, Climate Action and Environment, 2019b) and electricity and gas networks (Department of Communications, Climate Action and Environment, 2018d), set out some details about the policy provisions for integrated adaptation and emergency planning. In the communications sector, for example, framework regulations (S.I. No. 333/2011) require operators to report network interruption to the regulator, ComReg. Operators are required not only to repair infrastructure as needed, but '*have a positive obligation to take steps to guarantee the integrity of their networks and to ensure continuity of service is provided*.' This obligation illustrates one type of regulatory incentive for integrated climate change adaptation and disaster risk reduction measures to prevent negative impacts of new risks and to reduce the potential impact of existing risks. In practice, sectors are already planning and implementing adaptation to climate change-induced risk, but typically refer to such planning under the heading of 'business continuity'.

However, there are at least two areas where complex issues are still to be resolved. Irish sectoral institutions are beginning to work in a coordinated fashion under the Critical Infrastructure Working Group, including, among others, the communications and energy sectors, local governments, Irish Water, Climate Ireland and CAROs (Climate Action Regional Offices). The working group is creating a comprehensive inventory of critical infrastructure but faces challenges in reconciling the differing definitions of criticality across different sectors. Mapping the cascade of risks that cross the intersection of different critical infrastructure systems (e.g. flood risk that threatens critical access roads for an electricity sub-station, hospital or fibre-optic cable) is still outstanding. A mechanism to manage the cascading risk across institutional boundaries is also to be established to facilitate the financing and delivery of needed measures to prevent, reduce and manage residual risks at each intersection.

Adaptation strategies for non-critical infrastructure sectors, including those for biodiversity, built and archaeological heritage, agriculture,

forests and seafood, also address links to emergency planning. However, there is considerable variation in how and the extent to which this is carried out. The agriculture, forests and seafood sector adaptation plan (Department of Agriculture, Food and the Marine, 2019) notes the Department's role as lead on emergency planning for animal disease, animal foodstuffs and food safety. It integrates adaptation and emergency planning through actions to 'establish and regularly review contingency plans for emergency response to exotic animal and plant disease/pest outbreaks, feed and food incidents, and deploy such response plans as appropriate.' The Department further coordinates across government to plan for, mitigate and respond to fire and flood risks. For example, it has developed the Prescribed Burning Code for Ireland to support landowners who use regulated burning as a land management tool, and works closely with Met Éireann on the Fire Weather Index and issue of Forest Fire Danger Notices. The Department is also working closely with the Office of Public Works on flood risk management, using flood maps and projections for decision-making. It plays a role as a participant in the National Flood Forecasting Warning Service and in the Inter-departmental Flood Policy Coordination Group which can contribute to co-benefits from adaptation across multiple sectors. Of note, the biodiversity sector integrates well with other sectoral adaptation measures to contribute nature-based solutions, for example, establishing an objective to encourage all sectors 'to consider nature-based solutions as potential low-cost win-win climate change adaptation and mitigation solutions' and as a 'screen for maladaptation' (Department of Culture, Heritage and the Gaeltacht, 2019). The sector bears no lead responsibility for emergency management or disaster risk reduction but is playing a positive role in promoting nature-based solutions to a range of hazards.

Local Authority Adaptation Planning

The principle of subsidiarity is firmly embedded in the management and provision of services and assets in Ireland, with local authorities playing a critical role in the lives of citizens and the economy. Effective action by local authorities is vital for the prevention, reduction and response to

disaster risk, and in climate change adaptation. Moreover, local authorities have a culture and tradition of finding ways to work in a holistic, integrated manner given their broad range of responsibilities. That is not to say that such integrated working is not without challenges at the local authority level. As one research participant noted, it is at the local level where the often siloed workings of national government departments and agencies meet and where problems of policy coherence, or a lack thereof, manifest. The formation of cross-sectoral Climate Action Teams for the formulation of local authority adaptation plans may be an effective model for more integrated working to ensure sustained coordination of implementation measures, and could be extended to address risk reduction from extreme events/disasters.

Local authority roles, responsibilities and planned actions are enshrined in several interconnected commitments, strategies and plans. In 2019, local authorities signed the Climate Action Charter with the Minister for DCCAE (Department of Communications, Climate Action and Environment, 2019a) as part of the National Climate Action Plan. The charter commits local authorities to 23 wide-ranging actions. This includes a commitment to 'continue to identify and develop specific actions to be taken to reduce the risks associated with negative climate change impacts and build resilience to these impacts', although it does not mention integration of adaptation and emergency planning. The overarching strategy to fulfil the commitments in the charter is set out in the City and County Managers Association (CCMA) report entitled 'Delivering Effective Climate Action 2030' (City and County Managers Association, 2019). The strategy provides 'a roadmap with solid objectives for local authorities to work towards maximising their collective impact on Ireland's national climate targets.'

Many examples of local authorities taking integrated action on adaptation and disaster risk reduction exist. Cork County Council has mitigated the risk of coastal erosion and flooding to the R604 roadway at Garrettstown Beach using a 'grey' adaptation approach, installing an erosion control armour block protection system to reinforce the existing sea walls, gabion baskets, rock armour and embankments (CAROs, 2021b). The CCMA strategic goals for climate action place a strong emphasis on working with communities and building local resilience. In Mayo, a community-based

Flood Action Committee was established in Crossmolina as a partnership between residents, traders and the County Council for the dissemination of flood early warning systems and placing of sandbags and other defences. The partnership was instigated by the community which has been exposed to successive floods over recent years, and has been successful enough to be replicated in other communities including Ballina. Many other examples of good practice can be found in the Local Government Management Association (LGMA) 'Profile of Local Government Climate Actions in Ireland' (Clarke & O'Donoghue-Hynes, 2020). The LGMA also notes the drive for more green infrastructure options working with nature, in combination with traditional 'grey' adaptation approaches.

Research Outcomes

Practitioner Perceptions of Risk, Level of Adaptation and Principal Response Agencies' Ability to Cope with Extreme Weather-Related Disasters

Feedback from perception surveys and focus group discussions, conducted with multidisciplinary experts from councils and other institutions from County Mayo, Cork City and the Dublin region, provided a glimpse of progress as well as areas where further work may be needed to achieve integration of climate change adaptation and disaster risk. The questions posed to the groups aimed to elicit their opinions on issues such as levels of existing risk, organisational capacity and pathways for adaptation.

The responses provided by participants clearly suggested that while much progress had been made over recent years, there was still much to be done to reduce and adapt to the risks that are likely to be increased by climate change. In terms of the perception of different types of risk, responses covered a wide range. For instance, river flooding was considered a slightly higher risk that is less well adapted to than others, such as surface water flooding, droughts and heatwaves, and storms. The differences in perception of severity between hazard types was not so great as to offer a meaningful sense that one represented an overwhelming

priority, such that an all-hazard approach continues to be merited. Overall, respondents agreed that emergency services had done a rather good job in response to the various extreme weather events experienced in Ireland. Many focus group participants remarked upon the effective ways that emergency services reviewed responses and learned from them to improve future outcomes. Respondents were mostly positive about the work their organisations had done towards the integration of climate change adaptation and disaster risk around the five pathways included in the survey.[2] Feedback in the focus group discussions was realistic, though about the need for further progress. Their perceptions suggested that the most progress had been made on communications and stakeholder engagement, knowledge management and coordination. More work was needed on capacity building and, in particular, financing for personnel and training, infrastructure (e.g. flood defences) and equipment (e.g. fire response vehicles). The generally very positive perception of the emergency services' incident response performance was juxtaposed with the perceptions that significant further work is needed to reduce and prevent risk, which highlights the need to reduce the strain on emergency services in future as overall levels of risk grow as a result of climate change. In the absence of an integrated approach to climate change adaptation and disaster risk reduction, the possibility of overwhelming response capacity is real.

Practitioner Perceptions of the Six Pathways to Integrated Climate Change Adaptation and Disaster Risk Reduction

The current situation regarding the integration of climate change adaptation and disaster risk reduction in Ireland in the context of the six SHIELD pathways (Fig. 5.2), and some of the main challenges identified by the participants, is summarised below.

[2]To reduce the time it took for respondents to complete the survey the team condensed the six pathways of the SHIELD model to five, amalgamating communication and stakeholder engagement.

Sharing Knowledge

The ESPREssO Guidelines identify four key issues, all of which were variously identified in Ireland. The key issues are: the lack of awareness of the need to share knowledge; the risk of information overload; data and information as value; and knowledge silos. Noting these challenges, we must also consider who shares what knowledge when, how, why and with whom. The need for a curated information management system for adaptation will increasingly be met by Climate Ireland, the country's climate information platform, which became operational in 2018. The platform has been established under the Environmental Protection Agency (EPA) as the permanent curated repository of information that connects policymakers and practitioners at different levels with the science of climate change, provides support for hazard and risk analysis, policy-making and planning, and undergoes constant improvement based on government and user requirements.

The four CAROs also play an important role in sharing knowledge which includes liaising with third-level research establishments, the EPA-led Climate Research Group and overseas institutions, predominantly in the UK and Europe. Combined with the practical support to local authorities for the implementation of adaptation strategies as well as engagement with the departments and agencies delivering sectoral adaptation, the CARO role extends to supporting the application of shared knowledge. Research participants remarked upon the low level of awareness of climate change adaptation across all practitioner groups within local authorities as a constraint in the design of adaptation strategies. Climate Ireland provides training and technical assistance to local authorities and others through networks such as the Local Government Managers Association and the City and County Managers Association. The training plan to raise awareness of 2900 local authority staff on climate change adaptation is being rolled out in 2021 alongside an introductory course for local authority senior management.

Harmonising Capacity

The ESPREssO Guidelines note that 'identifying and ensuring the necessary expertise, equipment, and other forms of capacities within public

institutions is crucial for implementing disaster risk governance.' Ensuring that people with expertise and experience in hazard, risk and vulnerability analysis and management are distributed vertically and horizontally, broadly in line with risk profiles, and that investment in the development and maintenance of relevant knowledge and skills is sustained, are both important tasks.

Participants in both local authorities and departments and agencies responsible for sectoral adaptation expressed concern about having insufficient capacity to accomplish their climate action goals. This was echoed by some first responders, for example, in fire services, who noted that while they were currently able to keep up with demand, they would require more human and material capacity if demand continues to grow. Local authorities noted the rapid growth of policy commitments and plans on climate actions of all kinds (such as the Climate Action Charter for Local Authorities) and a growth of governance tasks including reporting and planning, but also a lack of significant additional capacity to deliver these new responsibilities. Some additional capacity is provided to local authorities by CAROs who themselves, in collaboration with the CCMA, are making the case for additional central funding to enhance capacity within the CAROs and local authorities. Participants raised questions about the availability of human resources and funds to implement the forthcoming Climate Action Plans being prepared in 2021. Numerous contributions also noted that local authority personnel have, in many cases, taken on climate change adaptation related tasks as part of their regular role without a background in climate services, education or training, with staff inevitably facing a steep learning curve. Those with technical backgrounds, such as engineering, reported being better prepared for such additional responsibilities.

Institutionalising Coordination

The ESPREssO Guidelines note that post-disaster evaluations often document failures in communication and coordination. To make coordination effective for integration of adaptation and disaster risk it is important to go beyond effective operational coordination of responses by making

connections between all steps of the disaster management cycle as reflected in Ireland's SEM framework.

Research participants referenced the positive impact of informal coordination and information-sharing networks using social media groups, the effective teamwork and coordination of local authority level Climate Action Teams in creating multi-sectoral climate adaptation plans, the supportive role of CAROs and the utility of MEM regional working groups, and coordination between state and voluntary emergency services and community groups, among other initiatives and structures. Cork City Council staff provided positive feedback on the work of their Severe Weather Assessment Teams and Flood Assessment Teams as examples of multidisciplinary coordinated actions to address disaster risk.

Several additional challenges were also identified. These included the increased complexity of coordinating across organisations and the need to understand budgets, ways of working and priorities of a growing stakeholder group at the local authority level. Other participants reflected on the challenge of harmonising coordination mechanisms within and across local authorities with transboundary systems such as river basins, and integrating information systems such as rain gauges for early warning. Finally, the establishment of sustainable coordination methods with a diverse range of voluntary and community-based actors for adaptation and emergency response/recovery is challenged by mandate clarity, jurisdictional levels and the diversity of adaptation-relevant tasks.

Engaging Stakeholders

Climate change adaptation and disaster risk reduction for resilience are tasks that require the understanding and contribution of a wide range of stakeholders across Irish government and society. The new EU Strategy on Adaptation states that the 'gravity of the adaptation challenge makes it a whole-government and whole-society endeavour.' Government alone cannot deliver the changes needed to achieve a sufficient level of resilience.

The ESPREssO Guidelines articulate a clear call for stakeholder inclusion, reflecting the Sendai Framework among other international agreements. The guidelines note that engaging stakeholders in the complex

agendas of Disaster Risk Reduction and Climate Change Adaptation is not easy given the range of different issues, agendas and interests of relevance. They identify some common challenges to overcome, including how to identify and engage with the right stakeholders in different aspects of the process, and determine the right way to engage them.

Focus group responses suggest that participants are confident that local authorities are performing well with stakeholder engagement. Some positive examples of engagement were reported, including flood action committees in County Mayo, engagement through Public Participation Networks and the proliferation of community-led initiatives where risk reduction co-benefits are built into collaborations, such as where public green spaces serve a flood attenuation purpose. Participants were not complacent about the level of effort and other costs needed by both government institutions and external stakeholder groups to sustain engagement over time, such as with the challenges arising from competing interests and the readiness of existing collaborators, like the established voluntary emergency services, to adapt and take on new tasks related to disaster risk reduction and climate change adaptation.

Noting the challenge of understanding and creating awareness of adaptation and its application, discussed above under the sharing knowledge pathway, the literature and some of Ireland's policy and planning frameworks recommend resilience-building as the ultimate goal of adaptation and disaster risk reduction, as well as the organising principle for stakeholder engagement. The SEM National Structures and Framework guideline on climate change adaptation, for example, states that 'the aim of adaptation is to reduce the vulnerability of our environment, society and economy, and increase resilience.' The resilience outcome can be more systematically employed to motivate and measure stakeholder engagement in Ireland through policy, communication, coordination, knowledge management, capacity building and financing mechanisms. As a starting point, a comprehensive stakeholder analysis for building a resilient Ireland is recommended. While many stakeholders are already well-known and engaged, some are not. To create a whole-society collective effort in building resilience to extreme weather events government, should have a clear understanding of stakeholder awareness, their information needs and how best to engage them.

Leveraging Investment and Financing

The ESPREssO guidelines highlight the critical insight that investment in disaster risk reduction reduces the cost of response and recovery in the long-term. However, governments are challenged by having to prioritise an investment that will not deliver immediately visible benefits.

Focus group participant responses suggest that the question of financing adaptation and disaster risk reduction is where the most work still needs to be done. The issue is a multifaceted one that relates not only to the amount of money available for investment, but how resources are allocated, what commitment, if any, is in place to sustain financing for the long-term and what rules govern the use of particular streams of funding. A review of current local authority adaptation plans shows that many of the actions proposed are not included within any specific budget lines. This may be more an issue of timing than the lack of available funds, as some of the proposed actions are not yet integrated into year-on-year budgets. However, research participants working in local authorities tended to see a lack of resources as a major constraint, whereas people working in central government or national agencies tended to consider that funding for adaptation and disaster risk reduction was largely adequate. Given the increasingly lengthy list of tasks and investments that sectors and local authorities are expected to make for adaptation and disaster risk reduction, an appraisal of funding mechanisms and the quantum of funds available to them is merited.

Ireland's commitment to 'green budgeting' suggests that a political investment in long-term financing to achieve profound structural changes by 2050 has been made. Regular renewal of the political consensus on the need for long-term investment in adaptation and disaster risk reduction is needed. This helps to sustain the commitment to long-term change beyond the typically short-term planning horizons of elected representatives, giving confidence to planners, implementers, the public and other critical stakeholder groups that Ireland will achieve its transition to a low-carbon and highly adapted economy. The consensus should set out the reciprocal responsibilities of the state and its citizens, detailing when, how and where the State will step in to deal with the consequences of

climate change, and when individuals and communities must take responsibility. Long-term financing solutions can then be developed based upon agreed responsibilities. This is consistent with the OECD Green Budgeting Framework's Building Block 1 for a Strong Strategic Framework where government's strategic priorities and objectives relating to the environment and climate are clearly set out so as to help inform fiscal planning. This in turn helps 'guide tax and spend decisions so that they can support the achievement of national objectives' (OECD, 2020). 'Green budgeting' may offer ways to ensure that funding is targeted more effectively on needs rather than on what one research participant identified as 'quick wins', and facilitate funding for important projects that may be less visible or politically appealing.

A significant challenge to overcome is the improvement of cost-benefit analysis for adaptation and disaster risk reduction investment. It is difficult to accurately assess the cost of present and future disaster risks to the economy, and to determine what is being spent within existing funds that has an adaptation or risk reduction effect. Technical developments as part of the 'green budgeting' process can address some of these problems. Accelerating the roll-out of 'green budget' tagging to incorporate both positive and negative budget measures (those that either enhance or detract from adaptation and disaster risk reduction outcomes) in sectors with active adaptation plans and local authorities, and tagging disaster risk reduction and adaptation expenditure separately from mitigation expenditures, would help give greater clarity on financing issues. This is in line with the OECD's Principle 4/10 for effective 'green budget' tagging (OECD, 2021). Digging deeper, extending 'green budget' tagging to a level of granularity beyond programme sub-head level, would enable local authorities and other sectoral institutions to more easily track the cost of managing climate change-related risks and to eliminate duplication in current funding. Local authorities are already developing approaches to improve financial analysis and management for disasters that may be suitable for scale-up. For example, Cavan County Council has piloted an approach to quantifying the costs of storm damage by subcategorising all expenditure made by relevant departments (CAROs, 2021a).

Developing Communication

The core message in the National Adaptation Framework's section on Emergency is that 'effective climate adaptation can minimise risks and costs and also protect lives and property by building resilience into existing systems. This can ultimately help minimise the emergency response that is necessary in response to severe weather events.' This is a simple and compelling headline message. However, many of the respondents expressed the view that there is a significant lack of awareness and understanding of adaptation in Ireland. The ESPREssO guidelines note that in increasingly knowledge-based societies like Ireland, a failure to communicate effectively about climate change adaptation and disaster risk reduction, and the actions that citizens and other stakeholder groups should take, will completely undermine the ability of a country to manage its risk.

Several participants noted the effectiveness of communications in managing the Covid crisis and suggested that lessons, such as the importance of using clear, concise language and focusing on personal behaviour, may be helpful in the further development of communications for climate change adaptation and disaster risk reduction. While many of the tasks for adaptation and disaster risk reduction are devolved to the local authority level for implementation, there is a strong case for a long-term, national-level, general communication campaign to change the low level of risk awareness among the general public. Such a campaign may bring together the various existing initiatives, such the 'winter ready' and 'summer ready' campaigns, while creating new content and means of engagement through social media. As a long-term initiative, a campaign must include an element in the education system that, in conjunction with an effective curriculum, will ensure that young people complete their education with the knowledge, skills and values to enable them to reach their full resilience potential.

Conclusions

Policies, plans, institutions and processes to adapt to climate change and to reduce disaster risk in Ireland are becoming well established. The objective to integrate actions for climate change adaptation and disaster risk

reduction is clearly articulated in policy, although the practical arrangements for who, what, when and how have been left open. Institutions are beginning to work with their peers and collaborators at different levels of government to determine the ways forward, overcome long-established silos and share information more effectively. By increasing the ability of Irish systems to reduce, avoid or transfer new and existing risk the result should be to reduce the impact of unmitigated residual risk.

Based on the research undertaken, and in conjunction with a detailed series of recommended actions for different stakeholders, we identified six overarching conclusions for the integration of climate change adaptation and disaster risk reduction in Irish emergency planning. They are:

1. The 5-stage model for emergency planning in the MEM and SEM frameworks implies seamless integration of the main stages. In reality, the integration of mitigation and recovery (the areas of greatest relevance for the integration of climate change adaptation are not as well integrated into the emergency planning system as they could be. The focus of both the MEM and the SEM is, in practice, primarily on response.
2. Applying the three objectives of disaster risk management – prevention of new risk, reduction of existing risk and management of residual risk – alongside the 5-stage model may facilitate clarity of role and purpose for lead government departments and their support organisations under the SEM in areas where integration with climate change adaptation is helpful.
3. The main adaptation challenge for principal response agencies, then, is to ensure that their capacity is at least equal to the changing levels of climate change-influenced hazards, community exposure and vulnerability. Sectoral agencies and local authorities must integrate adaptation in multiple ways throughout their service provision and infrastructure operation and maintenance responsibilities.
4. There are currently two discrete systems for the governance, management and coordination of climate change adaptation and disaster risk reduction at the national level. Identifying ways to coordinate expectations for integration and align incentives, priorities and planning processes will facilitate further integration at all levels of government.



Fig. 5.4 Pathways to integration

5. Sequencing policy-making, planning and research so that initiatives at different levels of government are coherent, mutually reinforcing and, consequently, easier to implement and more impactful.
6. To achieve integration, all future policies and plans should be specific about the six pathways of sharing knowledge, harmonising capacity, institutionalising coordination, engaging stakeholders, leveraging investment and developing communications. This will help to clarify the who, what, when and how questions that institutions are currently addressing iteratively and in a way that is consistent with the existing model for disaster risk management in Ireland, as described in the MEM Framework and SEM National Structures and Framework.

Our research finds that if attention is paid to each of the six pathways in future policies, plans and their implementation, Ireland will more readily achieve the benefits of integrated climate change adaptation and disaster risk reduction, resulting in more resilient communities. This is summarised in Fig. 5.4, above.

References

CAROs (Climate Action Regional Offices). (2021a). CARO Case Studies. [Online] Available at: https://www.caro.ie/projects-research/case-studies/nature-based-flood-relief-scheme. Accessed 30 Aug 2021.

CAROs (Climate Action Regional Offices). (2021b). Case Study: Cork – Beach Coastal Protection Works. [Online] Available at: https://www.caro.ie/projects-research/case-studies/beach-coastal-protection-works. Accessed 30 Aug 2021.

City and County Managers Association. (2019). *Delivering Effective Climate Action 2030*. CCMA.

Clarke, D., & O'Donoghue-Hynes, B. (2020). *A Profile of Local Authority Climate Actions in Ireland*. LGMA Research.

Climate Ireland. (2020). *Mapping Vulnerability to Environmental Hazards in Ireland*. University College Cork.

Cubie, D., & Natoli, T. (2021). Coherence, Alignment and Integration: Understanding the Legal Relationship Between Sustainable Development, Climate Change Adaptation and Disaster Risk Reduction. In S. Flood, Y. Jerez Columbié, M. Le Tissier, & B. O'Dwyer (Eds.), *Increasing Resilience to Climate Change: Integrating Disaster Risk Reduction, Sustainable Development Goals and Climate Change Adaptation Agendas*. Palgrave Macmillan.

Department of Agriculture, Food and the Marine. (2019). *Agriculture, Forestry and Seafood Climate Change Sectoral Adaptation Plan*. Government of Ireland.

Department of Communications, Climate Action and Environment. (2018a). *National Adaptation Framework: Planning for a Climate Resilient Ireland*. Government of Ireland.

Department of Communications, Climate Action and Environment. (2018b). *Local Authority Adaptation Strategy Development Guidelines*. Government of Ireland.

Department of Communications, Climate Action and Environment. (2018c). *Sectoral Planning Guidelines for Climate Change Adaptation*. Government of Ireland.

Department of Communications, Climate Action and Environment. (2018d). *Climate Change Adaptation Plan for the Electricity and Gas Networks Sector*. Government of Ireland.

Department of Communications, Climate Action and Environment. (2019a). *Climate Action Plan 2019 to Tackle Climate Breakdown*. Government of Ireland.

Department of Communications, Climate Action and Environment. (2019b). *Draft National Adaptation Plan for the Communications Sector*. Government of Ireland.

Department of Culture, Heritage and the Gaeltacht. (2019). *Biodiversity Climate Change Sectoral Adaptation Plan*. Government of Ireland.

Department of Transport, Tourism and Sport. (2019). *Transport Climate Change Sectoral Adaptation Plan*. Government of Ireland.

European Commission. (2021). *Forging a Climate-Resilient Europe -the New EU Strategy on Adaptation to Climate Change*. European Commission.

European Environment Agency (EEA). (2013). *Adaptation in Europe: Addressing Risks and Opportunities from Climate Change in the Context of Socio-Economic Developments* (EEA Report No. 3/2013). Publications Office.

European Environment Agency (EEA). (2017). *Enhancing Coherence of the Knowledge Base, Policies and Practices* (EEA Report No. 15/2017). European Environment Agency.

Greene, S., Medway, P., Cubie, D., & Le Tissier, M. (2020). Working Paper. Literature Review on Enhancing Integration of Disaster Risk and Climate Change Adaptation in Irish Emergency Planning. [Online] Available at: https://www.ucc.ie/en/media/academic/law/LiteratureReview_CCA_DRM_FINALJuly2020.pdf. Accessed 30 Aug 2021.

Lauta, K. C., Albris, K., Zuccaro, G., & Grandjean, G. (2018). *ESPREssO Enhancing Risk Management Capabilities Guidelines*. European Union.

National Directorate of Fire and Emergency Management. (2006). Major Emergency Management. [Online] Available at: http://www.mem.ie. Accessed 30 Aug 2021.

OECD. (2020). *OECD Paris Collaborative on Green Budgeting. Green Budgeting Framework: Highlights*. OECD.

OECD. (2021). *Green Budget Tagging: Introductory Guidance & Principles*. OECD Publishing.

Office of Emergency Planning, Department of Defence. (2020). *Strategic Emergency Management Guideline 4 Climate Change Adaptation*. Government of Ireland.

Sachs, J. (2020). Sustainable Development Report – Ireland. [Online] Available at: https://dashboards.sdgindex.org/profiles/irl. Accessed 11 Mar 2021.

Shine, T. (2018). *Climate Resilient Ireland* (2018-CCRP-SS.12). Environmental Protection Agency.

UNISDR. (2015). *Sendai Framework for Disaster Risk Reduction*. United Nations.

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6

Clothing the Emperor: Supporting National Climate Change Action in Ireland Through Local Governance Networks

Glen Smith

Introduction

> 'The Emperor has no clothes.' (Saoi O'Connor, Cork city school climate striker)

Saoi O'Connor was one of the first school strikers for climate in the city of Cork, Ireland. Every Friday during 2019, she would sit outside Cork City Hall with a sign that expressed her outrage at the way adults were responding to the climate crisis. At the age of sixteen, she took the decision to stop attending regular school and commit to home schooling and organising actions for the fight against climate change. Saoi went on to address the Fridays for Future press conference at the United Nations Climate Change Conference (COP25) in Madrid. Here, she claimed that

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the language of climate change talks, especially at the United Nations (UN) level, was kept deliberately technical and heavy on the use of jargon in order to keep the general public from fully understanding the content. Saoi's protest sign from the streets of Cork is not heavy on the use of jargon. It reads 'The Emperor has no clothes', a slogan inspired by Hans Christian Andersen's tale *The Emperor's New Clothes* (Andersen, 1949). The Emperor in this case is the Irish Government. Saoi is suggesting that the Irish Government's strategy for tackling the climate crisis does not go far enough. Policies upon policies and reports upon reports are doing an increasingly poor job of concealing a lack of action. Some might deem this an overly harsh criticism, but the slogan does invite us to explore how Ireland is responding to the climate crisis, and if there is room for improvement.

The fight against climate change (referred to in this chapter as 'climate action') underpins the survival of socio-ecological (human-nature) systems. Climate change impacts – rising sea levels, more frequent and intense storms, floods, droughts and extreme cold and hot temperature shocks – are indeed an existential threat (Kjellstrom & McMichael, 2013; Thuiller et al., 2005). Climate action seeks to counteract this threat through both mitigation and adaptation measures. Mitigation involves addressing the causes of climate change, most notably by reducing greenhouse gas emissions. Mitigation efforts are essential, but we are witnessing the impacts of climate change on a more regular basis and must begin to adapt to these. Adaptation measures are designed to make our systems, infrastructures and behaviours more resilient to climate change impacts.

Climate action is also intricately interwoven with disaster risk reduction (DRR) and the Sustainable Development Goals (SDGs). For example, the infrastructure needed to supply farmers, process and transport the harvest, and manufacture and distribute consumables to customer sale points needs to remain free of disruption. Storms and droughts can disrupt this process at multiple points. Should the chain be broken, the livelihoods of food producers can be seriously affected, as can wider food security. Vulnerabilities in food production chains undermine our attempts to achieve the goal of zero hunger (SDG2). Conversely, an educated society that is free of poverty and hunger can potentially commit more time and energy to climate action. Similar causal links can be

drawn between all of the SDGs. A recent report by the World Economic Forum clearly maps out the systemic connections between failing climate action and food crises, biodiversity losses, involuntary migration, water crises and a host of other global risks (WEF, 2020). These processes do not only affect the Global South; they also affect countries such as Ireland.

Efforts are ongoing in Ireland to integrate these three policy areas. The Irish Government contributed to the Sendai Framework for Disaster Risk Reduction 2015–2030 and produced a Sustainable Development Goals National Implementation Plan for 2018–2020. There is also clarity on how these actions should be governed. For example, the Minister for Communications, Climate Action and the Environment has overall responsibility for promoting the SDGs in Ireland. For each SDG target, the lead and stakeholder government departments will be named, with the list constantly updated. A number of 'SDG champions' have also been named, which are national organisations who can leverage appropriate action. The list is diverse and includes An Post (the postal service), Vodafone and the Irish Congress of Trade Unions.

Robust and flexible governance systems are essential for implementing policy and, where necessary, changing policy. This chapter considers the governance of climate action in Ireland, the next section provides some relevant governance theory, and the subsequent two sections outline Ireland's climate change policy and how its implementation is governed respectively. The town of Youghal, County Cork is then presented as a useful case study of local governance processes. The chapter concludes with ideas for how the emperor might be clothed.

Governance: Theoretical Concepts

A governance system helps organise people and their actions. These actions can be understood as the management tools that affect a system. Norway's series of financial incentives for purchasing and running electric cars is an example of a management tool to support climate change mitigation. A procedure for the assessment of the structural integrity of roads and buildings after extreme weather events is an example of a

climate change adaptation (CCA) management tool. Governance, on the other hand, is the process of organising people around these tools. A governance system helps determine how these processes are designed, who oversees them and how they might be changed, improved or discarded. Patsy Healey (2003) describes governance as 'the processes by which societies, and social groups, manage their collective affairs' (p. 104). In short, governance manages the rules of the game (Kjaer, 2004).

According to governance theory, governing is not something done exclusively by those at the top of a hierarchical system. It can happen at various levels and in formal and informal settings. In fact, it can be said that the 'new political culture no longer places much faith in solutions imposed from above, increasingly relying instead on a network of decision-making relationships that link government and civil society across many scales' (Van Driesche & Lane, 2002: 283). As a result, 'changes have taken place in the forms and mechanisms of governance, the location of governance, governing capacities and styles of governance' (Kersbergen & Waarden, 2004: 143). Governance is a process of continual negotiation. This continual negotiation occurs in a polycentric system (Morrison et al., 2017). Polycentric governance systems are multi-scalar and made up of many autonomous units which take account of one another through mutual adjustment.

These descriptions of modern governance invite us to engage with questions of power. Who has a say in management processes? Who is marginalised, either through design or unintentionally? How does this occur? This is often a question of incentives. Incentives are central to our (in)action on climate change. For example, Saffron O'Neill and Sophie Nicholson-Cole have demonstrated how the fear generated by the media around climate change might be useful for attracting people's attention, but it is ineffective for driving changes in personal behaviour (O'Neill & Nicholson-Cole, 2009). In fact, hope has been proven to be a more powerful incentive (Nabi et al., 2018). However, incentives also play a key role on a systemic level, beyond the behaviour of the individual. The incentives of powerful actors can shape policy direction or determine actions that continue in spite of that policy (Clarke & Flannery, 2020; Smith & Jentoft, 2017; Tafon, 2018). To achieve transformational change, 'we need to ensure that the impact drivers working towards such

a change are stronger than the impact drivers that cause climate change' (Uitto et al., 2017: 31). This requires effort 'outside of climate change action' (Ibid.) to actively dissuade non-sustainable natural resource use.

The Emperor's Clothes

Since 2015, Ireland has accelerated its progress towards delivering comprehensive climate change policy. The Climate Action and Low Carbon Development Act 2015 paved the way for a series of policies aimed to support both mitigation and adaptation actions. The main policies relevant to climate change include:

- The National Planning Framework (Project Ireland 2040) (DHPLG, 2018)
- The National Mitigation Plan (NMP) (DCCAE, 2017)
- The National Adaptation Framework (NAF) (DCCAE, 2018)
- The Climate Action Plan (CAP) (DCCAE, 2019)
- Twelve Sectoral Adaptation Plans
- Local Authority Climate Change Adaptation (CCA) Strategies

Ireland is beginning to introduce more climate change adaptation measures in addition to mitigation efforts, following the global trend to do so (Di Gregorio et al., 2017; Thornton & Comberti, 2017). The Government has stated that 'sufficient robust information now exists nationally to further progress the process of implementing adaptation actions and increasing social, economic and environmental resilience to climate change' (DCCAE, 2018). The policies listed above contain a wide range of actions and objectives that outline exactly how the nation can incorporate climate change thinking into the way it builds, travels, consumes, works and relaxes. The CAP alone contains 183 actions spread over the areas of the current state of play, governance, carbon pricing, electricity, enterprise, the built environment, transport, agriculture, forestry and land use, waste and the circular economy, the public sector leading by example, citizen engagement, community leadership and just transition, and adaptation. An 'all-of-government' approach helps ensure

that climate change is taken seriously in all government departments (DCCAE, 2019). The sectoral plans and local authority strategies do the same for all industries and lower administrative levels.

The example of transport infrastructure helps demonstrate how climate actions cascade through the various administrative levels in Ireland. The National Planning Framework (Ireland 2040) defines its National Strategic Outcome 2: Enhanced Regional Accessibility as:

> Enabling more effective traffic management within and around cities and re-allocation of inner-city road-space in favour of bus-based public transport services and walking/cycling facilities. (DHPLG, 2018: 140)

So, from a planning perspective, it appears that more emphasis will be based in future on transitioning away from car-use in urban areas towards alternative modes of transport, including buses. The National Development Plan (2018–2027) adds a stronger climate change element by outlining the following investment action:

> Transition to low emission buses, including electric buses, for the urban public bus fleet, with no diesel-only buses purchased from July 2019, while promoting commercial bus services and small public service vehicle industry to pursue low emission fleet. (Irish-Government, 2018: 54)

Continuing with this theme, the CAP includes in Action 87 (abridged):

> All future procurement processes for public buses will include evaluation of procuring only fully electric buses. This evaluation will include review of how electric buses have been introduced into other cities in a cost-effective way, including London, Paris and Manchester. (DCCAE, 2019: 96)

From the Ireland 2040 ambition to provide more effective traffic management, we now see the addition of greener choices. Not only should more bus travel options be provided but these should, where possible, involve only fully electric buses. The Transport Sectoral Climate Change Adaptation Plan integrates relevant actions into the transport sector. This policy marks a departure from pure mitigation thinking (such as introducing electric bus fleets) and explores how the infrastructure might be

kept running during system shocks, such as 'acute weather events', which constitutes adaptation. For example, Action 16 states:

> Continue engagement with disaster risk management for transport through active participation with the Office for Emergency Planning and the National Directorate for Fire and Emergency Management to ensure operational continuity and service delivery during acute weather events. (DTTS, 2019: 89)

Action 21 also states:

> Support implementation of remote working initiatives, including expansion of effective broadband connectivity, to facilitate remote working when travel is inhibited during extreme weather events. (DTTS, 2019: 90)

Whilst these actions would extend beyond bus services, they are clear examples of adaptation measures whereby steps are taken to ensure that a service either continues to operate under abnormal conditions or that users have alternative options. The Irish Transport Sectoral Climate Change Adaptation Plan is also relatively advanced in considering links to the SDGs. Under 'Related UN SDGs' for Action 16, for example, it lists numbers 3, 6, 7, 8, 9, 11, 13, 14 and 15. For Action 21, it lists 7, 9, 11, 12 and 13.[1] This is more comprehensive than some of the related policy documents in Ireland that often only state in the introduction that the SDGs need to be taken into consideration. Finally, the most localised climate policy level is that of the Local Authority Climate Adaptation Strategies. In the example of Cork, the most relevant are Actions 22 and 23 respectively:

> Establish a procedure for structural integrity assessments of infrastructure after extreme weather events.
>
> Integrate climate considerations into the design, planning, tendering process and construction of all transport infrastructure. (CCC, 2019: 51)

[1] Actions 16 and 21 of the Irish Transport Sectoral Climate Change Adaptation Plan collectively list SDGs: 3 – Good Health and Well-Being; 6 – Clean Water and Sanitation; 7 – Affordable and Clean Energy; 8 – Decent Work and Economic Growth; 9 – Industry, Innovation and Infrastructure; 11 – Sustainable Cities and Communities; 12 – Responsible Consumption and Production; 13 – Climate Action; 14 – Life Below Water; 15 – Life on Land.

The actions at this administrative level are relatively vague but the document is backed up by national policies. Individual (town) development plans would also reference these national policies on a case-by-case basis.

It should be noted that the example list of actions provided here is not exhaustive. Individual transport projects might refer to the Flood Risk Management Climate Change Sectoral Adaptation Plan, for example. But what this exercise has hopefully demonstrated is that a clear, hierarchical trail of actions can be traced through policies at various administrative levels in Ireland. These are the Emperor's clothes.

Governing Climate Change Action in Ireland

As mentioned, the Climate Action and Low Carbon Development Act of 2015 gave momentum to Ireland's action on climate change. It also marked the beginning of a concerted effort to organise people for this purpose. Multiple new agencies and institutions were set up, or the remit of existing ones amended. Some standout elements of this governance infrastructure include:

- Establishment of the **National Adaptation Steering Committee** 'to provide assistance and guidance to the various sectors (including local authorities) in the development of their sectoral/local-level adaptation plans.' (page 20)
- Inclusion of local government representation on the Committee to boost communication between governance layers (Ibid.)
- Establishment of **Climate Action Regional Offices (CAROs)** to help drive climate action and plan development at regional and local levels, and provide local authority capacity building (based on anticipated overburdening of local authorities)
- Creation of a **High Level Climate Action Steering Group** with representation from all relevant government departments and agencies. Meets quarterly to drive progress by sectors and agencies to implement the NMP and NAF
- Creation of the **Climate Change Advisory Council** 'to provide independent advice and to make recommendations to the government and ministers in relation to the low-carbon transition process and the adaptation agenda.' (page 21)*

- An **Adaptation Committee** was added to the Climate Change Advisory Council in 2016 with representation from science, local authorities and sectors

The interconnectedness of these groups, councils and committees is as comprehensive as it is complex. The overarching goal of this infrastructure is to ensure that processes and actions do not go uninformed, and that expert advice is integrated at all stages. Citizen and stakeholder input is also sought where possible, such as through the National Dialogue on Climate Action (NDCA). The NDCA aims to create awareness, engagement and motivation to act, and facilitates gatherings for discussions that can influence policy. It also incorporates a range of initiatives including a 'Green Schools' programme, an Environmental Protection Agency (EPA) climate lecture series, and a 'Tidy Towns Climate Action Award'. A Citizens' Assembly on climate change was also organised, which was tasked to consider 'How the State can make Ireland a Leader in tackling Climate Change' (TCA, 2018). Ninety-nine randomly selected Irish citizens were asked to make recommendations on climate action guided by expert advice. Analysis of this process has suggested that citizens' assemblies 'have a significant contribution to make in engaging and communicating with the public more deeply on the climate crisis' (Devaney et al., 2020: 144–145). Interestingly, one hundred percent of the assembly members agreed that the Irish Government should take a strong leadership role in addressing climate change (TCA, 2018). The policies and 'governance architecture' (Biermann et al., 2009) outlined in this section suggest this is indeed happening. However, examples from a small-town case study in Ireland provide evidence of mixed messages from above.

The Town of Youghal, County Cork

Youghal is a coastal town of almost 9000 people located at the estuary of the River Blackwater, which forms the border to Co. Waterford. The map in Fig. 6.1 shows the south coast of Ireland and the location of Youghal in relation to the cities of Cork and Waterford:

According to the 2018 Community Development Resource Centre Profile report:

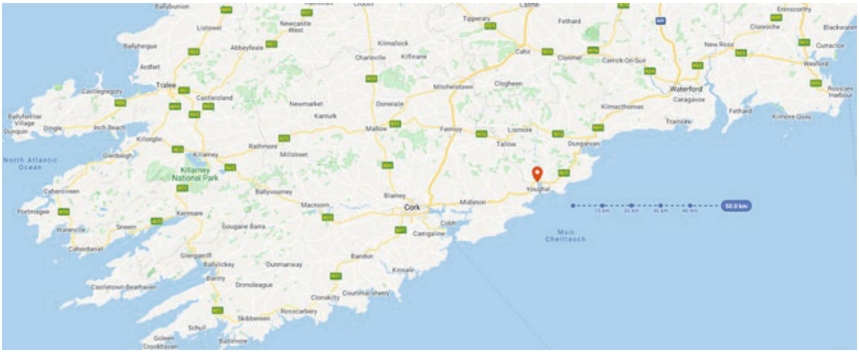


Fig. 6.1 Map showing the location of Youghal in County Cork. (Adapted from Google Maps)

> Youghal, taking its name from the Irish word *eochaill* meaning 'yew wood', is a historic sea-port town on the east coast of County Cork. The Irish Tourist Board has designated it an Irish Heritage Port. In the 19th and earlier 20th centuries, Youghal was one of the busiest sea-ports in the country. The town was also well rooted in the manufacturing industry and had a thriving economy.
>
> In recent times, industry has decreased substantially in the area and tourism is now a main focus. Steeped in the history of Walter Raleigh and Moby Dick, Youghal draws on its heritage, elegantly restored architecture and several well-preserved beaches to attract Irish and international visitors (Cumann Na Daoine, 2018).

This short excerpt presents some of the aspects of modern Youghal most relevant to this chapter. In the 1950s, a booming carpet manufacturing sector was able to support the town. This industry finally subsided in 2003 and anecdotal evidence collected during the BCOMAR project (see Footnote 1) suggests that the 'Celtic Tiger' economic boom between 1997 and 2007 largely bypassed the town. As a result, unemployment rose dramatically and even now stands 4% above the national average at 11%, while the local deprivation index is at −7.98, and the average for County Cork is +2.5 (Ibid.). Forty percent of the town is classified as 'disadvantaged' or 'very disadvantaged'. The town also faces climate change-related vulnerabilities. A significant portion of the town centre is

built on reclaimed land and is very low-lying. When severe storms occur at high tide, coastal flooding and damage affects these areas. This now happens every two years on average and sea level rise is likely to exacerbate the problem.

The excerpt above also hints at the opportunities in Youghal to use natural and cultural heritage assets to attract both domestic and international tourists. Walter Raleigh allegedly planted the first potato in Ireland in the town, and the opening scenes of the original *Moby Dick* film adaptation were filmed in and around Youghal marina (Huston, 1956). The coastal wetlands to the north and southwest of the town support a variety of bird species. St Mary's Collegiate Church (dating back to the 14th century) and the Clock Gate Tower in the town centre are significant heritage attractions. The town was also chosen to host Ireland's first IronMan triathlons for three years up to and including 2021. In the days leading up to the triathlon, the town's population effectively increases by 25% and local businesses benefit greatly.

To help realise the potential of these local assets, the Youghal Socio-Economic Development Group (YSEDG) and Daniel Noonan Archaeological Consultancy, in response to a request by Cork County Council, compiled a plan: YOUGHAL – A Heritage-Led Vision to the Next Decade, henceforth 'The Vision'. 'The Vision' was supported by The Heritage Council of Ireland. It is a well-presented document that provides a comprehensive overview of the local heritage assets and how the potential benefit of these might be maximised. It lists a series of enhancement projects, details how these will link together, and how the town will be made more navigable for tourists through directional, interpretative and orientational signposts.

From the perspective of this chapter, however, it is notable that the word 'climate' only appears once in 'The Vision'. It is used to point out that older buildings in the town 'were designed with energy conservation in mind, taking advantage of natural light, cross-ventilation, and climate-appropriate materials' (YSEDG, 2019: 45). Reading the document, it is very clear that increasing visitor numbers to Youghal and catering for their needs is the main goal of the authors. They have the right to do this, and to seek ways to alleviate the economic hardships of its recent past.

However, the connections between local and national aspirations are worthy of scrutiny. Tourism is one of Ireland's leading economic sectors, generating €5.6 billion in 2018 (from international visitors) and supporting up to 325,000 jobs.[2] 'The Vision' fits into wider aspirations set out by Fáilte Ireland, the National Tourism Development Authority, to expand this sector. Fáilte Ireland has led an extremely successful branding campaign for four distinct parts of the country: The Wild Atlantic Way, Ireland's Ancient East, Ireland's Hidden Heartlands and Dublin. Youghal is located in Ireland's Ancient East (IAE). In a 'Path to Growth' document, Fáilte Ireland describes IAE as 'a branded visitor experience encompassing the rich heritage and cultural assets that Ireland has to offer in the midlands/eastern half of the country, providing a counterbalance to the Wild Atlantic Way on the west coast' (Fáilte Ireland). Tourism is supported by an extensive transport, catering and leisure infrastructure. Sustainable management of this infrastructure (and of its growth) is a fundamental climate change challenge, both in terms of mitigation and adaptation. Despite this, the 'Path to Growth' document makes no reference to the climate.

There was another local vision building exercise that the BCOMAR team was able to observe in Youghal. The My Town, My Plan Community Training Programme Initiative ('My Town, My Plan') was set up by the Hincks Centre for Entrepreneurship Excellence at the Cork Institute of Technology (CIT) and worked in collaboration with the South and East Cork Area Development Partnership CLG (SECAD). According to the Hincks website, 'workshops are being used to provide information, stimulate discussion, link resources and develop an action plan in conjunction with the communities in the areas', in order to plan for the future with local residents. The programme ran in eight towns in County Cork. We attended the sessions to observe an example of how a local group might convene to discuss options for developing their town. Debate was open and varied, and well supported by SECAD professionals.

We raised the issue of local climate change vulnerabilities and how these might be integrated into plans to expand on local amenities and attract

[2] Irish Government online at: https://www.gov.ie/en/policy/3fcc3a-tourism/. Last accessed 23/07/2020.

tourists. Our team was asked to compile some ideas for doing this. To provide two brief examples, we suggested that the two coastal wetland areas be used in hybrid coastal flood defences (Sutton-Grier et al., 2015), also known as 'building with nature' (Bridges et al., 2015). This is widely accepted as a more sustainable approach than pure 'grey infrastructure' such as sea walls. We also suggested that the eroded groynes be reinstalled on the main beach in Youghal (Front Strand). This could encourage sediment deposition, thus widening the popular beach and also improving coastal flood protection. These ideas could enhance the regulating and cultural ecosystem services provided by these two features (Luisetti et al., 2011). Ultimately, no climate change adaptation measures were included in the final plan, although it did propose the construction of a train line to Cork City, with the hope that this would improve connectivity, whilst reducing traffic congestion and carbon emissions.

Clothing the Emperor

Youghal cannot be representative of how all of Ireland's coastal towns will react in the face of climate change impacts, but it does demonstrate quite aptly how local, informal governance networks are the first port of call for affecting change. Sports teams, church groups, hobby groups, conservation societies, business associations, etc. help to govern local life. These actors conceive ideas and projects. Regional and national governing bodies (and their policies) come into play at a later stage. But, to a certain extent, towns and villages govern themselves. The Irish Government has set out the clear national governance framework for climate change (outlined above) but has perhaps overlooked the potential of this local governance architecture. This architecture is not an obstacle in implementing change, but a potential asset. It could be mobilised (enticed) to deliver a lot more on climate action. Little effort has been made so far to encourage Youghal to present itself as a town that is adapting to climate change or as a pioneer in surviving rising sea levels. To do so would be remarkably innovative and, according to the World Economic Forum, it is the basis of future job creation (WEF, 2020).

At present, there is a lack of incentives for towns to develop in this way. Whilst the Irish Government is leading on climate action, it is simultaneously continuing to support actions that are not innately sustainable, non-polluting or adaptive. There is little concerted effort to ensure that the impact drivers for transformational change far outweigh the impact drivers that cause climate change. Tourism is a good example. Tourism is one of Ireland's largest economic sectors and one where climate change factors need to be taken seriously. Yet, 'The Vision' for Youghal does not express a strong intention to do so. Some of the climate change slack will be picked up by planning regulations and incentives when the projects outlined by 'The Vision' are realised, but an opportunity has been missed to present a more comprehensively sustainable approach. This is not the fault of the YSEDG and its partners. They have followed the more enticing national policies (and funding) designed to increase tourist footfall in Ireland. A similar observation can be made of the ideas emerging from the 'My Town, My Plan' process (though less tourism-focused). Again, this is through little fault of the organisers and contributors.

It also shouldn't be assumed that towns and villages govern themselves well. Local projects can be ill-conceived. However, further research might explore the potential for local focus groups to seek 'sustainable pathways', for example (IPCC, 2014). The 'sustainable pathways' concept also features prominently in national climate change policy in Ireland, such as the NAF, but with little guidance provided on implementation. The concept encourages broad input into decision points that support the selection of sustainable future trajectories, based on an understanding of risk, vulnerability and opportunity. The process could be overseen by local 'climate action officers' who would be employed to work full-time on mitigation and adaptation solutions. A similar recommendation was made for repurposing abandoned buildings in Ireland to provide sufficient housing (TCLI, 2020). Providing funding for increased local human resources would be one way for the Irish Government to 'walk the walk' on climate action. Supporting meaningful climate action would also bolster efforts in DRR and achieving the SDGs.

In Hans Christian Andersen's tale, *The Emperor's New Clothes*, the swindlers who arrive in town and pose as weavers carry evil intent. Their goal is to con the Emperor out of money and lay the blame for all who

cannot see his clothes on the ineptitude and stupidity of the beholder. There is no suggestion in this chapter that the Irish Government carries evil intent by weaving invisible policies. The Irish Government is elaborately dressed for climate action. But many of its clothes, if not invisible, at the very least have large holes in them. The result is that – from the perspective of climate action – more localised plans and initiatives are free to roam naked.

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References

Andersen, H. C. (1949). The emperor's new clothes. Burton, V. L., & Houghton Mifflin Company. (1949). (Original published 1837).

Biermann, F., Betsill, M., Gupta, J., Kani, N., Lebel, L., Liverman, D., Schroeder, H., & Siebenhüner, B. (2009). Earth System Governance: People, Places and the Planet. Science and Implementation Plan of the Earth System Governance Project. IHDP Report No. 20. Bonn.

Bridges, T. S., Burks-Copes, K. A., Bates, M. E., Collier, Z. A., Fischenich, J. C., Piercy, C. D., … Gailani, J. Z. (2015). *Use of Natural and Nature-Based Features (NNBF) for Coastal Resilience*. US Army Engineer Research and Development Center, Environmental Laboratory.

Clarke, J., & Flannery, W. (2020). The Post-Political Nature of Marine Spatial Planning and Modalities for Its Re-Politicisation. *Journal of Environmental Policy & Planning, 22*(2), 170–183.

Cork County Council (CCC). (2019). Climate Adaptation Strategy 2019–2024. Available at: https://www.corkcoco.ie/sites/default/files/2019-10/Cork%20County%20Council%20Climate%20Adaptation%20Strategy%202019-2024%20Final.pdf. Accessed 23 July 2020.

Cumann Na Daoine. (2018). Cumann Na Daoine (Youghal Community Development Resource Centre). Youghal Community Profile 2018. Available at: https://www.communityconsultants.ie/demo/wp-content/uploads/2018/10/Youghal-Community-Profile-2018.pdf. Accessed 23 July 2020.

Department for Transport, Tourism and Sport (DTTS). (2019). Sectoral Adaptation Plan for Transport Infrastructure. Available at: https://assets.gov.ie/39222/284b27f3507a411b982d8aff91e1bf49.pdf. Accessed 23 July 2020.

Department of Communications, Climate Action and Environment (DCCAE). (2017). National Mitigation Plan. Available at: https://www.dccae.gov.ie/documents/National%20Mitigation%20Plan%202017.pdf. Accessed 23 July 2020.

Department of Communications, Climate Action and Environment (DCCAE). (2018). National Adaptation Framework Planning for a Climate Resilient Ireland. Available at: https://www.dccae.gov.ie/documents/National%20Adaptation%20Framework.pdf. Accessed 23 July 2020.

Department of Communications, Climate Action and Environment (DCCAE). (2019). Climate Action Plan 2019 – To Tackle Climate Breakdown. Available at: https://www.dccae.gov.ie/documents/Climate%20Action%20Plan%202019.pdf. Accessed 23 July 2020.

Department of Housing Planning and Local Government (DHPLG). (2018). Project Ireland 2040 – National Planning Framework. Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/166/310818095340-Project-Ireland-2040-NPF.pdf#page=1. Accessed 23 July 2020.

Desmond, M. (2018). *National Preparedness to Adapt to Climate Change: Analysis of State of Play* (Report No. 256). Environmental Protection Agency. Available at: http://www.epa.ie/pubs/reports/research/climate/Research_Report_256.pdf. Accessed 23 July 2020.

Devaney, L., Torney, D., Brereton, P., & Coleman, M. (2020). Ireland's Citizens' Assembly on Climate Change: Lessons for Deliberative Public Engagement and Communication. *Environmental Communication, 14*(2), 141–146.

Di Gregorio, M., Nurrochmat, D. R., Paavola, J., Sari, I. M., Fatorelli, L., Pramova, E., … Kusumadewi, S. D. (2017). Climate Policy Integration in the Land Use Sector: Mitigation, Adaptation and Sustainable Development Linkages. *Environmental Science & Policy, 67*, 35–43.

Fáilte Ireland. Ireland's Ancient East Path to Growth. Five Year Plan for the Development of. Ireland's Ancient East. Our Strategic Intent. Available at: https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/2_Develop_Your_Business/Key%20Projects/Ireland%27s%20

Ancient%20East/Failte_Ireland_Irelands_Ancient_East_Path_to_Growth_Strategy.pdf. Accessed 23 July 2020.

Healey, P. (2003). Collaborative Planning in Perspective. *Planning Theory, 2*(2), 101–123.

Huston, J. (1956). *Moby Dick* [Film]. Warner Bros.

Intergovernmental Panel on Climate Change (IPCC). (2014). Urban Areas. In *Climate Change 2014: Impacts, Adaptations and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC.

Irish-Government. (2018). National Development Plan 2018–2027. Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/37937/12baa8fe0dcb43a78122fb316dc51277.pdf#page=null. Accessed 23 July 2020.

Kjaer, A. M. (2004). *Governance: Key Concepts*. Polity Press.

Kjellstrom, T., & McMichael, A. J. (2013). Climate Change Threats to Population Health and Well-Being: The Imperative of Protective Solutions That Will Last. *Global Health Action, 6*(1), 20816.

Luisetti, T., Turner, R. K., Bateman, I. J., Morse-Jones, S., Adams, C., & Fonseca, L. (2011). Coastal and Marine Ecosystem Services Valuation for Policy and Management: Managed Realignment Case Studies in England. *Ocean & Coastal Management, 54*(3), 212–224. https://doi.org/10.1016/j.ocecoaman.2010.11.003

Morrison, T. H., Adger, W. N., Brown, K., Lemos, M. C., Huitema, D., & Hughes, T. P. (2017). Mitigation and Adaptation in Polycentric Systems: Sources of Power in the Pursuit of Collective Goals. *Wiley Interdisciplinary Reviews: Climate Change, 8*(5), e479.

Nabi, R. L., Gustafson, A., & Jensen, R. (2018). Framing Climate Change: Exploring the Role of Emotion in Generating Advocacy Behavior. *Science Communication, 40*(4), 442–468.

O'Neill, S., & Nicholson-Cole, S. (2009). "Fear Won't Do It" Promoting Positive Engagement with Climate Change Through Visual and Iconic Representations. *Science Communication, 30*(3), 355–379.

Smith, G., & Jentoft, S. (2017). Marine Spatial Planning in Scotland. Levelling the Playing Field? *Marine Policy, 84*, 33–41.

Sutton-Grier, A. E., Wowk, K., & Bamford, H. (2015). Future of Our Coasts: The Potential for Natural and Hybrid Infrastructure to Enhance the Resilience of Our Coastal Communities, Economies and Ecosystems. *Environmental Science & Policy, 51*, 137–148.

Tafon, R. V. (2018). Taking Power to Sea: Towards a Post-Structuralist Discourse Theoretical Critique of Marine Spatial Planning. *Environment and Planning C: Politics and Space, 36*(2), 258–273.

The Citizens' Assembly (TCA). (2018). Third Report and Recommendations: How the State Can Make Ireland a Leader in Tackling Climate Change.

The Town Centre Living Initiative (TCLI). (2020, May). Six Pilot Towns: Synthesis Report. Available at: https://www.gov.ie/en/publication/86215-the-town-centre-living-initiative/. Accessed 22 July 2020.

Thornton, T. F., & Comberti, C. (2017). Synergies and Trade-Offs Between Adaptation, Mitigation and Development. *Climatic Change, 140*(1), 5–18.

Thuiller, W., Lavorel, S., Araújo, M. B., Sykes, M. T., & Prentice, I. C. (2005). Climate Change Threats to Plant Diversity in Europe. *Proceedings of the National Academy of Sciences, 102*(23), 8245–8250.

Uitto, J. I., Puri, J., & Van den Berg, R. D. (2017). *Evaluating Climate Change Action for Sustainable Development*. Springer Nature.

Van Driesche, J., & Lane, M. (2002). Conservation Through Conversation: Collaborative Planning for Reuse of a Former Military Property in Sauk County, Wisconsin, USA. *Planning Theory & Practice, 3*(2), 133–153.

van Kersbergen, K., & van Waarden, F. (2004). 'Governance' as a Bridge Between Disciplines: Cross-Disciplinary Inspiration Regarding Shifts in Governance and Problems of Governability, Accountability and Legitimacy. *European Journal of Political Research, 43*(2), 143–171.

World Economic Forum (WEF). (2020). New Nature Economy Report II. The Future of Nature and Business. In Collaboration with AlphaBeta. Available at: https://www.weforum.org/reports/new-nature-economy-report-ii-the-future-of-nature-and-business. Accessed 23 July 2020.

Youghal Socio-Economic Development Group (YSEDG). (2019). Youghal – A Heritage-Led Vision to the Next Decade. Available at: https://www.heritage-council.ie/content/files/Youghal_A_Heritage_Led_-Vision_-to_-the_-Next_Decade.pdf. Accessed 23 July 2020.

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7

Mainstreaming Climate Change Adaptation into Planning and Development: A Case Study in Northern Ireland

Cathy Burns, Stephen Flood, and Barry O'Dwyer

Introduction

Climate change has significant effects on local authorities, from the management of property and assets and delivery of services, to an increased need for community support alongside spatial development and regeneration. The impacts of climate change are so wide-ranging that

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adaptation should be incorporated in decision-making, policy development and service planning by local authorities (Maiden & Monaghan, 2017). This chapter outlines the adaptation planning journey undertaken by Derry City and Strabane District Council (DCSDC) in Northern Ireland, reflecting on the how the prevailing policy context and level of organisational adaptive capacity can create the conditions for mainstreaming climate adaptation into planning and development. Climate change adaptation (CCA) planning provides opportunities to integrate local authority policy drivers such as disaster risk reduction (DRR), which in councils takes the form of emergency planning, into community resilience. It is important to note that the level of complexity of climate change risk assessment and adaptation planning and actions is dependent on the available adaptive capacity. Adaptive capacity refers to the ability of systems, institutions, communities and the natural environment to adjust to potential damages, take advantage of opportunities, or to respond to the consequences of climate change (IPCC, 2014). Adaptive capacity is dependent on factors such as financial resources, availability of supporting information and data, institutional support, and institutional knowledge and training.

Mainstreaming climate change adaptation, disaster risk reduction and sustainable development into policy and planning involves the incorporation of these cross-cutting considerations into government activities and decision-making (Flood et al., 2020). The World Resources Institute (Mogelgaard et al., 2018) identifies five key factors that can facilitate the implementation of mainstreaming ambitions: (1) strong policy frameworks; (2) sustained and persistent leadership; (3) coordination mechanisms across sectors and between government departments; (4) information and tools; and (5) supportive financial processes. This chapter demonstrates the mainstreaming process in action as captured by these five key factors.

It is not currently a statutory requirement for local authorities in Northern Ireland to undertake adaptation planning. The need for adaptation planning within DCSDC was championed by a small team working in the Environment and Regeneration Department on whose recommendation Council approved the application and supporting

funding necessary to lead the CLIMATE[1] project. This began the three-year adaptation planning journey in DCSDC which evolved from a small team of enthusiastic proponents to a dedicated task force encompassing all Council service areas.

Climate Change and the Case for Local Authority Adaptation Planning

Within the area of DCSDC, significant flood events have served to increase awareness of the risks and impacts that climate change and associated severe weather events can have. This was particularly highlighted during a significant flood event in August 2017 during which 60–70 mm of rain (63% of August rainfall) fell in a period of 8–9 hours. Derry City has been identified by the Northern Ireland Government Department for Infrastructure as an area of potential significant flood risk (i.e. an area where significant flood risk exists now or is likely to occur in the future), while Strabane is listed as a transitional area of potential significant flood risk (DFI, 2018). The most recent Northern Ireland public perception survey (2019/2020) revealed that climate change was considered the biggest environmental concern for households in Northern Ireland (DAERA, 2020).

Local authorities are well positioned to take on the role of adaptation planning. Managing climate change impacts requires place-specific planning and actions (Archie et al., 2018). Due to the localised effects of climate change, local government decision-makers are now on the front lines when it comes to climate change adaptation planning and action. Box 1 provides an overview of the Derry City and Strabane District.

[1] Delivered during 2017–2020 the CLIMATE (Collaborative learning for Managing and Adapting to the Environment) project involved partners from Northern Ireland, Sweden, the Republic of Ireland and the Faroe Islands. The project sought to tackle climate change responses on a local and regional level through establishing a best practice local authority adaptation planning model and toolkit. In addition and to demonstrate the model and toolkit, three local authority climate adaptation plans were developed as case studies; one in DCSDC and two others in the Swedish municipalities of Sundsvall and Härnösand.

Box 1 Derry City and Strabane District Overview

Situated in the northwest of Northern Ireland, the area of Derry City and Strabane District Council serves a population of 150,680. The council area is diverse geographically, including mountain ranges, rivers, agricultural land and coasts. Urban areas consist of the regional city of Derry connected to a number of vibrant towns and villages, including Strabane. In addition, DCSDC shares a 140 km border with Donegal County Council in the Republic of Ireland. DCSDC is one of eleven local authorities in Northern Ireland providing a range of services including waste management, green infrastructure, tourism and economic development, planning, building control and environmental health. In 2019, DCSDC employed 904 people with land ownership extending to over 1000 hectares of land and property.

Policy Context and Potential Integration Opportunities

To be effective, adaptation planning should extend beyond managing severe weather events to include long-term planning for a changing climate as an integral part of ensuring business continuity, safeguarding people and places, protecting and enhancing the natural environment, and contributing to a resilient economy. Figure 7.1 details relevant policy developments from 1997 to 2020, categorised as national and international, regional and local.

National Policy

The UK Climate Change Act 2008 requires a UK Climate Change Risk Assessment every five years, part of which includes a detailed technical evidence report for Northern Ireland. This in turn informs the Northern Ireland Climate Change Adaptation Programme (NICCAP) – prepared by the Northern Ireland government Department for Agriculture, Environment and Rural Affairs (DAERA). There is currently no legal requirement for local authorities to take general action or meet targets in the 2008 Act. However, many local authorities consider they have a

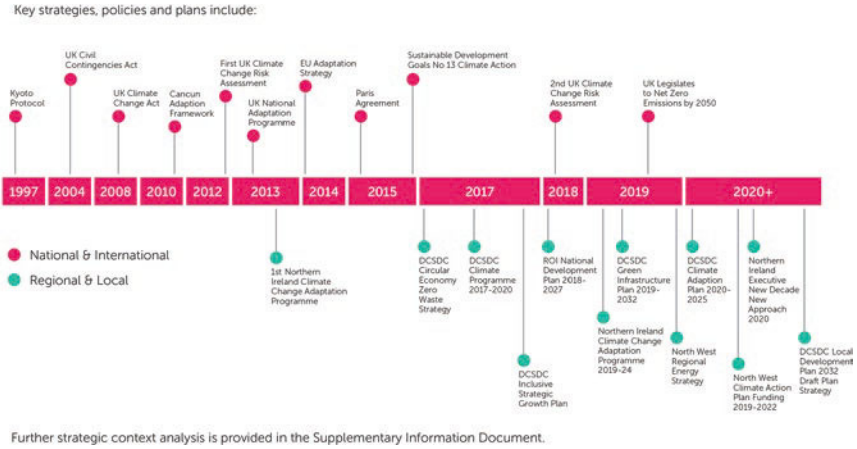


Fig. 7.1 Derry City and Strabane District Council climate change adaptation CCA planning strategic context (DCSDC, 2020a)

moral obligation based on their traditional duties (European Commission, 2018). In addition, the UK Civil Contingencies Act (2004) requires that risk assessments in the UK respond quickly to changes in the risk environment, including climate change. The UK National Risk Register of Civil Emergencies lists climate change and severe weather events as major risks to society. This includes flooding, storms, heatwaves, poor air quality and wildfires, (UK, 2017).

In Northern Ireland, the DAERA Climate Change Unit leads on development, implementation and monitoring of the NICCAP, with responsibility for action shared across all government departments and coordination through the Cross–Departmental Working Group on Climate Change and Adaptation Sub-Group. DAERA also work with Climate Northern Ireland to ensure engagement with local government and non-government sectors on the impacts of climate change, sharing best practice and promoting adaptation action.

The Northern Ireland Draft Programme for Government Outcome 2 supports climate adaptation with the aim: 'We live and work sustainably – protecting the environment.' Over three years (from January 2017 to January 2020) the lack of a working executive within the devolved

administration in Northern Ireland impeded the development of a regional climate change act which would certainly have strengthened the case for adaptation planning at a local authority level. However, with the restoration of the NI Executive in January 2020, the New Decade, New Approach (NDNA) deal committed that the Executive will tackle climate change head-on with a strategy to address its immediate and longer-term impacts. The NI Climate Change Bill is undergoing its passage through the Northern Ireland Assembly at time of writing.

Until recently, local authorities in Northern Ireland were not involved in climate change adaptation research or planning. However, Climate Northern Ireland[2] undertook a consultation exercise with local authorities in late 2017. Participating local authorities provided information on adaptation work that they have completed, is underway, or can be scheduled before 2024, which could help address the UK Climate Change Risk Assessment recommendations for addressing the risks facing Northern Ireland. This exercise highlighted that a number of initiatives were taking place across Northern Ireland which could be categorised as adaptation (e.g. community resilience planning, food growing projects enhancing food security, and coastal and biodiversity management projects). However, it was evident that none of the participating local authorities were taking a strategic or planned approach to climate change adaptation with relevant activities more often linked to economic, social or environmental factors, other than climate change (Climate Northern Ireland, 2018). In 2019, Climate Northern Ireland established the Northern Ireland Local Government Climate Action Network (LGCAN) to support local councils in adaptation planning. DCSDC are involved in LGCAN by sharing learning and best practice of adaptation planning.

In Northern Ireland, central government recognises the role of local authorities in climate resilience:

> Councils lead local action to protect communities and businesses from risks posed by severe weather events and are responsible for protecting local areas from development which could increase vulnerability to flooding. (DAERA, 2019)

[2] Climate Northern Ireland (NI) is a cross-sectoral adaptation network which supported DCSDC through the adaptation planning process.

However, it is recognised that certain responsibilities lie outside of council control such as rivers, water management, road and rail infrastructure, education, public housing and social services. It is therefore critical that all levels of government, businesses, the third level sector and communities work together to adapt to the impacts of climate change.

Local Policy and Plans

Within DCSDC, the strategic direction for climate adaptation is provided by a number of key policies and plans as outlined in Table 7.1. Four strategies and plans are identified, along with a number of relevant statements, as having particular relevance to climate change adaptation, disaster risk reduction and sustainable development. These potential integration opportunities are further explored in this chapter under the section heading of 'Further Mainstreaming Outcomes and Opportunities'.

Adaptation Plan Development

The catalyst for mainstreaming climate adaptation within DCSDC was the adaptation planning process developed and undertaken as part of the INTERREG CLIMATE project. Working with partners from Climate Northern Ireland and University College Cork/Climate Ireland, DCSDC followed the best practice five-step adaptation planning model/process outlined below. The completion of each step resulted in increased adaptation capacity through enhanced awareness, knowledge, data gathering and cross departmental collaboration, leading to a greater integration of climate change adaptation across all areas of planning and development in the organisation (Fig. 7.2).

Tonmoy et al. (2019) outline a three-tier climate risk assessment process for climate change adaptation at a local scale. This tiered assessment process allows organisations to systematically apply a risk management process to identify and manage their climate change risks. The levels from one to three are dependent on resources and time available. Therefore, a first-pass assessment demands less time, data and resources

Table 7.1 Derry City and Strabane District Council strategic context

DCSDC strategy/policy	Relevant statement(s)
Strategic Growth Plan 2017–2032	Vision *'A thriving, prosperous and sustainable City and District with equality of opportunity for all.'* Relevant outcomes and actions for consideration include: We prosper through a strong, sustainable and competitive economy We live sustainably – protecting and enhancing the environment We connect people & opportunities through our infrastructure Within the DCSDC Strategic Growth Plan, importance is given to climate change and supporting the environment. The planet matters: 'We care deeply about our local environment and climate change. We understand that we are ultimately dependent on the natural world as a support system and we need to live sustainably: to produce and consume within our planetary boundaries. We believe we can have a circular economy and a low carbon society. We need to promote renewable energy, develop an integrated, sustainable transport system and connect our rich waterways and greenways.'
Local Development Plan 2032 Draft Plan Strategy	Vision 'To make Derry City and Strabane District a thriving, prosperous and sustainable area – planning for balanced and appropriate high-quality development, whilst protecting our environment, and also promoting wellbeing with equality of opportunity for all.' The LDP will guide land use development and will outline policies and guidance for the development of the city and district The LDP General Development principles and policies state that development should demonstrate how they 'mitigate against the effects of climate change, adapt to its impacts, and ensure resilience.'

(*continued*)

Table 7.1 (continued)

DCSDC strategy/policy	Relevant statement(s)
Green Infrastructure Plan 2019–2032	Vision 'By 2032, the environmental, economic and social benefits of Green Infrastructure are valued and maximised by all.' Climate Change Strategic Aim: GI will be maximised to mitigate against and adapt to the effects of climate change
A Circular Economy/ Zero Waste Strategy for Derry City and Strabane District Council 2017	Derry City and Strabane District Council (DCSDC) is pursuing a clear vision for a Zero Waste Circular Economy. This is defined in the community plan as an economy where: 'resources are used for as long as possible, have maximum value extracted from them and are recovered and regenerated at the end of their service life to achieve a Zero Waste Circular Economy.' Focus on development placed on a more sustainable and resilient footing by bringing economic activity within the earth's carrying capacity, notably the constraints of climate change

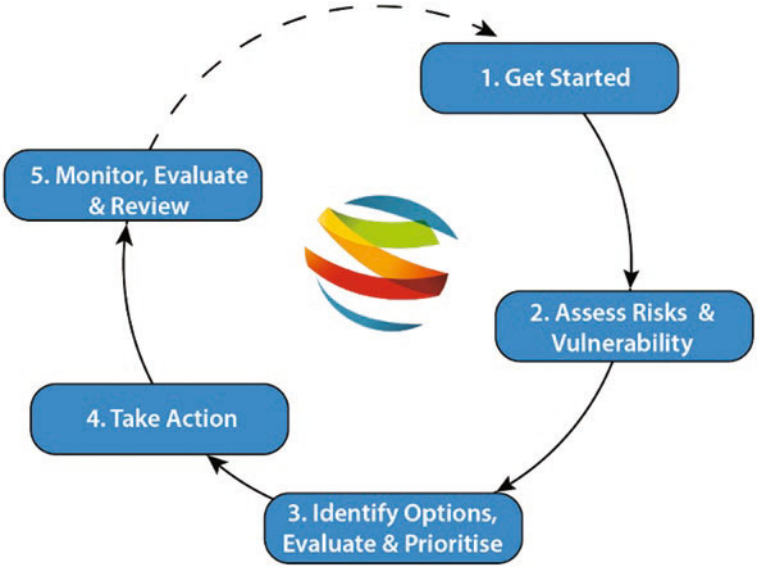


Fig. 7.2 CLIMATE project best practice adaptation planning model

than a more sophisticated and granular third-pass assessment. A first-pass assessment is a rapid and qualitative process carried out to gain an understanding of the climate change risks faced. A second-pass assessment builds on the first-pass assessment by including more intensive stakeholder engagement and the creation of a risk register to support the identification of adaptation options and opportunities. A third-pass assessment focuses on the further investigation of prioritised, shortlisted and site-specific risks. This process is resource-intensive, and is often employed in the case of costly and long-lived engineering projects that require detailed quantitative information on exposure and vulnerability to climate change-related risks, before implementing design and investment decisions.

The assessment carried out by DCSDC can be considered a hybrid of the first-pass and second-pass assessment. An overview of the five plan development steps and the main actions carried out within each is presented in Fig. 7.2. The actions carried out within each step were specifically tailored to work within the local government landscape of DCSDC, reflecting the prevailing levels of adaptive capacity (Table 7.2). The five key factors: (1) strong policy frameworks; (2) sustained and persistent leadership; (3) coordination mechanisms across sectors and between government departments; (4) information and tools; and (5) supportive financial processes, to implement mainstreaming effectively, were carefully considered throughout the process. Sustained and persistent leadership is evidenced from the outset with the creation of the position of Climate Programme Manager and the formation of the Climate Adaptation Working Group (as detailed under Step One). The importance of supportive financial processes is also captured under Step One in terms of liaising with DCSDC's finance department to explore potential budgetary requirements to support adaptation measures. Coordination mechanisms across sectors and between government departments are evident in Step One with the process of stakeholder mapping, the formation of a Climate Adaptation Working Group and the inclusion of climate change within the corporate risk register. This is also evident in Step Two where climate impact and risks across council are scored using the DCSDC risk matrix (DCSDC, 2020b). All actions documented within steps Three and Four also support this mainstreaming factor. The creation of strong policy

Table 7.2 Overview of adaptation plan development steps

Step	Summary of main actions
One	Climate Programme Manager undertook a situational analysis to assess adaptive capacity of the organisation Stakeholder mapping Formation of Climate Adaptation Working Group Climate change added to the corporate risk register Liaised with finance department to explore potential budgetary requirements to support adaptation measures
Two	Climate impact profile for the City and District developed to chart the effect of severe weather events Climate impact risks scored using the DCSDC risk matrix, and the UK Climate Change Risk Assessment urgency scoring was applied to identify priorities Future socio-economic profile of the City and District analysed Creation of a climate adaptation video highlighting both the human and service impacts of severe weather events locally, supporting the case for adaptation planning to improve resilience
Three	One-to-one meetings and working group workshops established the strategic direction of the plan and reached agreement on priorities Cross-cutting and functional themes created (See Fig. 7.3) Agreement to deliver CCA plan vision with a supporting action plan to be delivered within the initial five-year period by Council
Four	Finalisation of the climate adaptation plan including consultation across all directorates in DCSDC with final approval at committee by elected representatives Associated action and implementation plan circulated for final approval with commitments made across all relevant service areas
Five	Monitoring and review programme established including a quarterly progress review and annual report produced by the Climate Programme Manager The annual review process will include the following: Targets /Key Performance Indicators (KPIs) met Adaptive Capacity Assessment Policy and Procedural Review Reports to be submitted to the Environment and Regeneration Committee and Full Council meetings where appropriate, as well as the All Party Climate Emergency Working Group The Climate Programme Manager will report progress within the Civil Society and Local Government Adapts programme of the Northern Ireland Climate Change Adaptation Programme, providing the link between government and local authority level adaptation planning

frameworks is evident in Step Five where the governance and reporting mechanisms are set out. Communication, through the provision of information and tools, is captured under Step Two with the development of a climate impact profile for Derry City and District and the creation of a climate adaptation video highlighting both the human and service impacts of severe weather events in the region.

Further Mainstreaming Outcomes and Opportunities

DCSDC have committed to mainstream climate adaptation into policies and plans, and prepare Council staff for the effects of climate change through the cross-cutting themes of delivery and collaboration, communication and awareness, and knowledge and information (Fig. 7.3). This recognises that integrating and mainstreaming climate adaptation into policies is an effective mechanism to ensure resilience and preparedness. For example, the inclusion of climate adaptation considerations through a 'screening' of Council's existing and emerging policies will ensure that the future direction and procedures of services are resilient to climate

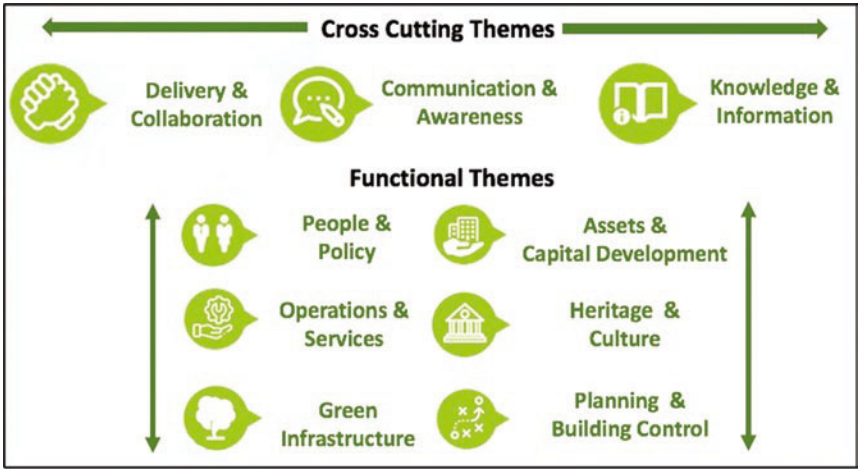


Fig. 7.3 Thematic priorities of the DCSDC climate adaptation plan (after DCSDC, 2020a)

impacts. This has extended to the inclusion of climate change considerations in all reports presented to the committee.

Assets and Capital Development

DCSDC's Assets & Capital Development Team have committed to prepare for and address the impacts of climate change, ensuring protection of Council assets, property and infrastructure. DCSDC's assets and estate including property, fleet and IT systems are at risk of damage from severe weather events and rising sea levels, resulting in service disruption and increased costs for repair and insurance premiums. It is recognised that all new developments, infrastructure projects and building refurbishments should be designed and built with changes in future weather patterns in mind. To this end, a Climate Change Risk & Opportunities Assessment has been undertaken for two major regeneration projects as part of the City Deal (DCSDC, 2021), with the intention that this will set the standards necessary for all future Council development projects.

Operations and Services

DCSDC recognises that service delivery is at risk from disruptions to energy supply, transport networks, staff access to places of work and impacts on productivity, and have committed to ensuring that operations, services and digital infrastructure are prepared and resilient to the effects of climate change, including waste management, recreation and leisure facilities, and ongoing daily operations across all services. In addition, DCSDC will ensure it is prepared for severe weather events and climate shocks through its emergency planning and risk reduction functions.

Green Infrastructure

Green infrastructure is acknowledged by DCSDC to have a critical role in the environmental, economic and social success of the region, and has developed the Green Infrastructure Plan 2019–2032 as a framework to

value and maximise the benefits for all. Climate change is a strategic theme within the GI Plan with opportunities identified across the city and district to deliver adaptation. It is widely accepted that nature-based solutions delivered through green infrastructure offer 'no regret' responses to climate change, delivering multiple benefits to society and the environment. DCSDC has committed to ensuring the protection and enhancement of green infrastructure against climate change impacts, while maximising the benefits and opportunities GI provides for climate adaptation.

Heritage and Culture

DCSDC has committed to embedding climate adaptation within the heritage and culture functions of the organisation through further identifying and addressing the impacts, risks and opportunities of climate change to local heritage assets, collections, cultural programmes, festivals and events. A detailed heritage and museum risk and adaptation planning report was completed in 2019 to further embed adaptation within the relevant service areas.

Planning and Building Control

Population, socio-economic profiles, settlements and land use influence the impacts of climate change. As a result, DCSDC has a critical role in mitigating and preventing the effects of climate change as well as adapting to them, particularly through its planning function. Effective development planning and design has a central role to play in future-proofing the city and district in order to address climate change and improve adaptive capacity and resilience. DCSDC recognises that, if used positively, planning has a significant contribution to make by enabling high standards of development and raising awareness and aspirations, rather than simply implementing regulations. To this end, the adaptation plan includes the thematic priority of ensuring that all new built developments and land uses across the district will be designed and built to adapt

to climate change. DCSDC will seek to ensure that all new built developments and land uses across the district will deliver climate adaptation through the new Local Development Plan, by applying current planning policies and building controls in combination with the Council's own new climate change planning policies. When deciding on planning applications, DCSDC will continue to apply existing regional planning policies to ensure that all public and private developers are undertaking sustainable forms of development (e.g. by ensuring that new buildings or land uses are not located in flood plains where they could flood or cause flooding elsewhere). Similarly, DCSDC's Building Control function will apply the latest building standards for all developments, consistent with best practice in climate change adaptation. DCSDC is preparing the Local Development Plan 2032 which, when adopted, will govern all planning applications and guide development across the District in a sustainable manner that will embed climate change considerations.

People and Policy

The City & District Local Community Growth Plans provide frameworks for development of community initiatives, projects and regeneration. Within the Local Community Growth Plans climate change is noted as one of the main challenges facing the region, with key actions included to ensure the resilience of local communities.

Climate adaptation has also been embedded in DCSDC's involvement in regional working groups, in particular those pertaining to coastal management, sustainability, emergency planning and resilience, water management and flooding. DCSDC recently passed a motion to establish an all-party working group to address the issue of climate change, the initial focus being the development of a climate pledge outlining Council's commitment to mitigation and adaptation. A multi-agency team has been established to facilitate coordinated climate action across the North West. Lead by DCSDC, the team held its inaugural meeting in November 2019 with further meetings arranged throughout 2020.

Reflections and Lessons Learned

The main challenges facing DCSDC relate to securing support and buy-in for adaptation planning. Despite increased media coverage of climate change and significant flood events in the city and district, there remains a gap in knowledge and skills. A significant amount of engagement is required to increase understanding of the relevance of climate change and adaptation planning to each service area. This can then lead to challenges in terms of time and resources. The ability to communicate risks and solutions has been the most important tool when undertaking adaptation planning, particularly when discussing the process and securing input or support from colleagues. Over thirty one-to-one meetings were held alongside a series of workshops to engage relevant teams in the development of the adaptation plan. The teams included those from risk and emergency planning, finance, digital services, planning, green infrastructure, capital development, economic development, health and safety, property and fleet management, energy management, human resources, heritage and museums, festivals and events, and marketing and public relations. In addition, it is important to note the resource challenges to mainstreaming climate adaptation within local authorities. The development of the DCSDC adaptation plan was made possible with EU funding support and provision of staff to lead the process. In the absence of such funding support, it is likely that adaptation planning will become an additional duty for existing staff, thereby reducing the capacity for research, coordination and engagement.

The adaptation planning process has enabled greater understanding of the specific risks to DCSDC and created a dedicated working group on climate action, as well as acted as a catalyst for further climate action, culminating in approval to take forward the Climate Change Adaptation Plan which aims to 'Deliver climate action on a cross sectoral multi agency basis to achieve greater adaptation and resilience to the effects of climate change while leading by example to reduce emissions and mitigate against further global warming.'

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References

Archie, K. M., Chapman, R., & Flood, S. (2018). Climate Change Response in New Zealand Communities: Local Scale Adaptation and Mitigation Planning. *Environmental Development*. https://doi.org/10.1016/j.envdev.2018.09.003

Climate Northern Ireland. (2018). *Local Authority Consultation – Adaptation Planning*. Climate Northern Ireland.

DAERA. (2019). *Northern Ireland Climate Change Adaptation Programme 2019–2024*. Department of Agriculture, Environment and Rural Affairs.

DAERA. (2020). Northern Ireland Environmental Statistics Report. Available at: https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2020. Accessed 20 Mar 2021.

DCSDC. (2020a). Climate Change Adaptation Plan 2020–2025. Available at: http://meetings.derrycityandstrabanedistrict.com/documents/s31062/Appendix%201%20DCSDC_Climate%20Change%20Adaptation%20Plan%202020-2025%20Final%20Draft.pdf. Accessed 10 Dec 2020.

DCSDC. (2020b). Risk Management Strategy for Derry City and Strabane District Council. Available at: http://meetings.derrycityandstrabanedistrict.com/documents/s29423/10%20App%205%20RiskMgtStrategyDCSDC%20Version%203%20Nov19.pdf. Accessed 2 Apr 2021.

DCSDC. (2021). North-West City Deal. Available at: https://www.derrystrabane.com/Council/News/UK-Government-signs-agreement-for-%C2%A3250m-investment. Accessed 10 Apr 2021.

DFI (Department for Infrastructure). (2018). Northern Ireland Flood Risk Assessment (NIFRA). Available at: https://www.infrastructure-ni.gov.uk/publications/northern-ireland-flood-risk-assessment-nifra-2018. Accessed 10 Mar 2021.

European Commission. (2018). Adaptation Preparedness Scoreboard: Draft Country Fiche for United Kingdom. Available at: https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/country_fiche_gb_en.pdf. Accessed 10 Mar 2021.

Flood, S., Paterson, S., O'Connor, W., O'Dwyer, B., Whyte, H., Le Tissier, M., & Gault, J. (2020). *National Risk Assessment of Impacts of Climate Change: Bridging the Gap to Adaptation Action* (Report Number 346). Environmental Protection Agency.

IPCC (Intergovernmental Panel on Climate Change). (2014). Climate Change 2014: Impacts, Adaptations and Vulnerability. In *Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC.

Maiden, T., & Monaghan, P. (2017). *Climate Ready Councils, the Business Case for Managing the Impacts of Severe Weatherand a Changing Climate*. Local Government Association.

Mogelgaard, K., Dinshaw, A., Ginoya, N., Gutierrez, M., Preethan, P., & Waslander, J. (2018). From Planning to Action: Mainstreaming Climate Change Adaptation into Development. World Resources Institute Working Paper. Available from: https://wriorg.s3.amazonaws.com/s3fs-public/from-planning-action-mainstreaming-climate-change-addaptation-into-development.pdf. Accessed 6 Apr 2021.

Tonmoy, F. N., Rissik, D., & Palutikof, J. P. (2019). A Three-Tier Risk Assessment Process for Climate Change Adaptation at a Local Scale. *Climatic Change*. https://doi.org/10.1007/s10584-019-02367-z

UK Government Office. (2017). *National Risk Register of Civil Emergencies*. Cabinet Office.

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Section III

International Case Studies

8

Sustainability, Disaster Risk Reduction and Climate Change Adaptation: Building from the Bottom Up – A South African Perspective from the Small-scale Fisheries Sector

Merle Sowman and Xavier Rebelo

Introduction

South Africa, like many countries in Africa, is a signatory to various international multilateral agreements such as the UN 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs), the Paris Agreement (2016), Sendai Framework for Disaster Risk Reduction (2015–2030) and, more recently, the Voluntary Guidelines for Securing Small-scale Fisheries (FAO, 2015), so as to chart a more sustainable and climate-appropriate development pathway. Consequently, South

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Africa has developed policies and strategies to promote sustainable development and respond to climate change and its impacts. Reducing and managing disasters are also dealt with in the suite of policies and legislation that seeks to manage and reduce risk and vulnerability, especially amongst the poor and marginalised sectors of society. Climate change is one factor that is increasingly contributing to disaster risk.

Coastal fishing communities who depend on marine resources for food and livelihoods are a particularly vulnerable sector (Allison et al., 2005, 2009; Dolan & Walker, 2006; Kalikoski et al., 2018). Worldwide, over 200 million people depend on SSFs for their livelihoods, and this sector employs approximately 90% of the world's capture fisheries and fish workers (Ruiz-Díaz et al., 2020). Due to a range of factors, this sector is among the poorest and most marginalised in the world. Firstly, the nature of fishing is largely unpredictable and subject to a range of environmental factors such as resource availability, seasonality, weather and climate (FAO, 2015). Other factors such as macroeconomic and political factors, unstable institutional arrangements, weak local-level organisations and limited government support add to their vulnerability context (Allison et al., 2005; FAO, 2015). In addition, SSFs are subject to a myriad of pressures on their fishery system including: the impacts of industrial and even recreational fishing; the prevalence of illegal, unreported and unregulated (IUU) fishing; restrictions on access to traditional fishing grounds and other natural resources; poor infrastructure; lack of facilities and basic services, and limited social protection (Allison et al., 2005; Bennett et al., 2020). Thus, they are particularly vulnerable to the effects of climate change and natural and human-induced disasters.

Fishing communities are often at the front line of climate change due to their geographic location in high-risk coastal areas. This makes them particularly vulnerable to disasters such as floods, coastal erosion, and storms at sea (Dolan & Walker, 2006; Kalikoski et al., 2018). Changes in sea temperatures and oceanic chemistry will have an impact on fish migration, distribution, recruitment, growth, abundance and predator-prey relationships, which will in turn affect the livelihoods and wellbeing of coastal communities (McIlgorm et al., 2010). Shifts in species abundance and movement of fish means that fishers may need to travel further out to sea, or venture out in marginal weather conditions, placing them

at great risks, often without or with limited safety equipment. These fishers are deeply connected to the ocean and observe and experience environmental changes and the impacts that result from these changes on a daily basis. They hold immense knowledge about changing environmental conditions and are well placed to contribute knowledge and ideas about adaptation strategies that are required to reduce risk, build resilience and 'leave no one behind' (Mohammed et al., 2020). Yet, they are seldom consulted about their experience and knowledge of environmental change and risks to their livelihoods, or invited to contribute to policy and strategy formulation processes. While their experience and knowledge may be relevant to a local context, the ideas generated at this level are likely to produce proposals for local socio-economic development, climate adaptation and disaster risk reduction (DRR) that are locally appropriate and supported. Furthermore, the cumulative knowledge from fishing communities located around the coast could provide information and insights regarding socio-economic development needs, risk reduction and climate adaptation strategies that inspire a more integrated and locally grounded approach to the development of national policies, strategies and plans to address coastal risk.

While the advent of democracy in South Africa catalysed a massive law reform process that led to the promulgation of a plethora of progressive policies and laws across all sectors, the implementation of policy and law has been weak (Munzhedzi, 2020). The fields of sustainable development, climate change and disaster risk reduction are governed by different policies and laws and are the responsibility of different government departments and governance actors operating at different levels of government. Despite calls for integration, coordination, cooperative governance and involvement of civil society in all three arenas, there is limited integration across these endeavours. Research on the vulnerability of small-scale fishers to various threats and stressors, including climate change, provides a useful lens for examining the relationships between these interrelated fields and reveals how governance actors respond to coastal communities at risk and their quest for sustainable livelihoods.

This chapter reviews the policies, strategies and plans relevant to sustainable development, disaster risk management and climate change adaptation (CCA) in South Africa and examines the extent to which

there is policy alignment and institutional cooperation to integrate these complementary agendas in the coastal environment, with particular focus on coastal fishing communities. Drawing on extensive involvement in the small-scale fisheries policy development and implementation process in South Africa over several years (Sowman et al., 2014a; Sowman et al., 2014b; Sowman & Sunde, under review), as well as a research project concerned with assessing vulnerability of fishing communities to climate change and building resilience to adapt to change (Raemaekers & Sowman, 2015; Sowman & Raemaekers, 2018; Sowman, 2020), the chapter highlights a number of issues regarding the ongoing vulnerability of coastal fishing communities to climate change and associated impacts, and how these undermine the ability to pursue a sustainable development pathway. It then reflects on the findings from a number of community-based vulnerability assessments conducted in South Africa and argues that communities are best placed to identify and help shape local development and adaptation plans, based on their knowledge and experience. How this knowledge gets integrated both vertically and horizontally into formal government planning and decision-making processes, however, and leads to implementation of projects and plans that yield tangible results, remains a challenge.

South Africa's Policy and Legal Framework for Sustainable Development, Climate Change and Disaster Risk Reduction

Introduction

South Africa has a sophisticated and progressive policy and legal framework for sustainable development, climate change governance and disaster risk reduction (DRR) and management (DRM). The advent of democracy in South Africa ushered in a new constitutional dispensation, spearheaded by the promulgation of the Constitution in 1996 (RSA, 1996). The Constitution is underpinned by human rights principles and seeks to redress past injustices and promote substantive equality, generating a

'window of political opportunity' to remould the existing apartheid legislation and policy in a manner that directly confronts the legacy of apartheid (Glavovic, 2006). All policies, legislation, strategies and action plans are now required to be formulated in terms of, and measured against, constitutional rights and provisions. The environmental right, contained within the Bill of Rights, guarantees everyone the right to an environment that is not harmful to their health or wellbeing, and requires the State, through reasonable legislative and other measures, to protect the environment, ensuring that conservation is promoted and that pollution and ecological degradation are prevented. Ultimately, all laws and policies must 'secure ecologically sustainable development, while at the same time promote justifiable economic and social development' (RSA, 1996, section 24). Human rights, including the environmental right and its association with promoting sustainable development, as enshrined in the Constitution, thus played a significant role in influencing environmental (in the broadest sense of the term) policies and laws. Based on these constitutional imperatives and South Africa's adoption of various international multilateral agreements such as the SDGs, the Paris Agreement and Sendai Framework for Disaster Risk Reduction (2015–2030), legislation, as well as various policies, strategies, management and action plans have been developed to address the commitments to these agreements.

National Strategy for Sustainable Development

South Africa's National Strategy for Sustainable Development and Action Plan 2011–2014 (NSSD1) builds on the 2008 National Framework for Sustainable Development and several initiatives to address issues of sustainability in South Africa. It presents an understanding of sustainable development and provides a high-level roadmap for strategic sustainable development. Strategic priorities include, inter alia, to enhance effective governance and institutional structures and mechanisms to achieve sustainable development, and to effectively adapt to and manage climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity. The NSSD1 identifies particular adaptation

interventions that are relevant or targeted at coastal communities in furtherance of this objective. These interventions include the introduction of development restrictions in the coastal zone, the maintenance of ecosystems that act as buffers against natural disasters, improved disaster management systems, adaptation plans at the local level and the bolstering of the adaptation capacity of communities. The NSSD1 also includes three 'process principles' that are intended to guide the implementation of its listed interventions. The second of these principles requires that the recommended interventions be underpinned by consultation and participation (DEA, 2011).

National Environmental Management Act

South Africa's umbrella environmental legislation, the National Environmental Management Act No. 107 of 1998 (NEMA), contains a set of 'environmental management principles' which give expression to the principle of sustainable development and are intended to guide the formulation of environmental policy and decision-making (Kidd, 2013). The NEMA advocates an integrated and co-ordinated approach to decision-making and the promotion of collaborative platforms for harmonising policies, legislation and actions pertaining to the environment. Whilst the NEMA principles and provisions do not explicitly refer to climate change, the NEMA does make provision for the circumvention of an environmental authorisation in terms of a listed activity in order to prevent or contain an emergency situation, which includes a 'disaster', as defined in the Disaster Management Act (DMA) (section 30A(7)). Importantly, the NEMA also establishes that 'sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures' (section 2(4)(r)).

Coastal Management

Shortly after the promulgation of the NEMA, and in line with the aforementioned recommendation, South Africa's first integrated coastal management (ICM) policies and legislation emerged in the configurations of the White Paper for Sustainable Coastal Development of 2000 (White Paper) and the Integrated Coastal Management Act No. 24 of 2008 (the ICMA). South Africa's coastal policy and legislative framework for promoting sustainable coastal development and protecting coastal ecosystems and communities has been heralded as progressive (Sowman & Malan, 2018). Both the White Paper and the ICMA were instrumental in transforming the previous biocentric and bureaucratic approach to coastal management into a participatory approach, underscored by human development imperatives and the need to promote sustainable livelihoods through equitable access to coastal resources and commons (Glavovic, 2006).

Noticeably, the ICMA places considerable emphasis on the public nature of the coast and conveys an intention to enhance and extend equitable access to the coastal commons, while concurrently preserving the integrity of the coastal ecosystem. Governance under this new coastal management paradigm calls for a participatory and adaptive management approach, which seeks to integrate policies and actions across scales as well as recognise the interlinkages between environmental processes and human activities (Glavovic, 2016; Sowman & Malan, 2018). The development and application of strategic guidance documents, known as coastal management programmes (CMPs), at different levels of governance, is seen as central to informing planning and decision-making. The hierarchical relationship between CMPs allows for the formulation of a strategic and overarching National CMP, followed by more localised CMPs that accommodate increasing degrees of local management detail. These CMPs set out priority areas including priorities relevant to reducing coastal risk. Priority 1 of the National CMP, for example, refers to effective planning for coastal vulnerability to global change, including climate change. In addition, the ICMA includes various mechanisms that can be harnessed to reduce risk to coastal ecological systems and

communities such as the declaration of coastal protection zones, coastal public property, special management areas and demarcation of management lines (Sowman & Malan, 2018). Collaborative governance is key to the implementation of the ICMA, which promotes the establishment of both formal and informal institutions for coastal management, in addition to partnerships among a variety of role players in the quest for improved coastal governance (RSA, 2008, preamble).

Disaster Risk Management

A new paradigm for disaster management has also emerged, with a shift from a reactive approach to implementing post-disaster emergency relief measures to a more holistic and integrated, proactive, pre-disaster planning approach. The Disaster Management Act No. 67 of 2002 (DMA), as amended, and the National Disaster Management Framework (NDMF) of 2005 aim to reduce, prevent and/or mitigate risks associated with disasters and their severity through rapid and effective responses, as well as post-disaster recovery and pre-disaster planning. The DMA calls for the establishment of 'disaster management centres' at the national, provincial and municipal levels. The objective of these disaster management centres is to promote a coordinated and integrated approach to disaster management, with a particular emphasis on adaptation and mitigation strategies (section 9).

The NDMF constitutes the policy instrument specified by the DMA to provide 'a coherent, transparent and inclusive policy on disaster management appropriate for the Republic as a whole' (section 7(1)). While the DMA provides guidance on the nature and approach to disaster risk management, the NDMF delineates how coherence, transparency and inclusive disaster management, as well as cooperation across spheres of government, will be attained. This includes the establishment of an Intergovernmental Committee for Disaster Management, the establishment of disaster management centres, as well as advisory forums at the national, provincial and local level.

Although the coastal zone is not explicitly mentioned in the DMA, the NDMF, in the very first paragraph, makes specific reference to South

Africa's 'extensive coastline' and 'coastal threats' as significantly increasing the potential for disaster risk. This understanding identifies the coast as a strategic area in which to focus and strengthen disaster risk management efforts in South Africa. In this regard, the NDMF identifies a variety of risks and disasters that may unfold in South Africa and prioritises developmental measures that decrease the vulnerability of disaster-prone areas and communities. The NDMF is intended to guide the subsequent formulation of provincial and municipal disaster management frameworks and strategies.

Since municipalities are at the forefront of coastal disasters, it is incumbent on them to ensure that coastal risk and disaster management responses (both before, during and after a disaster) are appropriately integrated into their local integrated development plans (van Niekerk, 2006; Coburn et al., 1991). The NDMF lists various 'planning points' or requirements that must be considered by national, provincial and municipal government in their disaster risk management initiatives. Central among these is that disaster risk management initiatives will be more effective if they are the result of deliberative and participatory processes, which include local knowledge and expertise. Consequently, disaster risk management planning must always involve the active and constructive consultation between all at-risk sectors, communities and role players (DCGTA, 2005, section 3.3.1.3; RSA, 2002, section 7(2)(f)).

Climate Change

The 2011 National Climate Change Response White Paper sets the objective to effectively manage inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity. The Paper proposes a strategic approach that is: needs-driven and customised; developmental; transformational; empowering and participatory; dynamic and evidence-based; balanced and cost effective, and integrated and aligned. This vision is informed by the principles established in the Constitution, the Bill of Rights, the NEMA, the Millennium

Development Goals and the United Nations Framework Convention on Climate Change (UNFCCC).

The Paper is cognisant of the fact that coastal human settlements are extremely vulnerable to sea-level rise, flooding, coastal erosion and increased frequency and intensity of coastal storms. In response to these threats, the Paper specifies the need for enhanced disaster risk reduction and disaster risk managment as well as a succinct approach to adaptation. The Paper also identifies that adaptation responses have a strong local flavour and require the development of detailed bottom-up governance approaches that incorporate the participation of both local communities and government. As such, the Paper acknowledges the vital role that local government plays in addressing climate change-related issues.

The 2018 Draft Climate Change Bill provides for a coordinated and integrated approach to addressing climate change impacts, through engaging actors across government scales, and is underpinned by the principles of co-operative governance. The Bill aims to enhance adaptive capacity, bolster resilience and reduce vulnerability to climate change, and places great emphasis on institutional arrangements at the provincial and municipal level. A central policy tool proposed by the Bill is the formulation of a National Environmentally Sustainable Framework, which will delineate the appropriate mechanisms, systems and procedures to facilitate in the achievement of the objectives of the Bill. The Bill also makes provision for the establishment of 'Committees on Climate Change' at the national and provincial tiers of government.

The National Climate Change Adaptation Strategy (NCCAS) provides the necessary guidance to government actors across national, provincial and municipal scales in response to climate change. The NCCAS serves as South Africa's National Adaptation Plan in terms of the country's international obligations, as espoused in the Paris Agreement under the UNFCCC. The strategy seeks to facilitate greater coherence and coordination between various stakeholders, including governments, non-governmental organisations, the private sector and local communities, in strengthening climate resilience, and to integrate the national disaster risk management framework into climate change preparedness, response and recovery. The NCCAS advocates for the inclusion and strengthening

of adaptive capacity and resilience to climate change in national, provincial and municipal disaster management plans. The implementation of the adaptation strategies contained in the NCCAS is to be guided by a set of listed principles and key elements for adaptation and climate resilience. The NCCAS promotes the principles of participatory governance, and reaffirms that climate change adaptation strategies must be underpinned by the active participation of a wide range of stakeholders, including government, civil society organisations, communities and the private sector.

Small-Scale Fisheries Policy

At a sector level, the Policy for the Small-scale Fisheries Sector in South Africa of 2012 (SSF policy) proposes a fundamental shift in the approach and philosophy to the governance of SSFs. This new approach is underpinned by human rights principles, community involvement, participation and socio-economic development (Sowman et al., 2014a; Sowman et al., 2014b). The SSF policy delineates a collection of governance principles that echo international best practice and key constitutional principles, and is steered by objectives that seek to redress the unequal distribution of resources for SSF communities.

A central tenet of the SSF policy is the co-management of marine resources, which entails a people-centred and community-orientated approach towards the devolution of management decisions on fishing communities. The SSF policy, in line with South Africa's international and regional agreements on developing sustainable fisheries, recognises the value of sustainable resource management and harvesting within SSF communities. While the SSF policy canvasses on issues of disaster relief in relation to the ability of fishers to access disaster relief assistance and social security schemes, and aims to enhance safety at sea through bettering labour standards, it does not explicitly list the DMA under the category of laws relevant to the SSF sector. Although the SSF policy recognises the particular vulnerability of SSF communities to climate change, the only mechanism through which this vulnerability is addressed in the SSF policy is through the establishment of technical and advisory support

services, such as support hubs, where fishers may access research and findings on climatic conditions. A lack of engagement with the interlinkages between climate adaptation and sustainable development is surprising, provided the vulnerable geographical location and fragile socio-economic circumstances of SSF communities in South Africa.

Coastal Fishing Communities in South Africa

In South Africa, the fisheries sector contributes <1% to the country's gross domestic product (GDP). Despite this relatively low contribution to GDP, it is an extremely important industry, especially in the Western Cape province, providing formal employment to approximately 28,000 people and supporting over 40,000 small-scale and subsistence fishers throughout South Africa (Sowman et al., 2014b, Sunde & Erwin, 2020). To date, 350 fishing communities have been identified and registered along the entire 3000 km stretch of coast from the Orange River mouth on the Namibia border to Kosi Bay on the Mozambique border. These fishing communities are engaged in a wide range of fishing activities, from boat-based line fishing on the west coast of South Africa to intertidal harvesting along the eastern seaboard and customary trap fishing in the Kosi Bay lake systems in KwaZulu-Natal (Sowman et al., 2014a; Sunde et al., 2013). Despite their reliance on marine resources as a vital source of food and livelihoods, as well as an integral facet of their customary practices in parts of the country (Mbatha, 2018; Sowman & Cardoso, 2010; Sunde et al., 2013), these fishers have a long history of exclusion and marginalisation from the fisheries governance regime (Isaacs, 2006; Sowman, 2006).

Failure of government to address the rights and needs of this sector in the new democratic dispensation led to protests and a legal action that resulted in a court ruling requiring the Minister to embark on a policy-reform process that would give legal recognition and protection to this sector, and secure access rights for traditional fishers. After an extensive policy development process (2008–2012), the SSF policy was promulgated and amendments to the Marine Living Resources Act (1998) were enacted in 2014 (DAFF, 2012, 2014). However, the process of allocating

rights and implementing the new SSF policy in coastal communities has been slow and fraught with difficulties (Sowman & Sunde, under review). This slow roll-out of policy has entrenched the vulnerable position of many SSFs, largely due to worsening economic conditions in South Africa, high levels of unemployment, deepening poverty and the lack of social protection for this marginalised sector. Of course, the COVID-19 pandemic has laid bare the vulnerability of poor and marginalised peoples in South Africa and exposed the government's failures to protect and support its most vulnerable groups (Bond, 2020). A lack of political will to prioritise this hitherto neglected sector, as well as the slow pace of policy implementation, has meant that thousands of fishers remain outside of the legal process and risk fines and imprisonment if caught harvesting resources without a valid permit. Despite good intentions, the lack of human capacity and resources within the SSF Directorate in the Department of Environment, Fisheries and Forestry (DEFF), and the narrow interpretation of fisheries development and management, has meant that SSFs remain vulnerable and at risk to various threats and disasters (Sowman & Sunde, under review).

Findings

Despite a progressive policy that gives legal recognition to SSFs in South Africa and a commitment to a rights-based, community-orientated approach that is inclusive and developmental (Sowman & Sunde, 2021), underpinned by sustainable development principles, the socio-economic conditions that prevail in these coastal communities continue to affect the precarious nature of their livelihoods. Participation of the first author in the SSF policy development process (2008–2012) and in follow-up meetings, workshops and roundtable discussions on the implementation of the policy with fisher representatives and their social partners over several years, has highlighted how the vulnerability of this sector is exacerbated by climate change and, more recently, the COVID-19 pandemic (Sowman & Sunde, under review). While the SSF policy was designed to provide legal recognition and protection to SSFs, ensure preferential access to coastal fishing communities, support the development of these

fisheries, build local-level organisations and expand markets, thousands of coastal fishers do not have secure access to resources, and many communities still lack access to basic services and facilities (Sowman & Sunde, under review). Of particular concern is the lack of social protection provided to small-scale fishers and the failure to ensure their right to food and access to resources to pursue a livelihood. Despite the commitment to an inclusive and developmental approach, the SSFs sector is managed by the Small-Scale Fisheries Directorate who are under-resourced and focused on resource allocation and management. Proposals for a more holistic and 'whole of government approach' that recognises the complexity of the SSF system and works collaboratively with fishers to manage resources and develop their fisheries have not been embraced.

Understanding how these various agendas play out in the SSF arena in South Africa was further informed by a series of vulnerability assessments conducted in five coastal fishing communities as part of a number of FAO-GEF-BCC-supported projects on understanding vulnerability to climate change and building resilience in coastal communities in the Benguela Current Large Marine Ecosystem (BCLME) region. The first phase of the project focused on developing a community-based vulnerability assessment tool to assess vulnerability of coastal communities to climate change. This assessment tool, known as the RVA tool (Raemaekers & Sowman, 2015; Sowman & Raemaekers, 2018), has been applied in fifteen fishing communities in the BCLME region (Sowman, 2020). In this chapter, we draw on the findings from the RVA workshops conducted in five fishing communities in South Africa and the follow-up work to develop adaptation strategies to address vulnerabilities associated with climate change. The RVA was conducted over a two-day period and was structured around a series of participatory exercises that sought to understand the local socio-ecological context with a particular focus on identifying environmental and climate-related stressors and changes, the impacts associated with these stressors and changes, and the adaptation strategies required to respond to these livelihood threats (Raemaekers & Sowman, 2015; Sowman & Raemaekers, 2018).

Table 8.1 provides a summary of the main threats to livelihoods identified by fishers in the workshops in South Africa, and lists the adaptation

Table 8.1 Livelihood threats and adaptation strategies

Stressor/threat	Interventions and adaptation strategies
Environmental/climate	
Unpredictable weather and seasonal changes (including rougher seas, changing wind patterns and ocean currents)	Increased interaction between SSF and scientists to bolster knowledge on climate variability and change Safety at Sea training and establishment of Safety at Sea system Increased access to information and communication technologies (ICTs) for weather forecasts Explore supplemental livelihoods (e.g. tourism, marine products) Upgrade boats to manage rough seas
Declining individual catches	Explore harvesting of other resources (seaweeds etc.) Monitor and record catches to assist with management Develop supplemental livelihoods (e.g. mariculture) Improve implementation of regulations and compliance
Increasing levels of pollution and environmental degradation	Community-government partnerships to address waste collection/recycling Strengthen networks with scientists and lawyers to challenge polluting and damaging activities Better monitoring and compliance by government
Shorter, later fishing season	Explore markets interested in diversified catches and undervalued species Training on quality control and seek access to cold-chain infrastructure Better collaboration with DAFF re access to alternative resources
Governance	
Weak local-level organisation	Develop local fisher associations or fisher co-operatives Training to run co-op effectively (e.g. financial and business management training)

(*continued*)

Table 8.1 (continued)

Stressor/threat	Interventions and adaptation strategies
Lack of communication with and support from government	Set up and improve communication channels with government Facilitate fisher-scientist exchanges to improve knowledge base Increase collaboration between government and fishers through co-management structures Prioritise the implementation of the SSF policy
Socio-Economic	
Lack of equipment and support for infrastructure	Explore supplemental livelihoods (e.g. tourism, marine products) Improve infrastructure, facilities and security at harbour
Lack of markets and unequal access to markets	Development of local products and increased access to markets Training and skills development in small business and marketing Develop/implement a cold-chain storage and quality control system to maximise markets and promote undervalued species
Competition from commercial and recreational fishers, and mining sector	Obtain compensation for habitat damage (e.g. from mining) Strengthen policies and regulations to protect marine resources Improve monitoring and enforcement of commercial fishing and mining activities

actions and strategies that they considered appropriate and 'doable' to address vulnerabilities and build resilience. Although the focus was on identifying adaptation strategies to address climate variability and change, many of the strategies were relevant to addressing threats to livelihoods and building resilience to deal with their vulnerability context more broadly.

Although the focus of the project was on understanding vulnerability of coastal fishing communities to climate change, it became clear in the workshops that climate change could not be discussed in isolation of the

myriad of other stressors facing these communities, including their pre-existing vulnerabilities, many of these associated with discriminatory apartheid legislation that excluded them from the fisheries sector and other spheres of economic life. A list of basic needs including housing, education, health facilities etc. were mentioned in all workshopsx, and stressors associated with poverty were ever present. Nonetheless, for many fishers, changing environmental conditions that affect fishing was an issue of concern in all communities. These changes included unpredictable weather and seasonal changes (including rougher seas, changing wind patterns and ocean currents), fish being further out at sea and reduced individual catches. Threats from other sector activities, in particular mining and commercial fishing activities, as well the pollution arising from these activities, were identified as significant threats to their livelihoods.

Lack of communication with and support from government was considered a further key threat to livelihoods and, as decisions were top-down, local fishers were seldom consulted and mechanisms for communication were limited. Weak local-level organisations were also identified as negatively affecting fishers' livelihoods through inability to access information, engage with government, obtain permits and explore better market opportunities. Key socio-economic threats to livelihoods were identified as lack of equipment and support for infrastructure, lack of markets and unequal access to markets due to powerful marketers, as well as competition for resources from other sectors.

In considering how to deal with these threats, including threats associated with climate change and possible disasters, fishers identified a number of interventions and adaptation strategies which they see as necessary to be able to respond to these threats and adapt to climate change. Many of the interventions focused on government fulfilling their monitoring, regulatory and management functions in terms of other sectors, as well as providing the necessary infrastructure support for fishing activities, such as cleaning facilities at landing sites. The adaptation strategies identified can be grouped into five main categories: namely, strengthening local organisations (e.g. fisher co-operatives), development of supplementary or alternative livelihoods, skills training and capacity development,

improving safety at sea and access to better ICTs for weather forecasts, and improving market access and opportunities.

Strengthening local organisations and building institutional capacity was recognised as critically important in order to address stressors and respond more effectively to climate change impacts and disaster risks. Building fisher organisations and establishing local co-operatives were identified as urgent actions by South African fishing communities. Communities identified the nature of support required and listed potential government departments, development agencies, NGOs and tertiary institutions that could assist them. In all communities, various types of skills training associated with product beneficiation, marketing of products, business and financial management, the use of mobile phone apps (developed by ABALOBI ICT4 fisheries) to record and market catches, as well as training in food hygiene and safety, were also identified. In response to various environmental stressors, many participants listed supplemental livelihood activities (e.g. local tourism, mariculture), as an important adaptation strategy. These alternative livelihoods largely focused on exploring supplemental livelihoods from the sea, whether through the targeting of alternative resources (e.g. seaweeds), mariculture development or tourism. Improving product beneficiation, preserving various marine products such as mussels, and expanding markets were also identified as key actions for building resilience.

Improving safety at sea was identified as an important adaptation strategy. This included better and safer equipment such as global positioning systems (GPS), vessel monitoring systems (VMS), access to the internet and, in cases where certain fish species were only found further out at sea, bigger and more robust boats. Fishers also required access to early warning systems which they argued was the responsibility of government. Currently, in all cases, only those fishers with access to the internet can obtain long-term weather forecasts.

In nearly all the workshops, participants stressed the importance of taking forward the identified adaptation strategies and actions. Fishers looked to external stakeholders, such as NGOs and researchers, to play a facilitating role in bringing together the relevant government departments and other parties in order to turn adaptation proposals into action plans. Communities were clear that support from international funding

agencies was needed, since government was unlikely to be in a position to fund many of the proposals.

Discussion

Relying on the SSF sector in South Africa as a case study, this final section discusses some of the challenges in bringing the various agendas, namely sustainable development, climate change and DRR together. It then reflects on what NGOs and local communities, and in particular their local knowledge, can contribute to informing policies, adaptation and management plans in these arenas.

Lack of a Holistic and Integrated Approach

Understanding the vulnerability context of coastal fishing communities, including the various factors that shape their capacity to cope with and adapt in the face of poverty, and increasing threats associated with climate change and natural and human-induced disasters, requires a historical perspective, as well as a holistic and integrated approach (Barange et al., 2018). SSF communities in South Africa have been neglected for several decades and their pre-existing vulnerabilities cannot be ignored when addressing climate change threats and disasters. These communities face a myriad of stressors and threats, including socio-economic challenges, governance failures and, more recently, threats associated with climate change (Sowman & Raemaekers, 2018). These stressors (old and new) often act in concert, driving a complex web of vulnerability amongst communities (Sowman & Sunde, under review). Thus, assessing vulnerability, building adaptive capacity for climate change and preparing proactively for disasters requires a recognition of these interlinkages among governance actors. It also requires an appreciation of the differential impact that climate change may have on different communities and groups.

Clearly, a one-size-fits-all approach is not appropriate. Nor will a sector response be appropriate in most cases (e.g. a fisheries management

department dealing with the ongoing threat of coastal flooding at a landing site due to increased winter storms). Given the complex nature of these problems, there is a need for a multi-sector and broader governance response. This requires government to go beyond its narrow mandate and work more holistically and collaboratively with other departments and enlist the expertise and support of NGOs, researchers and other actors, as appropriate. While most policies and strategies relevant to sustainable development, climate change and DRR advocate this more holistic and integrated approach, in practice a top-down, sector-specific and regulatory approach is being adopted.

Lack of Alignment and Policy Coherence at National Level

Although South Africa boasts an extensive assemblage of sustainable development, climate change adaptation and disaster risk management legislation and policy, effective climate change adaptation and disaster risk reduction is severely hampered by a lack of policy coherence and alignment between government departments and among different spheres of government. Whilst sustainable development and climate change is generally considered to fall within the environmental ambit, disaster risk reduction is considered an area of broader concern. The DEFF is charged with the overall implementation of sustainable development, climate change and coastal policy, while the Department of Cooperative Governance and Traditional Affairs (DCGTA) is responsible for disaster risk management. Accordingly disaster risk reduction, has been sluggish in connecting risk reduction associated with extreme events to climate change adaptation.

Climate adaptation is largely considered an environmental issue in South Africa, thereby relegating its importance in relation to the plethora of socio-economic issues that compete for primacy. While the concept of sustainable development offers opportunities to integrate the facets of environmental protection, economic development and social upliftment, progress on formulating the second National Strategy for Sustainable Development (NSSD2), which was expected to come to fruition between

2015 and 2020, has not occurred. While policy generation on sustainability appears to have stalled, issues of socio-economic development are increasingly being prioritised over environmental integrity, severely constraining future adaptation options for climate variability and associated increases in disastrous events.

South Africa's economic downturn, exacerbated by the COVID 19 pandemic, as well as its embrace of the 'Blue Economy' agenda, has led to an aggressive push to grow and revive the South African economy through a reliance on energy-intensive industries like oil and gas, mining, shipping and mariculture. Coupled with the national electricity supply crisis, there is considerable pressure on government departments like the Department of Mineral Resources (DMR) which aims to promote economic growth through the development of mineral resources and the energy sector, and exploit natural resources for socio-economic upliftment. Although the DMR has committed to sustainable development in the mining and energy sector and is obliged to comply with the environmental authorisation procedures before the issuing or granting of rights and permits, it interprets sustainable development in a manner that prioritises socio-economic development above environmental imperatives. Despite the disjuncture between the environmental impacts of mining and South Africa's commitments to mitigating climate change, various permits to mine along the West Coast of South Africa have recently been issued, while further rights for oil and gas exploration are awaiting approval. This reveals contradictions within national government regarding the interpretation of sustainable development principles, which is further evidenced by the divergent framings and interpretations of the concepts between government departments. Although the DEFF is responsible for the implementation of sustainability and climate adaptation objectives, it has failed to halt the activities of extractive industries, undermining its policies and strategies to mitigate climate change and adapt in the face of climate variability. Thus, while sustainable development and climate adaptation need to be integrated into the policies and strategies of all government departments, important questions arise as to which departmental framing and interpretation of these imperatives dominates. The need for a uniform approach to implementing these concepts within the strategies of all government departments is particularly

necessary in ensuring that environmental concerns are not overlooked as South Africa embarks on its Economic Reconstruction and Recovery Plan.

Mismatch Between Policy Rhetoric and Implementation

Much of South Africa's sustainability, disaster risk mangement and climate change legislation and policy is innovative and reflects the contemporary state of international thinking regarding these subject matters. However, as is the case with various legislative and policy initiatives in South Africa, effective implementation remains deficient (Kidd, 2013).

While the South African judiciary has endorsed the principle of interdependency and exhibited an acute awareness of the implications of climate change on the attainment of socio-economic development, translating this understanding into a practical reality remains challenging due to the fragmentation of government departments tasked with implementing climate change adaptation, disaster management and socio-economic strategies (Murcott, 2018; Schlosberg, 2013) The DEFF is the leading government department for the implementation of sustainable development and climate adaptation objectives and strategies in South Africa, however DEFF lacks the authority to influence other departments. The 'silo' mentality of government departments impedes the cross-pollination of sustainability, adaptation and disaster management imperatives within the strategies of departments tasked with implementing development objectives.

Although the vast majority of national government policies and frameworks for sustainable development, climate adaptation and disaster management acknowledge the critical role of local government for their implementation, they rarely endow municipalities with the resources and authority to meet national targets (Perine & Keuck, 2018; Reddy & Wolpe, 2017). In this regard, there is a substantial mismatch between the ambitious objectives set at the level of national policy and their implementation at the municipal level.

Climate adaptation and disaster risk managment are generally the responsibilities of the relevant department within municipalities, where

such a department exists. However, rural and small municipalities may only have ad-hoc committees to manage environmental issues (Mokwena, 2009) or, in the case of disaster risk management, advisory forums to facilitate stakeholder participation. These departments are generally under-resourced and lack the authority to influence the mandates of departments dealing with transportation, energy, water and land-use planning, which are focused on deliverables and are tethered to sectoral plans and campaign promises. Thus, jurisdictional ambiguity exists between the various line functions at the local level, impeding action on the ground. In view of these resource and capacity constraints, it is challenging to envision opportunities to apply cooperative governance principles, integrated and coordinated disaster management, and stakeholder involvement, at the municipal level.

Thus, while the intricate web of policies continue to swell both in number and ambition, at the better funded and capacitated levels of national and provincial government, until the gap between policy rhetoric and implementation is effectively bridged at the local level, these frameworks will remain largely aspirational. Despite a strong emphasis on the involvement of local communities in the co-production of disaster risk managment and climate change adaptation initiatives, the reality of SSFs exhibits that converting policy rhetoric into practical reality is a 'field of struggle' (Glavovic, 2006).

Role of NGOs and Other Actors in Facilitating Change and Building Resilience

The apparent failure of the State to address the needs of and respond to the threats facing SSFs in South Africa, has increased their reliance on NGOs and other actors such as researchers. These social partners, including Masifundise Development Trust, Legal Resources Centre, ABALOBI NPO and many researchers, are involved in supporting SSFs in a variety of ways, such as in their efforts to claim rights to resources, gain information on policy and management decisions, improve local fisheries monitoring and management, gain access to better markets, build institutional capacity and local skills, and challenge government decisions that they

consider to be unfair. Worldwide, ongoing distrust of and frustration with government authorities on the part of development and donor agencies has led to increased support for NGOs as facilitators of change, implementers of development projects and brokers of agreements (Murray & Overton, 2011). NGOs and other social partners are certainly playing an increasing role in supporting SSFs in South Africa in these various ways. Communities see NGOs and other trusted social partners as better able to represent their interests and needs because they are more attuned to local socio-ecological contexts and mostly work with poor and marginalised communities.

Lessons from work in the SSF policy arena over the years and involvement in the vulnerability assessment and adaptation planning workshops reported in this chapter, suggest that NGOs and researchers are increasingly providing support (technical, legal, access to information, skills training, capacity building, facilitation, networking etc.) to SSF communities in view of the absence of government to address their vulnerability circumstances and fulfil their mandates. Where communities have existing relationships with researchers and NGOs, they are able to gain information and access to support and resources more easily than those communities that are not well networked. Through these networks, communities are able to work collaboratively with their NGO and research partners to seek funding for particular strategies that could deliver immediate benefits.

However, while NGOs and researchers can play an important role in facilitating information exchange, providing technical and other supports, securing funding and facilitating local development and climate adaptation plans, in order for these plans and strategies to be implemented, relevant government departments need to be involved. Critically, implementation of these proposals and/or adaptation strategies needs to be integrated into local-level planning and development processes, as well as elevated so as to contribute to various plans and strategies at the provincial and national levels.

Integrating Bottom-Up Local-Level Planning Both Vertically and Horizontally

Local fishing communities are at the coalface of changing weather conditions and longer-term climate changes and bear the brunt of disasters (Dolan & Walker, 2006; Kalikoski et al., 2018). Their observations and first-hand experiences of changing environmental conditions (and how these impact local fisheries and livelihoods) imply that they are well placed to identify strategies and pathways to build resilience and sustainable livelihoods (Raemaekers & Sowman, 2015). Incorporating their knowledge, insights and proposals into various local, provincial and national plans and strategies concerned with sustainable development, climate change and disaster risk reduction, both horizontally and vertically, would ensure that policies, plans and strategies are grounded in local realities. These higher-level documents, informed by local-level experiences and knowledge, are likely to have more legitimacy and be more relevant and useful when applied at the local level.

While there is vast literature on the importance of mainstreaming information generated at the community-level into national-level processes, and several policy and strategy documents advocate for participation of local communities in policy and plan formulation, the practicalities of inserting local knowledge into national sustainable development plans, disaster risk management plans and climate change adaptation strategies, is a challenging task (Adhikari & Taylor, 2012; Pahl-Wostl & Knieper, 2014). Thus, NGOs and other social partners working with communities need to engage with relevant government actors at some stage in these local-level processes to ensure that plans and strategies generated at the local level, such as the community-based adaptation plans reported on in section 4, are integrated into local, provincial and national development plans, climate change strategies and disaster risk managment plans. This is necessary to ensure that community-based assessments and plans, facilitated by NGOs or researchers, are acted upon and lead to implementation. Working from the bottom up and integrating this local information into higher-level plans and strategies, often required

by law, will give policy- and plan-makers first-hand insight into the realities experienced by communities at risk, their vulnerability context, the changing environmental conditions they experience, their needs and priorities, and their proposals for adapting to change and dealing with disasters. The plans and strategies emanating from such a bottom-up approach are likely to be more widely supported and realistic, and contribute to sustainable development goals (SDGs) than those imposed from the top down.

Conclusion

South Africa has developed an impressive suite of policies, strategies and laws to deal with commitments to sustainable development and addressing and managing climate change challenges and disaster risks. These national policies, however, are not well aligned or implemented in a coordinated and integrated manner. Nor are they attuned to the realities facing local communities. Our work in coastal communities in South Africa reveals the lack of policy alignment and limited coordination across government departments at all levels charged with oversight responsibilities for these endeavours. Failure to adopt a holistic and integrated approach, as well as mismatches between policy rhetoric and implementation practices, leave vulnerable communities exposed. Local communities working in partnership with NGOs and other social partners can contribute considerable knowledge and experience to these processes as they are experiencing the effects of climate change and disasters first-hand and have practical proposals for dealing with and adapting to climate change and promoting sustainable livelihoods. Although their experience and knowledge are based on their local environmental context, the ideas generated at this level are likely to produce proposals for local socio-economic development, climate adaptation and disaster risk reduction that are locally appropriate and supported. Incorporating this local knowledge into local development and sector plans as well as sustainable development and sector-specific policies, strategies and plans at the national level, would enhance understanding of the realities on the ground and lead to policies, strategies and plans that are more harmonised and more likely to be supported and implemented.

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References

Adhikari, B., & Taylor, K. (2012). Vulnerability and Adaptation to Climate Change: A Review of Local Actions and National Policy Response. *Climate and Development, 4*, 54–65.

Allison, E. H., Adger, W. N., Badjeck, M.-C., Brown, K., Conway, D., Dulvy, N. K., Halls, A., Perry, A., & Reynolds, J. D. (2005). *Effects of Climate Change on the Sustainability of Capture and Enhancement Fisheries Important to the Poor: Analysis of the Vulnerability and Adaptability of Fisherfolk Living in Poverty* (Project No. R4778J). Fisheries Management Science Programme, Marine Resources Assessment Group/Department of Foreign and International Development.

Allison, E. H., Perry, A. L., Badjeck, M. C., Adger, W. N., Brown, K., Conway, D., Halls, A. S., Pilling, G. M., Reynolds, J. D., Andrew, N. L., & Dulvy, N. K. (2009). Vulnerability of National Economies to the Impacts of Climate Change on Fisheries. *Fish and Fisheries, 10*(2), 173–196.

Barange, M., Bahri, T., Beveridge, M. C. M., Cochrane, K. L., Funge-Smith, S., & Poulain, F. (Eds.). (2018). *Impacts of Climate Change on Fisheries and Aquaculture: Synthesis of Current Knowledge, Adaptation and Mitigation Options* (FAO Fisheries and Aquaculture Technical Paper No. 627) (628 pp). The Food and Agriculture Organization of the United Nations.

Bennett, N. J., Finkbeiner, E. M., Ban, N. C., Belhabib, D., Jupiter, S. D., Kittinger, J. N., Mangubhai, S., Scholtens, J., Gill, D., & Christie, P. (2020). The COVID-19 Pandemic, Small-Scale Fisheries and Coastal Fishing Communities. *Coastal Management, 48*(4), 336–347. https://doi.org/10.1080/08920753.2020.1766937

Bond, P. (2020). Covid-19 Attacks the Down-and-Out in South Africa. *ESR Review: Economic and Social Rights in South Africa, 21*(3), 4–9.

Coburn, A. W., Spence, R. J. S., & Pomonis, A. (1991). *Vulnerability and Risk Assessment: Disaster Management Training Programme*. UNDRO.

DAFF (Department of Agriculture, Fisheries and Forestry). (2012). *Policy for the Small-Scale Fisheries Sector in South Africa*. Government Gazette..

DAFF (Department of Agriculture, Fisheries and Forestry). (2014). *Marine Living Resources Amendment at 5 of 2014*. Government Gazette No. 37659.

DCGTA (Department of Cooperative Governance and Traditional Affairs). (2005). South African National Disaster Management Framework.

DEA (Department of Environmental Affairs). (2011). *National Strategy for Sustainable Development and Action Plan* (NSSD1) 2011–2014.

Dolan, A. H., & Walker, I. J. (2006). Understanding Vulnerability of Coastal Communities to Climate Change Related Risks. *Journal of Coastal Resources, 39*, 1317–1324.

FAO (Food and Agricultural Organisation). (2015). *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication*. FAO.

Glavovic, B. (2006). The Evolution of Coastal Management in South Africa: Why Blood Is Thicker than Water. *Ocean and Coastal Management, 49*, 889–904.

Glavovic, B. (2016). Towards Deliberative Coastal Governance: Insights from South Africa and the Mississippi Delta. *Regional Environmental Change, 16*, 353–365.

Isaacs, M. (2006). Small-Scale Fisheries Reform: Expectations, Hopes and Dreams of 'a Better Life for All'. *Marine Policy, 30*, 51–59. https://doi.org/10.1016/j.marpol.2005.06.010

Kalikoski, D. C., Jentoft, S., Charles, A., Herrera, D. S., Cook, K., Béné, C., & Allison, E. H. (2018). Chapter 2: Understanding the Impacts of Climate Change for Fisheries and Aquaculture: Applying a Poverty Lens. In M. Barange, T. Bahri, M. C. M. Beveridge, K. L. Cochrane, S. Funge-Smith, & F. Poulain (Eds.), *Impacts of Climate Change on Fisheries and Aquaculture: Synthesis of Current Knowledge, Adaptation and Mitigation Options* (FAO Fisheries and Aquaculture Technical Paper No. 627) (pp. 19–39). FAO.

Kidd, M. (2013). Environment. In I. Currie & J. De Waal (Eds.), *The Bill of Rights Handbook*. Juta.

Mbatha, P. N. (2018). *The Influence of Plural Governance Systems on Rural Coastal Livelihoods: The Case of Kosi Bay*. PhD, Environmental and Geographical Science Department, University of Cape Town.

McIlgorm, A., Hanna, S., Knapp, G., Le Floc'H, P., Millerd, F., & Pan, M. (2010). How Will Climate Change Alter Fishery Governance? Insights from Seven International Case Studies. *Marine Policy, 34*(1), 170–177.

Mohammed, E. Y., Steinbach, D., & Steele, P. (2020). Fiscal Reforms for Sustainable Marine Fisheries Governance: Delivering the SDGs and Ensuring No One Is Left Behind. *Marine Policy, 93*, 262–270.

Mokwena, L. (2009). *Municipal Responses to Climate Change in South Africa: The Case of eThekwini, the City of Cape Town, and the City of Johannesburg* (Research Report 113). Center for Policy Studies. Available at: https://www.africaportal.org/publications/municipal-responses-to-climate-change-in-south-africa-the-case-of-ethekwini-the-city-of-cape-town-and-the-city-of-johannesburg/. Accessed 9 May 2021.

Munzhedzi, H. (2020). Evaluating the Efficacy of Municipal Policy Implementation in South Africa: Challenges and Prospects. *African Journal of Governance and Development, 9*, 89–105.

Murcott, M. (2018). The Procedural Right of Access to Information as a Means of Implementing Environmental Constitutionalism in South Africa. In E. Daly & J. May (Eds.), *Implementing Environmental Constitutionalism: Current Global Challenges*. Cambridge University Press.

Murray, W. E., & Overton, J. D. (2011). Neoliberalism Is Dead, Long Live Neoliberalism? Neostructuralism and the International Aid Regime of the 2000s. *Progress in Development Studies, 11*(4), 307–319.

Pahl-Wostl, C., & Knieper, C. (2014). The Capacity of Water Governance to Deal with the Climate Change Adaptation Challenge: Using Fuzzy Set Qualitative Comparative Analysis to Distinguish Between Polycentric, Fragmented and Centralized Regimes. *Global Environmental Change, 29*, 139–154.

Perine, C., & Keuck, H. (2018). *Building Urban Resilience to Climate Change: A Review of South Africa*. Prepared for the United States Agency for International Development: Chemonics International Inc.

Raemaekers, S., & Sowman, M. (2015). *Community-Level Socio-Ecological Vulnerability Assessments in the Benguela Current Large Marine Ecosystem.* (Fisheries and Aquaculture Circular No. 1110). Food and Agriculture Organization of the United Nations. Available at: http://www.fao.org/3/a-i5026e.pdf. Accessed 9 May 2021.

Reddy, Y., & Wolpe, P. (2017). *Sustainable Energy Solutions for South African Local Government: A Practical Guide*. Sustainable Energy Africa. Available at: http://www.cityenergy.org.za/uploads/resource_434.pdf. Accessed 9 May 2021.

RSA. (1996). *The Constitution of the Republic of South Africa*. Government Printers.
RSA. (2002). *National Disaster Management Act No. 57 of 2002*. Government Printers.
RSA. (2008). *The National Environmental Management: Integrated Coastal Management Act No. 24 of 2008*. Government Printers.
Ruiz-Díaz, R., Liu, X., Aguión, A., Macho, G., deCastro, M., Gómez-Gesteira, M., & Ojea, E. (2020). Social-Ecological Vulnerability to Climate Change in Small-Scale Fisheries Managed Under Spatial Property Rights Systems. *Marine Policy, 121*, 104192. https://doi.org/10.1016/j.marpol.2020.104192
Schlosberg, D. (2013). Theorising Environmental Justice: The Expanding Sphere of a Discourse. *Environmental Politics, 22*, 37–55.
Sowman, M. (2006). Subsistence and Small-Scale Fisheries in South Africa: A Ten-Year Review. *Marine Policy, 30*(1), 60–73. https://doi.org/10.1016/j.marpol.2005.06.014
Sowman, M. (2020). Participatory and Rapid Vulnerability Assessments to Support Adaptation Planning in Small-Scale Fishing Communities of the Benguela Current Large Marine Ecosystem. *Environmental Development, 36*.
Sowman, M., & Cardoso, P. (2010). Small-Scale Fisheries and Food Security Strategies in Countries in the Benguela Current Large Marine Ecosystem (BCLME) Region: Angola, Namibia and South Africa. *Marine Policy, 34*, 1163–1170.
Sowman, M., & Malan, N. (2018). Review of Progress with Integrated Coastal Management in South Africa Since the Advent of Democracy. *African Journal of Marine Science, 40*, 121–136.
Sowman, M., & Raemaekers, S. (2018). Socio-Ecological Vulnerability Assessment in Coastal Communities in the BCLME Region. *Journal of Marine Systems, 188*, 160–171.
Sowman, M., & Sunde, J. (2021). A Just Transition? Navigating the Process of Policy Implementation in Small-Scale Fisheries in South Africa. *Marine Policy*. (Under Review).
Sowman, M., Raemaekers, S., & Sunde, J. (2014a). Shifting Gear. A New Governance Framework for Small-Scale Fisheries in South Africa. In M. Sowman & R. Wynberg (Eds.), *Governance for Justice and Environmental Sustainability: Lessons Across Natural Resources Sectors in Sub-Saharan Africa* (pp. 200–219). Routledge.
Sowman, M., Sunde, J., Raemaekers, S., & Schultz, O. (2014b). Fishing for Equality: Policy for Poverty Alleviation for South Africa's Small-Scale Fisheries. *Marine Policy, 46*, 31–42.

Sunde J., & Erwin, K. (2020). *Cast Out: The Systematic Exclusion of The KwaZulu-Natal Subsistence Fishers from the Fishing Rights Regime* (Policy Research Report). Prepared for KZN Subsistence Fishing Forum and South Durban Community Environmental Alliance (SDCEA).

Sunde, J., Sowman, M., Smith, H., & Wicomb, W. (2013). Emerging Proposals for Tenure Governance in Small-Scale Fisheries in South Africa. *Land Tenure Journal, 1*, 118–144.

Van Niekerk, D. (2006). Disaster Risk Management in South Africa: The Function and the Activity – Towards an Integrated Approach. *Politeia, 25*, 95–115.

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9

Adapting to Climate Change Through Disaster Risk Reduction in the Caribbean: Lessons from the Global South in Tackling the Sustainable Development Goals

Yairen Jerez Columbié

Introduction

Small Island Development States (SIDS) are at the forefront of global agendas for climate-related environmental challenges, as reflected in extant documentation of agreements endorsed by international organisations, including the SIDS Accelerated Modalities of Action (SAMOA) Pathway (UNGA, 2014), the Paris Agreement (UNFCCC, 2015), the 2030 Agenda for Sustainable Development (UNGA, 2015), the Addis Ababa Action Agenda (UN, 2015) and the Sendai Framework for Disaster Risk Reduction (UNISDR, 2015). Nevertheless, there is still insufficient recognition in the academic literature of the valuable information

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provided by SIDS about climate change resilience across multiple countries and regions (Robinson, 2017), and about how their knowledge can inform adaptation pathways at a global scale (See also UNFCCC, 2017). This absence of the SIDS' knowledge in adaptation research discourses (which emerged in the mid-1990s) neglects their leading role in raising awareness of climate change and implementing adaptation strategies ever since the 1980s (Ourbak & Magnan, 2018; Petzold & Magnan, 2019).

This chapter brings forth the experiential knowledge of the SIDS in transnational cooperation for tackling the following Sustainable Development Goals (SDGs) through disaster risk reduction initiatives and tools for climate change adaptation: Goal 3) Good health and wellbeing; Goal 4) Quality education; Goal 9) Industry, innovation and infrastructure; Goal 11) Sustainable cities and communities; Goal 13) Climate action; Goal 14) Conserve and sustainably use the oceans, seas and marine resources for sustainable development; Goal 16) Peace, justie and strong institutions and Goal 17) Partnerships. I analyse some of the strategies, tools and impacts of adaptation initiatives led by Caribbean SIDS through triangulation with international organisations and the European Union, within the African, Caribbean and Pacific-European Union Natural Disaster Risk Reduction (ACP-EU NDRR) Program, in order to illustrate how adaptation works on the ground and to discuss successful actions that have proven to be replicable and scalable. Although the program includes territories from Africa, the Pacific and the Caribbean, the study focuses on the latter region, where a high concentration of culturally diverse SIDS exposed to extreme weather events has shaped a policy landscape that enables the study of the role of regional policies in tackling the SDGs within the contexts of extreme vulnerability to global warming and sea level rise. Finally, the chapter proposes to gather lessons from the Caribbean SIDS that are instructive at a global scale and to provide guidelines for the articulation of a theoretical framework for adaptation research that translates into transformative policies and action, shaped by both the needs and the knowledge of vulnerable and resilient people.

The study combines critical reading of reports, briefs and theoretical documents with a review of empirical experience of Caribbean SIDS within the UNDP-ACP-EU Natural Disaster Risk Reduction (NDRR) Program, in order to discuss both the terms and perspectives advancing

actionable knowledge in adaptation research. In light of the SIDS' connectedness and frontline position in participatory climate action, I propose the articulation of a theoretical framework for adaptation research implementation that looks at transnational and local experiences to co-develop transferrable yet context-specific adaptive strategies and tools with and for people. The chapter draws mainly upon empirical experience reflected in reports and academic research relating to the SIDS' transference of knowledge and implementation of adaptive capacities with people's participation across vulnerable communities.

'Not-So-Natural' Disasters and Climate Justice

The Africa, Caribbean and Pacific (ACP) group of countries has seventy-nine member states, which are considered to be among the most vulnerable to disasters caused by extreme weather and to the adverse impacts of climate change (ACP-EU NDRRP, 2019). Among these countries, thirty-seven are SIDS that are being directly affected by climate change and where global warming of 1.5 °C is expected to prove particularly challenging and contribute to the loss of, or change in, critical natural and human systems (IPCC, 2018).

Most of the Caribbean is composed of small islands, where the combination of size and topography restricts the availability of land and demands the use of narrow coastal areas and steep hillsides for the location of population settlements (Taylor et al., 2012; cf. Pulwarty et al., 2010). This 'climate sensitivity is both interwoven into and entrenched in all levels of Caribbean existence' (Taylor et al., 2012, p. 172). Although some uncertainties remain with respect to global warming and the future of storm formation and development in the Atlantic, the greater frequency and intensity of Atlantic hurricanes can be taken as evidence of a long-term shift in climatic patterns, and model simulations suggest that losses of livelihoods and environmental assets due to severe tropical storms are likely to increase in the Caribbean (Bhatia et al., 2018; Moore et al., 2017). Although intraregional variations are relevant (Stennett-Brown et al., 2019), the territories of the Caribbean share a common environment and similar development challenges. The vulnerability of

the peoples from this region is exacerbated by both its geographic characteristics and its economic and, in some cases, also political dependence, shaped by a long history of colonisation, enslavement, imperialism and extractivism,[1] which has fuelled industrialisation processes in the Global North and, in consequence, global warming (Sealey-Huggins, 2017). In light of the sociohistorical causes of underdevelopment and the inequalities shaping differential vulnerability to climate change, researchers have been emphasising that disasters are not so natural, and that blaming nature and looking away from human-induced climate change poses obstacles to risk reduction, sustainable development and both climate action and climate justice (Chmutina & Meding, 2019; Cruz-Martínez et al., 2018).

A recent study of past and future comparative vulnerabilities of some Caribbean countries to climate change based on physical and demographic factors shows that intraregional variations are important. The countries included in this study were: Antigua, Bahamas, Barbados, Belize, Cuba, Dominican Republic, Grenada, Guyana, Jamaica, St. Lucia, St. Vincent and Trinidad and Tobago. Of the twelve Caribbean countries examined, locations in Jamaica, Guyana and Belize emerged as among the most vulnerable (Stennett-Brown et al., 2019). These three countries were some of the latest in achieving independence from the British Crown in the Caribbean. Whereas Jamaica and Guyana became independent in 1962 and 1966 respectively, Belize was declared an independent state in 1981. The direct relation between the long-lasting effects of colonialism and increased environmental vulnerability is also supported by extant research corroborating that overseas territories in the Caribbean are more vulnerable to climate change than sovereign states (Bonilla, 2020; Siegel et al., 2019; Torres & Weidemeyer, 2019). It is important to bear in mind that, as stated by Yarimar Bonilla (2020, p. 12), 'the victims of disaster, including the disaster of colonialism, have repeatedly been forced to wait for repair.'

[1] The term extractivism is used to name extractive capitalism in the Americas, which is an economic system based on expropriation and intensive exploitation of environments, and depends on prior colonial and neo-colonial projects (see Gómez-Barris, 2017).

By using the term 'natural disasters' in the most recent assessment of the SIDS Accelerated Modalities Action (SAMOA) Pathway, heads of state and government, ministers and high representatives gathered at the United Nations failed to acknowledge the not-so-natural character of disasters. This conceptual contradiction of the SAMOA Pathway, which is an integral part of the 2030 Agenda for Sustainable Development, hampers its objective of being an effective 'standalone overarching framework for guiding global, regional and national development efforts to achieve the sustainable development aspirations of SIDS' (UN, 2019, p. 1). Although the midterm review of the SAMOA Pathway provides clear guidelines for action to support sustainable development across the intersections of gender and socio-economic background for the present and into the future, it is insufficiently aligned with the economic reparations, cultural recognition and acknowledgement of the sociohistorical causes of vulnerability that are necessary for effective climate action and justice (see Jafry, 2018). Bearing in mind the current context of climate injustice, this study proposes a theoretical framework for 'radical, bolder and experimental' adaptation and action pathways (Burton in Klein et al., 2017, p. 12). I argue that this can be achieved by integrating the participatory, transdisciplinary and translocal approach of the SIDS to transgress epistemic, political and physical borders in the face of increasing 'borderless climate risks' (Benzie & Persson, 2019, p. 369).

Why are participatory, transdisciplinary, cross-sectoral and translocal perspectives key for connected climate action? risk management in SIDS draws upon extensive experience in using participatory techniques in communities of the Global South, particularly in Latin America, from as early as the 1960s (see Paulo Freire, 1967). This participatory approach has proved to be not only effective but indispensable in contexts of extreme environmental challenges such as the Caribbean and the Pacific, where most SIDS are located (DasGupta & Shaw, 2017; Potter & Pugh, 2017; Pugh & Momsen, 2006). Paul Routledge (2011) has called attention to the need for 'translocal solidarity' through the direct participation of those most affected by economic and climate inequity. This connects with the possibility that a shared notion of climate (in)justice informs the practice of solidarity, 'potentially creating a common ground that enables different themes to be interconnected, and different political actors from

different struggles and cultural contexts to join together in common struggle' (Routledge, 2011, p. 385; cf. della Porta et al., 2006).

Similarly, transdisciplinary research and praxis enables collaboration through the integration of diverse forms of knowledge and methodologies to address multifactorial problems. It aims to come up with practice-oriented solutions by transcending disciplinary boundaries and including the perspectives and needs of diverse stakeholders in the research process (Pohl & Hadorn, 2007). As an intrinsically multifactorial goal and process, climate action calls not only for the complexity approach of transdisciplinarity but also for communication, coordination and collaboration across sectors. Closely intertwined with transdisciplinary perspectives, cross-sectoral integration approaches and methods enable the assessment of impacts and risks, and the development of adaptation strategies and tools for interrelated sectors (UNFCCC, 2008). Although both qualitative and quantitative methods can be used for cross-sectoral integration, this study refers mainly to qualitative methods that identify linkages and the direction of impacts across socio-ecological systems. Finally, the supranational character of climate change supports the proposed translocal and post-national perspective. The use of the term 'post-national' here indicates a position critical of the predominant role of the nation state in the planning and governance of 'borderless climate risks' (Benzie & Persson, 2019, p. 369). It aims to highlight the need for exploring governance structures that contribute to putting cooperation and knowledge transfer at the centre of the new generation of adaptation research and climate action.

Reducing Risks and Tackling the SDGs on the Ground

The African, Caribbean and Pacific-European Union Natural Disaster Risk Reduction (ACP-EU NDRR) Program was launched in 2011 as an initiative of the ACP Group of States, funded by the European Union and managed by the Global Facility for Disaster Reduction and Recovery (GFDRR). The program implements three strands of activities: (i) regional- and subregional-level projects, which support transnational

cooperation and regional activities for advancing national disaster risk reduction agendas; (ii) country-level projects, with activities at the national level driving disaster risk reduction and climate change adaptation policy development and implementation through need-based and demand-driven technical assistance, and (iii) post-disaster capacity building and recovery activities to improve the response capacity of ACP countries by building capacity to conduct post-disaster needs assessments, providing rapid technical assistance, and mainstreaming disaster risk reduction in recovery planning (ACP-EU NDRRP, 2019).[2] The following examples illustrate how all three strands of the program connect with these interrelated SDGs: Goal 3) Good health and wellbeing; Goal 4) Quality education; Goal 9) Industry, innovation and infrastructure; Goal 11) Sustainable cities and communities; Goal 13) Climate action; Goal 14) Conserve and sustainably use the oceans, seas and marine resources for sustainable development; Goal 16) Peace, justice and strong institutions, and Goal 17) Partnerships.

With fourteen active projects in 2019, the Caribbean continued to benefit from the partnerships supported by the ACP-EU NDRR program, which has facilitated a total of thirty-four initiatives in the region. Recent activities have responded to an increasing demand for open access to risk information, technical assistance and capacity building in designing national preparedness strategies and more resilient infrastructure. During the period 2018–19, two regional projects supported knowledge and data sharing among countries and disaster risk management practitioners, alongside nine country-level projects and three post-disaster and capacity building initiatives (ACP-EU NDRRP, 2019).

A regional follow-up project for the Caribbean Handbook for Risk Information and Management (CHaRIM) (2015–present) was launched in November 2018 with the objective of supporting governments in the design and guidance of hazard and risk assessments and planning. CHaRIM is an online platform that supports the generation and application of landslide and flood hazard and risk information to facilitate evidence-based decision-making for better planning and more resilient

[2] As of June 2019, the ACP-EU NDRRP had facilitated a total of 21 regional projects, 64 country-level projects and 38 post-disaster & capacity building activities.

infrastructures. This platform relies on three interlinked components: (i) a user case book that details the steps required to use the hazard and risk information through examples and exercises for planning of infrastructure, risk reduction measures and emergency preparedness; (ii) a methodology book that explains the methods for obtaining risk information at both local and national scale, and (iii) a data management book that describes the types and quality of data needed for activities at different levels, as well as methods and protocols for data collection, management and sharing.[3] This web service targets policymakers, public engineers, spatial analysts, national emergency management organisations, forestry departments and water resources departments from Belize, Dominica, Grenada, Saint Lucia, and Saint Vincent and the Grenadines, some of which are among the smallest and most vulnerable countries in the Caribbean region (see Stennett-Brown et al., 2019).[4] The objectives of the online handbook and the related follow-up activities facilitated by the ACP-EU NDRRP, in close coordination with the Caribbean Disaster Emergency Management Agency (CDEMA) and the Caribbean Risk Information System, centrally connect with the aforementioned SDGs, and more directly with Goal 9) Industry, innovation and infrastructure, Goal 11) Sustainable cities and communities, Goal 13) Climate action and Goal 17) Partnerships.

Also in line with the SDGs discussed in this chapter, an ACP-EU NDRRP regional project co-financed the organisation of the Understanding Risk (UR) Caribbean Conference, which took place from 27 May to 1 June 2019 in Barbados. The conference brought together close to 500 participants, including members of governmental organisations, academics, private sector companies, disaster management practitioners, international organisations and donors, to discuss alternatives for sustainable development, climate change adaptation and disaster risk

[3] For more information about CHaRIM please visit http://www.charim.net/

[4] With the exception of Guyana, Suriname and Belize, the Caribbean is composed of small islands and cays which are either low lying (e.g., Bahamas, most of the Grenadines, Barbuda), volcanic with mountainous interiors and very short coastlines (e.g., St. Kitts and Nevis, St. Lucia, St. Vincent, Dominica, Grenada, Montserrat), or with topographies combining both hilly interiors and limited coastal plains (e.g., Antigua, Barbados, Haiti, Jamaica and Trinidad and Tobago) (Taylor et al., 2012, p. 171).

management. The forum was an opportunity to share actionable knowledge and to launch the Caribbean Regional Resilience Building Facility, a partnership between the European Union (EU), the World Bank Group, and the Global Facility for Disaster Reduction and Recovery (GFDRR), set up in the aftermath of the destructive 2017 Hurricane Season.[5] The beneficiary countries for this initiative are Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.

The Caribbean Regional Resilience Building Facility program has three main components and associated activities: (i) Regional Technical Assistance Facility to Mainstream Resilience, with activities focused on providing institutional, policy and regulatory advice to beneficiary countries on a demand-driven basis to build administrative and technical capacity for advancing recovery and resilience in key development sectors, with the aim of identifying public investment projects; (ii) Adaptation Facility for Leveraging Investments in Resilience in the Caribbean, with a focus on methodological support and evidence-based information to support beneficiary countries' decisions in the formulation of resilience and climate change adaptation investments, and (iii) Expanding Financial Protection Against Disasters in the Caribbean Sovereign Countries, a component that supports beneficiary countries to expand their coverage under the Caribbean Catastrophe Risk Insurance Facility-Segregated Portfolio Company (CCRIF-SPC) and related insurance and risk reduction mechanisms (GFDRR, 2019). With a clear focus on capacity building for managing investment, the Caribbean Regional Resilience Building Facility program directly supports Goal 9) Industry, innovation and infrastructure, Goal 11) Sustainable cities and communities, and Goal 13) Climate Action.

These projects' focus on regional cooperation for climate change adaptation and disaster risk reduction–which are key to supporting

[5] The 2017 Atlantic hurricane season had above-normal activity, with 407 official forecasts issued. The Caribbean experienced one of the deadliest hurricane seasons of contemporary history, with 17 named storms of which 10 became hurricanes including six major formations (category 3, 4 or 5) and three simultaneously active hurricanes on September 7 alone: Katia, José and Irma (Cangialosi, 2018).

sustainable development–echoes the work of the Caribbean Risk Management Initiative (CRMI) in mainstreaming resilience in the region. The CRMI is an umbrella programme launched in 2004 by the UNDP's Bureau of Crisis Prevention and Recovery (BCPR) and the Regional Bureau for Latin America and the Caribbean (RBLAC) as a knowledge network designed to build capacity across the Caribbean region for the management of climate-related risks between the different linguistic communities. Participant countries include Cuba, Trinidad and Tobago, Jamaica, Barbados, Guyana, the Dominican Republic, Belize and Haiti (Fairholm, 2015; Pallen, 2008). A significant initiative of the CRMI's strategy has been scaling up Cuba's efficient Risk Reduction Management Centres model across partnering Caribbean states, an approach that led to successful pilot projects between 2011 and 2014 in the British Virgin Islands, the Dominican Republic, Guyana, Jamaica, and Trinidad and Tobago. The transfer of this participatory risk reduction model to other countries corroborates the UNDP's acknowledgement that 'while the countries of the region are varied in terms of language, culture and political-economic organisation, they are linked by geography, history and common development challenges, allowing them to benefit from each other's experiences' (UNDP, 2016, p. 7).

The aforementioned initiatives are part of a policy and planning landscape that has evolved in the last two decades for bringing together the Climate Change Adaptation, Disaster Risk Reduction and Sustainable Development Goals agendas as a strategy to confront both the 'existential threat' and the 'development crossroads' that climate change poses to the Caribbean (Rhiney & Baptiste, 2019, p. 71). In terms of policy, the region aligns with the Enhanced Comprehensive Disaster Management Strategy and Programming Framework 2014–2024 (CDEMA, 2014) and with the Regional Framework for Achieving Development Resilient to Climate Change (CCCCC, 2009), which provide a roadmap for building regional states' resilience to anticipated global climate change impacts. Both documents call attention to the centrality of disaster risk reduction for climate change adaptation and sustainable development. They are supported by an Implementation Plan that specifically outlines the region's strategic approach for 'delivering transformational change' up to 2021 and makes explicit the fact that disaster risk reduction and

climate change are 'inextricably linked' (CCCCC, 2012, p. 91).[6] In this light, the main goal of the CDEMA strategy is to support regional sustainable development enhanced by comprehensive disaster management through three main strategic elements: (i) mainstreaming climate change adaptation strategies into sustainable development; (ii) promoting the implementation of specific adaptation measures to address key vulnerabilities in the region, and (iii) promoting actions to reduce greenhouse emissions through fossil fuel reduction and conservation, and switching to renewable and cleaner energy sources. Table 9.1 is a recreation of the CDEMA Comprehensive Management Programming Framework Implementation Plan (CCCCC, 2012, p. 92), which has been reworked for the purpose of this study to show how the specific expected outcomes and outputs of this strategy address different SDGs:

- SDG3) Good health and wellbeing
- SDG4) Quality education
- SDG9) Industry, innovation and infrastructure
- SDG11) Sustainable cities and communities
- SDG13) Climate Action
- SDG14) Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- SDG16) Peace, justice and strong institutions
- SDG17) Partnerships

In highly vulnerable territories such as the SIDS of the Caribbean, climate change adaptation and disaster risk management strategies are deeply intertwined and have evolved in parallel. The planning framework of CARICOM shows the integration into the policy cycle of the experiential knowledge of the region and the importance of mainstreaming climate change into disaster risk management for pursuing sustainable development

[6] Although these policy documents are addresses to Caribbean Community (CARICOM) states (Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, St Kitts and Nevis, St Vincent and the Grenadines, Suriname and Trinidad and Tobago), they set a favourable framework for other forms of regional translocal collaboration including non-member states, such as those exemplified by the Caribbean Risk Management Initiative through its pilot projects in other Caribbean sovereign countries and overseas territories (Jerez Columbié & Morrisey, 2020).

Table 9.1 The CDEMA comprehensive management programming framework and the SDGs

Goal Regional sustainable development enhanced through comprehensive disaster risk management (CDM)	
Purpose To strengthen regional, national and community level capacity for mitigation, management and coordinated response to natural and technological hazards, and the effects of CCA	
Outcome	Outputs
1. Enhanced institutional support for CDM Program implementation at national and regional levels	1.1. National Disaster Organizations are strengthened for supporting CDM implementation and a CDM program is developed for implementation at the national level 1.2. CDERA CU is strengthened and restructured for effectively supporting the adoption of CDM in member countries 1.3. Governments of participating states/territories support CDM and have integrated CDM into national policies and strategies 1.4. Donor programming integrates CDM into related environmental, CCA and disaster management programming in the region 1.5. Improve coordination at national and regional levels for disaster management 1.6. System for CDM monitoring, evaluation and reporting being built
2. An effective mechanism and programme for management of CDM knowledge has been established	2.1. Establishment of a Regional DRR Network to include a DRR Centre and other centres of excellence for knowledge acquisition sharing and management in the region 2.2. Infrastructure for fact-based policy and decision-making is established/strengthened 2.3. Improved understanding and local/community-based knowledge sharing on priority hazards 2.4. Existing educational and training materials for CDM are standardised in the region 2.5. A strategy and curriculum for building a culture of safety is established in the region

SDG3	SDG4	SDG9	SDG11	SDG13	SDG14	SDG16	SDG17
Yes			Yes	Yes	Yes	Yes	Yes
Yes			Yes	Yes	Yes	Yes	Yes
Yes			Yes	Yes	Yes	Yes	Yes
Yes			Yes	Yes	Yes	Yes	Yes
Yes			Yes	Yes	Yes	Yes	Yes
Yes			Yes	Yes	Yes	Yes	Yes
Yes	Yes		Yes	Yes	Yes	Yes	Yes
Yes		Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes		Yes	Yes	Yes	Yes	Yes
Yes	Yes		Yes	Yes	Yes	Yes	Yes
Yes	Yes		Yes	Yes	Yes	Yes	Yes

Goal Regional sustainable development enhanced through comprehensive disaster risk management (CDM)	
Purpose To strengthen regional, national and community level capacity for mitigation, management and coordinated response to natural and technological hazards, and the effects of CCA	
Outcome	Outputs
3. DRM has been mainstreamed at national levels and incorporated into key sectors of national economies (including tourism, health, agriculture and nutrition)	3.1. CDM is recognised as the roadmap for building resilience and decision-makers in the public and private sectors understand and take action on DRM 3.2. DRM capacity enhanced for lead sector agencies, national and regional insurance entities, and financial institutions 3.3. Hazard information and DRM is integrated into sectoral policies, laws, development planning and operations, and decision-making in tourism, health, agriculture and nutrition, planning and infrastructure 3.4. Prevention, mitigation, preparedness, response, recovery and rehabilitation procedures developed and implemented in tourism, health, agriculture and nutrition, planning and infrastructure
4. Enhanced community resilience in CDERA states and mitigation and response to the adverse effects of CCA and disasters	4.1. Preparedness, response and mitigation capacity (technical and managerial) is enhanced among public, private and civil sector entities for local level management and response 4.2. Improved coordination and collaboration between community disaster organisations and other research/data partners including CCA entities for undertaking CDM 4.3. Communities more aware and knowledgeable on disaster management and related procedures including safer building techniques 4.4. Standardised holistic and gender-sensitive community methodologies for natural and anthropogenic hazard identification and mapping, vulnerability and risk assessments, and recovery and rehabilitation procedures developed and applied in selected communities 4.5. Early Warning Systems for DRR enhanced at the community and national levels

SDG3	SDG4	SDG9	SDG11	SDG13	SDG14	SDG16	SDG17
Yes			Yes	Yes	Yes	Yes	Yes
Yes		Yes	Yes	Yes	Yes	Yes	Yes
Yes		Yes	Yes	Yes	Yes	Yes	Yes
Yes		Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes		Yes	Yes	Yes	Yes	Yes
Yes		Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes		Yes	Yes	Yes	Yes	Yes
Yes	Yes		Yes	Yes	Yes	Yes	Yes
Yes		Yes	Yes	Yes	Yes	Yes	Yes

goals. This regional perspective – which can provide instructive lessons to territories where climate change is still less tangible, like those located in the Global North – is aligned with a 'climate dialectic' that recognises not only the physical impacts, but also 'the wider justice and development implications of climate change' (Rhiney & Baptiste, 2019, p. 75).

Despite the fragmentation imposed on the territories of the Caribbean by colonial and imperial campaigns, the current disaster risk reduction translocal policies and initiatives exemplify how global warming and extreme weather events are contributing to re-making connections in the region (see Jerez Columbié & Morrissey, 2020). The histories of the Atlantic hurricane belt – the region we know as the Caribbean, including the northern littoral of South America, the Gulf of Mexico and the Florida peninsula – cannot be told without considering a common environmental history (Johnson, 2011; Schwartz, 2005; Soluri et al., 2018). The study, design and implementation of effective alliances, strategies and tools for climate change adaptation, disaster risk reduction and sustainable development in the region should bear in mind both the diverse cultural heritage of the Caribbean and its unity.

Conclusions

Developing resilience in conditions of extreme geographic and economic vulnerability, SIDS have learned to 'share what works' for climate change adaptation and action through translocal solidarity and a participatory approach that is particularly evident in the evolution of environmental management in the Caribbean (UNDP, 2016). Voicing out the SIDS' contribution to climate change knowledge is key for advancing action in disaster risk reduction, climate change adaptation and the Sustainable Development Goals. The examples of South-South cooperation between SIDS and triangulation with Europe and international organisations included in this chapter show that a coherent and effective theoretical framework for impactful adaptation research and climate action pathways (in line with the Sustainable Development Goals) should bring forward participatory, transdisciplinary and translocal perspectives informed by the experiences of communities in creating resilience

to environmental challenges. The Sendai Framework for Disaster Risk Reduction 2015–2030 (A/RES/69/283) – one of the main results of the SIDS' leadership in disaster risk reduction and climate change – recognises regional platforms as critical mechanisms to monitor progress in adaptation implementation. The regional platforms studied in this chapter are playing a key role in the development of strategies and policies and in the advancement of knowledge and mutual learning at regional, local and international levels.

Notwithstanding the positive lessons provided by Caribbean SIDS in creating resilience through horizontal cooperation, it is important to highlight that the alliances, experiences, initiatives and policies studied in this chapter are limited by a dominant development model that does not fully acknowledge the moral and material debt that the Global North is still to pay to the Global South. In a context of global inequality, where the communities that were expropriated and enslaved are also the most affected by external debt and the most vulnerable to climate change, acknowledging the historical legacies of imperialism and colonialism is a prerequisite for saving and improving lives. Whereas South–South cooperation and regional policies are vital for disaster risk reduction, more effort should be put into communicating the sociohistorical dimension of environmental vulnerability, historicising resilience and decolonising climate change knowledge (see Jerez Columbié & Morrissey, 2020). A decolonised Global North – one that acknowledges the debt it acquired through slavery, colonialism and imperialism – could play an active role in shaping a new sustainable development model through reparations and justice (see Fanon, 2004; Narayan, 2019).

Although extant research on disaster risk reduction – from disciplines as diverse as cultural and social geography, cultural, regional and disaster studies, as well as, most recently, climate change adaptation – has followed the evolution of environmental management and adaptation in the Global South, climate change adaptation research and the Sustainable Development Goals agenda have failed to fully acknowledge the experiential knowledge of early adaptors as well as the socio-historical causes of differential vulnerability to global warming. Transdisciplinary and decolonising approaches to the three agendas offer opportunities for addressing this climate justice challenge through the integration of the

knowledge of early adaptors in the Global South into research and action for more coherent, inclusive and effective theory, policy and praxis responses to environmental challenges.

References

ACP-EU NDRRP. (2019). *ACP-EU Natural Disaster Risk Reduction Program 2018–2019 Activity Report*. GFDRR.

Benzie, M., & Persson, Å. (2019). Governing Borderless Climate Risks: Moving Beyond the Territorial Framing of Adaptation. *International Environmental Agreements: Politics, Law and Economics*, 369–393. https://doi.org/10.1007/s10784-019-09441-y

Bhatia, K., Vecchi, G., Murakami, H., Underwood, S., & Kossin, J. (2018). Projected Response of Tropical Cyclone Intensity and Intensification in a Global Climate Model. *Journal of Climate, 31*(20), 8281–8303.

Bonilla, Y. (2020). The Coloniality of Disaster: Race, Empire, and the Temporal Logics of Emergency in Puerto Rico, USA. *Political Geography, 78*, 1–12.

Cangialosi, J. P. (2018). *2017 Hurricane Season*. US National Hurricane Center.

CCCCC. (2009). *Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009–2015)*. CCCCC.

CCCCC. (2012). *Delivering Transformational Change 2011–2021: Implementing the CARICOM Regional Framework for Achieving Development Resilient to Climate Change*. CCCCC.

CEDMA. (2014). *Enhanced Comprehensive Disaster Management Strategy and Programming Framework 2014–2024*. CEDMA.

Chmutina, K., & von Meding, J. (2019). A Dilemma of Language: "Natural Disasters" in Academic Literature. *International Journal of Disaster Risk Science, 10*(3), 283–292.

Cruz-Martínez, G., Fernández Arrigoitia, M., Ortiz Camacho, J., & Román-Velazquez, P. (2018). Introduction to the Special Issue: 'The Making of Caribbean Not-So-Natural Disasters'. *Alternautas, 5*(2), 4–12.

DasGupta, R., & Shaw, R. (2017). *Participatory Mangrove Management in a Changing Climate: Perspectives from the Asia-Pacific*. Springer.

della Porta, D., Peterson, A., & Reiter, H. (2006). *The Policing of Transnational Protest*. Routledge.

Fairholm, J. (2015). *Caribbean Risk Management Initiative Phase II. Report*. Caribbean Risk Management Initiative, UNDP.

Freire, P. (1967). *Educação como prática de liberdade*. Rio de Janeiro: Paz e Terra.

Fanon, F. (2004/1961). *The Wretched of the Earth*. Grove Press.
GFDRR. (2019). *The Caribbean Regional Resilience Building Facility*. GFDRR.
Gómez-Barris, M. (2017). *The Extractive Zone: Social Ecologies and Decolonial Perspectives*. Duke University Press.
IPCC. (2018). *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming.* Intergovernmental Panel for Climate Change. Available at: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf. Accessed 29 May 2020.
Jafry, T. (Ed.). (2018). *Routledge Handbook of Climate Justice*. Routledge.
Jerez Columbié, Y., & Morrissey, J. (2020). Subaltern Learning: Climate Resilience and Human Security in the Caribbean. *Territory, Politics, Governance*, 1–20. https//:doi.org/10.1080/21622671.2020.1837662
Johnson, S. (2011). *Climate and Catastrophe in Cuba and the Atlantic World in the Age of Revolution*. University of North Carolina Press.
Klein, R. J. T., Adams, K. M., Dzebo, A., Davis, M., & Kehler Siebert, C. (2017). *Advancing Climate Adaptation Practices and Solutions: Emerging Research Priorities* (SEI Working Paper). Stockholm Environmental Institute.
Moore, W., Elliott, W., & Lorde, T. (2017). Climate Change, Atlantic Storm Activity and the Regional Socio-Economic Impacts on the Caribbean. *Environment, Development and Sustainability, 19*(2), 707–726.
Narayan, J. (2019). Fanon's Decolonized Europe: The Double Promise of Coloured Cosmopolitanism in the Age of Austerity. In *European Cosmopolitanism: Colonial Histories and Postcolonial Societies*. Routledge.
Ourbak, T., & Magnan, A. K. (2018). The Paris Agreement and Climate Change Negotiations: Small Islands, Big Players. *Regional Environmental Change, 18*(8), 2201–2207. https://doi.org/10.1007/s10113-017-1247-9
Pallen, D. (2008). *Evaluation of the Caribbean Risk Management Initiative (CRMI). Evaluation Report*. Caribbean Risk Management Initiative, UNDP.
Petzold, J., & Magnan, A. K. (2019). Climate Change: Thinking Small Islands Beyond Small Island Developing States (SIDS). *Climatic Change, 152*(1), 145–165. https://doi.org/10.1007/s10584-018-2363-3
Pohl, C., & Hadorn, G. H. (2007). *Principles for Designing Transdisciplinary Research*. Oekom.
Potter, R., & Pugh, J. (2017). *Participatory Planning in the Caribbean: Lessons from Practice*. Routledge.
Pugh, J., & Momsen, J. H. (2006). *Environmental Planning in the Caribbean*. Ashgate Publishing, Ltd.
Pulwarty, R. S., Nurse, L. A., & Trotz, U. O. (2010). Caribbean Islands in a Changing Climate. *Environment: Science and Policy for Sustainable Development, 52*(6), 16–27.

Rhiney, K., & Baptiste, A. K. (2019). Adapting to Climate Change in the Caribbean: Existential Threat or Development Crossroads? *Caribbean Studies, 47*(2), 59–80. https://doi.org/10.1353/crb.2019.0014

Robinson, S. (2017). Climate Change Adaptation Trends in Small Island Developing States. *Mitigation and Adaptation Strategies for Global Change, 22*(4), 669–691. https://doi.org/10.1007/s11027-015-9693-5

Routledge, P. (2011). Translocal Climate Justice Solidarities. In J. S. Dryzek, R. B. Norgaard, & D. Schlosberg (Eds.), *The Oxford Handbook of Climate Change and Society* (pp. 384–398). OUP.

Schwartz, S. B. (2005). Hurricanes and the Shaping of Circum-Caribbean Societies. *Florida Historical Quarterly, 83*(4), 381–409.

Sealey-Huggins, L. (2017). 1.5°C to Stay Alive: Climate Change, Imperialism and Justice for the Caribbean. *Third World Quarterly, 38*(11), 2444–2463.

Siegel, K. J., et al. (2019). Sovereign States in the Caribbean Have Lower Social-Ecological Vulnerability to Coral Bleaching than Overseas Territories. *Proceedings of the Royal Society B: Biological Sciences, 286*(1897), 1–10.

Soluri, J., Leal, C., & Pádua, J. A. (2018). *A Living Past: Environmental Histories of Modern Latin America*. Berghahn.

Stennett-Brown, R. K., Stephenson, T. S., & Taylor, M. A. (2019). Caribbean Climate Change Vulnerability: Lessons from an Aggregate Index Approach. *PLoS One, 14*(7), 1–19. https://doi.org/10.1371/journal.pone.0219250

Taylor, M. A., Stephenson, T. S., Chen, A. A., & Stephenson, K. A. (2012). Climate Change and the Caribbean: Review and Response. *Caribbean Studies, 40*(2), 169–200. https://doi.org/10.1353/crb.2012.0020

Torres, H., & Weidemeyer, T. (2019). Chapter 12: Natural Hazards, Resilience, and Sovereignty: The Case of Puerto Rico and the U.S. Virgin Islands. In F. I. Rivera (Ed.), *Emerging Voices in Natural Hazards Research* (pp. 303–325). Butterworth-Heinemann.

UN. (2015). *Addis Ababa Action Agenda of the Third International Conference on Financing for Development (Addis Ababa Action Agenda)*. UN.

UN. (2019). *Mid-Term Review of the SAMOA Pathway. High Level Political Declaration*. UN.

UNDP. (2016). *Sharing What Works: South-South Cooperation for Disaster Risk Reduction in the Caribbean*. UNDP.

UNFCCC. (2008). *Handbook on Vulnerability and Adaptation Assessment*. UNFCCC.

UNFCCC. (2015). *Paris Agreement*. UNFCCC.

UNFCCC. (2017). *Opportunities and options for integrating climate change adaptation with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015–2030*. (Technical paper by the secretariat). New York: UNFCCC.
UNGA. (2014). *SIDS Accelerated Modalities of Action (SAMOA) Pathway*. UNGA.
UNGA. (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. UNGA.
UNISDR. (2015). *Sendai Framework for Disaster Risk Reduction 2015–2030*. UNISDR.

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10

Towards a Resilient Riverine Community: A Case Study in Sadong Jaya, Sarawak, Malaysia

Swee Kiong Wong and Regina Garai Abdullah

Introduction

Climate change has become one of the main discussion topics in sustainable development studies, particularly in relation to its global impacts (Byers et al., 2018; Cramer et al., 2018; IPCC, 2014, 2018). The accelerating pace of climate change has exacerbated the levels of uncertainty in society and economy (Cramer et al., 2018). This uncertainty is increased by changes in ecological and biological systems as well as by local community access to diverse capital assets, which are difficult to capture or quantify accurately. Assets include natural, human, social, financial and physical capital. It is also believed that the most vulnerable groups in society will experience a more severe impact due to climate change (IPCC, 2018). Such impacts arise mainly because of the spatial-temporal conditions affecting socio-economic status and access to various capital assets, which in turn creates a vicious cycle.

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Like other parts of the world, Malaysia is experiencing the impacts of climate change. A tropical Southeast Asian country, Malaysia has a hot and humid climate all year round and plentiful rainfall. In the last decades, the country has increasingly experienced extreme weather events, characterised by days of high temperature, high rainfall, dry spells, thunderstorms and strong winds (Daniel, 2019). This is an indication of the impacts of climate change (Hashim & Hashim, 2016).

As we embrace a new decade with a higher frequency of severe weather occurrences as an impact of climate change, the global community is facing great challenges in responding to the global call to achieve the Sustainable Development Goals. Measures must be taken in order to ensure that no one is left behind as we move beyond 2021. In particular, the challenge in attaining greater societal resilience as well as bridging the inequality gaps among populations must be addressed. In Malaysia, inequality exists in various forms and includes unequal access to resources in the forms of various capital assets by different communities. This inequality is also evident in Sarawak, a resource-rich Malaysian state located on the island of Borneo (Fig. 10.1).

This limited access can arise from the unsustainable development practices which, in turn, exacerbate the inequality problem in the region (Alston, 2020; Booth, 2019; Brown & Langer, 2015). As highlighted by Donnges (2003), 'a key element of poverty is isolation, expressed as the lack of access people have to basic, social and economic goods, facilities and opportunities' (p. 9). This poses the question of how community with limited access to resources can adapt and strive to become more resilient.

Based on the definition by the Intergovernmental Panel on Climate Change (IPCC, 2014, p. 5), resilience refers to 'the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganising in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.' In fact, resilience goes beyond the ability to bounce back to an equilibrium after a disturbance (i.e. loss or damages suffered after flooding, together with heavy rain or loss of natural resources for livelihoods due to the negative

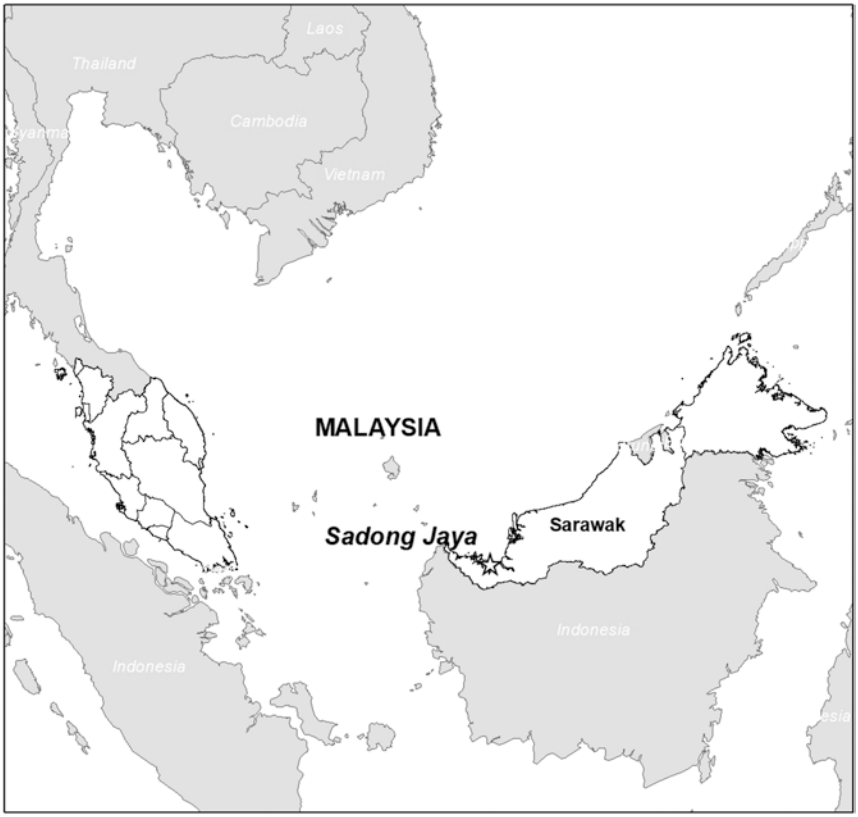


Fig. 10.1 Locational map of Malaysia

externalities); it also includes the buffering capacity before a disturbance forces the system from its stable equilibrium state, as well as the ability to adapt in reaction to a disturbance (Lama et al., 2017). In other words, resilience does not only incorporate a reactive notion of immediate response and recovery in the short-term to cope with the impacts of disturbances or shocks, it also entails a proactive notion of anticipation and learning to develop long-term resilience by the community (Lama et al., 2017). At a household level, a resilient household is thus 'a household that has adaptive capacity to maintain its level of wellbeing and ability to adapt in the face of climate change' (Scheyvens, 2015, p. 14) or other shocks. According to Gitz and Meybeck (2012), building

resilience connects centrally with reducing vulnerabilities. However, it is important to note that a more resilient community might reduce vulnerabilities, but less vulnerability cannot always be an indicator of resilience. They are not just opposite sides of the same coin.

This study highlights the vulnerabilities faced by one riverine community in Sarawak, the Sadong Jaya, particularly in dealing with different types of risks and disasters, as well as the capital assets accessible to them. This riverine community is located at the downstream of the Sadong River in the sub-district of Asajaya, Samarahan, in Sarawak, a southwesterly Malaysian state in Borneo (Fig. 10.2), and shares its coastline with the



Fig. 10.2 Locational map of Sadong Jaya, Sarawak, Malaysia

South China Sea. There are approximately twenty-five settlements in the area, comprising of 3146 households with a total population of 14,937 people. The majority of the population are Malay, Iban (which is the largest indigenous ethnic group in Sarawak) and Chinese (Sadong Jaya Sub-District Office, 2019). In addition, Sadong Jaya is unique in its social composition as there are Bugis and Javanese – originally from Indonesia – who have stayed in Sarawak for decades and are now considered local Sarawakians.

Besides sharing common social and physical resources, the Bugis and Javanese have assimilated local culture into their daily lives in the multi-ethnic setting of Sarawak. In this chapter, we explain how the local community copes with socio-ecological stresses and shocks, and how its members adapt to these shocks in the long run. The manner in which they adapt to disasters is significant as it influences their capability to protect their livelihoods and to sustain themselves. Furthermore, we compare and contrast empirical evidence from studies on different riverine communities in order to analyse the similarities and the differences between their adaptation mechanisms. Each mechanism refers to the ways in which communities manage their livelihoods and optimise their capital assets.

Methodology

This chapter provides insights on mechanisms adopted by the local community in Sadong Jaya by narrating its experience in dealing with adversity and vulnerability as a result of climate change. The findings discussed in this chapter are based on data that was collected between 2018 and 2019 using qualitative methods. A series of household interviews and focus group interviews were conducted, whereby key informants were selected using a purposive sampling approach. A total of four separate Focus Group Discussion (FGD) sessions were conducted with community leaders at Sadong Jaya District to capture data on livelihood assets, strategies and challenges, and their responses in relation to disaster risk management (DRM) and/or adaptation strategies. Specifically, the FGDs

explored the mechanisms that the community members opted for when facing different circumstances of shock and vulnerability. Content analysis was carried out, based on the different themes identified from all the data collected, either through the FGDs or in-depth interviews with the key informants, before the conclusion was derived.

Results and Discussion

Livelihoods and Experiences of the Local Community in Sadong Jaya

The majority of the population in Sadong Jaya are fishermen, although the number has declined drastically in recent years. The economic landscape of Sadong Jaya today is dominated by a resource-based economy. There are approximately 1171 registered fishermen in the area and all of them are traditional fishermen. The term 'traditional fisherman' is a classification used by the Fisheries Department to describe fishermen who normally catch fish within five nautical miles from the shore. Traditional fishermen normally use traditional fishing gear and frequently travel by boats that are less than 40 GRT (40 Gross Register Tonnes) and powered by small outboard engines.

Due to its topography and geographical location along the lower Batang Sadong (or Sadong River) with three settlements lying closer to the coastal area of the South China Sea, floods affect this area every year. In fact, twelve of the twenty-five settlements in Sadong Jaya experience flooding annually, particularly after heavy rainfall during monsoon season, together with occurrences of high tides (known locally as king tides). These settlements are: Kampung Semera Ulu, Kampung Semera Cina, Kampung Pelanduk Ulu, Kampung Iboi Ulu, Kampung Ulu Sadong, Kampung Jemukan, Kampung Jemukan Cina, Kampung Sungai Putin, Kampung Rangawan, Kampung Terasi Iban and Kampung Terasi Ulu.

Estuarine, coastal or riverine floods are common natural disasters experienced by the local community in these low-lying settlement areas in Sadong Jaya. Estuarine and coastal flooding occurs when overflowing river water from heavy or non-stop rainfall is trapped and not discharged

into the sea due to a king tide. This situation causes flooding in settlements that are located on adjacent land. Riverine flooding, on the other hand, happens when continuous heavy rainfall causes a river or creek to swell beyond its monsoon drain capacity, resulting in the inundation of the adjacent floodplain area. Due to their proximity to the river or the sea, as well as the availability of or access to various capital assets, the local community in Sadong Jaya experiences a variation of flood intensity and severity. With a properly maintained drainage system as well as properly functioning watergates, local communities in this vicinity would be less prone to a high degree of damage brought on by the floods. Implementing this is contingent on a number of factors, including: the availability of and access to the physical capital of watergates; human capital in the form of the skills required to operate the watergate; the right work ethic, in order to respond and take immediate action whenever necessary, as well as the social capital that ensures strong horizontal and vertical integration with relevant agencies. Local communities still remember the floods that occurred in 1974 and in 2011 as the two worst events they ever experienced in Sadong Jaya. Both disasters caused massive destruction and imposed high costs on the local community. The headman (who is the government-appointed community leader) of Kampung Sungai Buluh stated that 'some houses were submerged under the flood water during the worst flood occurrence in 2011 and we lost our crops and livestock.'

Residents in Sadong Jaya further elaborated that floods and their aftermath are becoming more unpredictable and uncontrollable. This situation is attributed to the drastic development that was carried out in the area since the 1980s. Road construction and the clearing of land by local communities for various agricultural and physical development projects are said to have caused the area to become more prone and vulnerable to floods.

Similarly, the area also experiences droughts which, according to the locals, have become more severe and unpredictable in recent years. This became more evident after the cultivation of the oil palm monocrop replaced the rich biodiversity of the forest area and when the agricultural development in the area turned from small-scale subsistence farming to small-scale cash crop cultivation during the 1990s. Furthermore, it is

important to bear in mind that the shift into a big plantation area was led by the Federal Land Consolidation and Rehabilitation Authority (FELCRA). FELCRA is a corporatised Malaysian government-linked company, incorporated in 1997, and is owned by the Ministry of Finance. FELCRA is heavily involved in oil palm plantation, rubber, paddy, fertiliser, property, livestock and agri-food related business. They develop land owned by the locals, with the aim of enhancing the standard of living of the local community. The involvement of FELCRA in Sadong Jaya is mainly in oil palm plantation, however. As a result of this shift in focus, massive destruction of the area's ecosystem is evident. In particular, turning the forest area into monocrop cultivation land has destroyed the assimilative capacity of the original natural environment.

This disturbed ecosystem cannot cope with the accelerated impacts of climate change. What once was a healthy forest ecosystem now shows signs of degradation that results in rainwater not flowing out through natural channels and not being efficiently absorbed by the soil. Consequently, flash floods are becoming more frequent in the area whenever heavy rain falls consistently over several days. In some cases, local communities are experiencing flash floods even after only a few hours of continuous heavy downpours which then meet together with the king tide. The negative consequences of flash floods include damage to electronic and electrical appliances, fixtures and furniture, as well as the destruction of crops and livestock. According to members of the community, despite the massive material cost of these extreme events, no report has ever been made of a loss of human life during floods in Sadong Jaya. A local respondent from Kampung Terasi Ulu complained that:

> In 2011, the water level was three to four feet high till our waist level in the worst flood that we had ever experienced … when the rainfall did not stop and the king tide affected us at the same time in the village.

Another local respondent from Kampung Pelandok Ulu shared his experience and described the flood of 2011 as the worst to ever hit them. The water level surpassed the cement floor in his home by over two feet. That incident occurred after a heavy rain started to fall continuously for six hours, from 10 o'clock at night to 4 o'clock in the morning.

Adapting, Building Resilience and Reducing Vulnerability in Sadong Jaya

Despite the high disaster risk and vulnerability faced by the local community in Sadong Jaya, it has managed to enhance its resilience through a reactive rebound system and proactive capacity building for adaptation. Over the years, the local community has developed its capabilities through a dynamic learning curve to face climate hazards and risks in a low-lying area that is increasingly prone to floods under extreme weather conditions. Moreover, it has adapted itself well to survive and even to thrive under circumstances of limited access to different capital assets, particularly to natural capital, due to climate change or irreversible anthropogenic activities. This is particularly evident in the vicinity of Sadong Jaya at the downstream of the Sadong River which is often a waste disposal or collecting point for sediment from soil erosion and agriculture runoff or other economic activities carried out upstream. This sediment pollutes the water in the river and the sea and potentially depletes the fisheries' resources.

Members of the local community in Sadong Jaya have not only developed higher resilience through livelihood diversification, a number of them are also trying to adjust by cultivating crops that are less vulnerable or susceptible to flooding or extreme weather. The local community at Sadong Jaya also has strong vertical social capital through close links with the relevant government agencies and political representatives. This relationship has enabled it to convince the relevant authority to construct flood mitigation infrastructure in the area. Physical capital such as watergates, bunds and improved drainage systems have helped to reduce the vulnerabilities faced by the community during flooding. For instance, the construction of nine watergates in settlements of Sadong Jaya has helped to mitigate the damaging effect brought about by flash floods. Watergates reduce disaster risk and losses of crops and livestock. Additionally, the locals are also able to protect their household items from damages caused by the flash floods in their area.

Institutional intervention strengthens the local community's capability to maintain wellbeing while facing disaster risks or shocks. This is important for promoting equality, particularly in protecting resource-scarce

and socially vulnerable groups at the riverine area. The Sadong Jaya case study analysed in this chapter emphasises the importance of having good synergies between the local government and local community and institutions, thereby enhancing the human capability to face either natural or man-made shocks. In the presence of anthropogenic, industry-induced climate change, the impacts of natural phenomena such as king tides have often been exacerbated by unsustainable human activities which turn mild or even beneficial natural shocks into damaging human-induced shocks (i.e. more frequent and intense flash flood events). Therefore, more frequent maintenance of drainage systems by the relevant authorities (such as the Drainage and Irrigation Department) as well as engaging the local community in the management of watergates in the area are good examples of context-specific institutional interventions. As mentioned by Liu and Chan (2003), the flood management in Malaysia has always been an institutional approach, with the Drainage and Irrigation Department playing the key role. In this context, the Drainage and Irrigation Department is one of the institutions that plays a specific role in managing the watergate and can address the specific problems in a locality using localised intervention measures. The effectiveness of this type of disaster management can be enhanced by incorporating non-structural measures, such as those traditionally used by the people, into the official disaster management system (Liu & Chan, 2003, p. 213). This form of intervention has the tendency to enhance the social resilience of the local community in overcoming livelihood predicaments associated with recurrent flood disasters. In this context, local community empowerment and human capacity building are carried out to enhance resilience levels. This unique, strong, vertical social capital developed in Sadong Jaya should be promoted to address the factors that increase the vulnerability of local communities to flood disasters, and to shape resilience. This approach has proven more effective than focusing on short-term emergency responses alone, as highlighted by Liu and Chan (2003) in their study on the Malaysian flood hazard management programme.

Furthermore, a strong institutional support system has ensured that a portable, clean water supply is brought by the relevant agency to the local community when it raises the problem of water shortages. Despite its

limited supply, such assistance has been welcomed, particularly during prolonged dry spells/seasons of drought which, as informed by the local community, have increased in intensity over the years. It should be noted that the agency responsible for this is the Sarawak Rural Water Supply Department, a local government agency in Sarawak. One of its main roles is to develop safe water supply facilities to the rural community. In addition, the local community was provided with a water storage tank by the local government under the rural development project, enabling them to store water and mitigate the water shortage problem. Inevitably, this has enhanced community capabilities for sustaining livelihoods and improving quality of life. The latter is achieved by capitalising on the social and physical assets rendered through institutional assistance during drought season every year.

In addition, improved road conditions in the settlement area and the extension of farm roads since 2000 have enabled the local community to access more markets, increase livelihood diversification and provide access to buyers for its produce. Better physical road access since the 2000s has enabled the local community to sell its agricultural or fish produce in the markets for a better price. This is particularly relevant because the freshness of agricultural and fishery produce is a key determinant of demand from consumers and wholesale buyers in the market. Better road access also allows members of the local community to travel further from their settlements on a daily basis to seek a wider range of employment, training and educational opportunities. Thus, access to physical assets through road construction by the government has enhanced the standard of living of the local community in Sadong Jaya. With better road access to the market, it can sell its natural produce as well as agriculture produce at higher prices without relying on intermediaries. The natural produce includes wild ferns and fishery produce, while the agriculture produce includes fresh fruit, bunches of oil palm, coconuts and bananas.

Moreover, the construction of the Sadong Bridge or Sungai Buloh Bridge has facilitated the local community in accessing the nearby job market and goods and services market. Completed in October 2016, the Sadong Bridge stretches over 1.48 km from Sadong Jaya near Asajaya to Sadong near Simunjan in the Samarahan Division of Sarawak, making it the longest bridge in Sarawak. Sadong Bridge is an important physical

asset to the members of the local community, especially as it enables them to seek alternative employment opportunities outside their settlements. This provides additional income streams for locals when extreme weather affects the economic activities of their respective settlements. Furthermore, the Sadong Bridge enables commuters to reduce their travel time when compared with the previous mode of transportation (i.e. using the ferry to cross the Sadong River) to nearby towns for work. The headman of the community of Kampung Jemukan mentioned that it usually took them four hours to travel from Kampung Jemukan to Kuching using a 120-HP motorboat before the construction of the Sadong Bridge. Today, the same trip only takes about half of the time needed in the past. Commuters can use the road access to Kuching without being constrained by the ferry operation hours. The headman of Kampung Jemukan further elaborated that now the members of the community can commute at any time of the day, which is especially important in cases of emergency. This shows that the construction of the Batang Sadong bridge has indeed improved the quality of life of the local community in Sadong Jaya. Not only does it provide the inhabitants with more access to job markets, but it also improves the accessibility of markets for their goods as well as health and education services. Moreover, they have better access to government agencies to apply for physical or financial assistance to enhance their quality of life.

As discussed above, the level of resilience is dependent on the ability to bounce back and reorientate after facing shocks and stresses. The riverine community in Sadong Jaya depends mainly on agriculture as its livelihood and can cope well as long as it has access to suitable land for cultivation. As mentioned above, in order to reduce disaster risk caused by flash floods, many villagers have cultivated more flood-resistance crops such as coconut, oil palm, banana, pineapple, lime and paddy. The villagers also participate in aquaculture and animal husbandry. The study found that even though agriculture is the main economic activity, the number of villagers involved in agriculture activities, particularly swamp paddy, has reduced drastically over the years. Driven by a higher monetary return and improved access to markets through better road systems, many local villagers have shifted their focus from planting swamp paddy to other crops (e.g. oil palm). Local communities are able to enhance their

resilience while improving their food security through trade and the income generated from oil palm cultivation. They are able to use this income to purchase food and other essential items for their households. Of course, agriculture production is not without its vulnerabilities. It is, by nature, subject to different types of risk, ranging from production to price to climatic shock. In a given system, shocks in one dimension can spread into another dimension (Gitz & Meybeck, 2012). The local community in Sadong Jaya has enhanced its resilience through livelihood diversification, by taking up off-farm employment outside its own settlements, as well as diversifying its farm activities.

Challenges for the Future

Rural communities, such as those in Sadong Jaya, are often more resource-dependent than urban dwellers. When facing socio-ecological risks, they normally strategise to adjust, reorganise and adapt themselves. Sometimes, diversified livelihood strategies are adopted as a coping mechanism in order to minimise vulnerability. This enables them to retain the same functions, structure, identity and even social dynamics and organisation to ensure livelihood security. In the context of the fishermen in Sadong Jaya, despite an abundance of fish, they face the problem of depleting natural resources. This is mainly caused by competition from illegal fishermen and/or registered fishermen who use illegal fishing gear (e.g. trawlers). Such methods are unsustainable and affect the fish stock in the area. In addition, pervasive use of pesticides in extensive oil palm plantations can cause the runoff water to be polluted, thus affecting fish stocks in the river and sea. Due to depleting fishery resources, some fishermen have diversified their livelihoods by participating in other economic activities such as subsistence farming or seeking employment opportunities outside their settlements. Ellis and Allison (2004), for instance, highlight the significance of diversification as an adaptation strategy to counter the risks and uncertainties of socio-economic shocks. Based on their studies in Tanzania, which involved 344 rural households, they explain how diversification is one of the key rural adaptation strategies (Ellis & Allison, 2004, p. 5). The findings of the study clearly show that those with better

training, either through formal education or skill enhancement, have a better resilience level compared to those who did not invest in human capital formation earlier.

According to the fishermen interviewed as part of this study, present weather conditions are extremely unpredictable. In the past, weather patterns were consistent throughout the year. For example, it was easy to predict when the monsoon season started (usually at the end of the year, in November, and continuing until March of the following year). However, climate change is contributing to increased uncertainty in the local community of Sadong Jaya. As reiterated by a community leader:

> It is easier for me to tell you which months were monsoon season and which months were dry season in the past, as this happened periodically without much variation every year. But it is indeed very difficult for me to inform you when normally is the rainy or monsoon season today and when is the drought season these days. The weather is just unpredictable, without us having any clues about when we need to get ready to elevate our valuable household items to a higher ground. That is why you can see how we suffer great losses in terms of our agriculture produce, livestock, household electrical appliances and furniture and fixtures during flash floods.

In the past, fishermen would be able to predict rough sea conditions using their traditional knowledge and know when to avoid adverse weather conditions at sea. They normally scheduled repairs and maintenance work on their fishing boats and fishing gear at the turn of the year, when the weather was less favourable. Occasionally, they took up some contract work to build houses or worked as labourers, either in the settlement or outside their community, during monsoon season from November to March every year. As weather variability can no longer be predicted accurately as a consequence of climate change, the local fishing community has limited information for planning and adapting. Some fishermen opt for a secondary economic activity to reduce their livelihood vulnerability. In fact, out-migration has been a common strategy for enhancing livelihoods and reducing vulnerability (Paris et al., 2005).

As highlighted earlier in this chapter, Sadong Jaya is prone to annual flooding due to its unique geographical location on a floodplain area. Whenever a king tide and heavy rainfall coexist for long hours or days,

the most vulnerable parts of the community suffer the consequences of floods. The phenomena of floods and droughts have been common in Sadong Jaya for decades. However, the severity of disaster risk due to climate change in recent decades has resulted in local communities in Sadong Jaya facing increased levels of vulnerability. Despite being part of the same region, the level of vulnerability among local communities in the vicinity of Batang Sadong differs. For instance, those residing closer to the coastal area without the watergate infrastructure provided by the local government are more vulnerable and susceptible to loss and disruption of livelihoods whenever there is an unexpected flash flood, compared with those who reside on higher ground, with the protection of a watergate and a regularly maintained bund.

In summary, the riverine community in Sadong Jaya has experienced greater risk, brought on by the extreme and unpredictable weather that causes flash flooding. As a consequence, local communities face vulnerabilities caused by erosion from constantly strong currents and waves at coastal areas and riverbanks. The depleting forest and fishery resources due to over-exploitation, not only by the local fishermen but also by the illegal fishermen who are encroaching on the Malaysian water body, have resulted in a higher degree of vulnerability among fishermen (Viswanathan et al., 2001; Zhang & Bateman, 2017). The encroachment of fishermen into the Malaysian water body is, to some extent, part of a domino effect owing to declining fishery resources in other nearby regions. This study corroborates that local communities need to be empowered in order to become more responsible stewards of nature and resources, and to make the right decisions for supporting the resilience of their livelihoods.

The importance of institutional arrangements to plan and manage vulnerabilities, and enhance resilience among the locals, is imperative. For instance, the Australian Natural Disaster Resilience Index (ANDRI) is one of the frameworks that can be used to assess resilience based on coping and adaptive capacities. Parsons et al. (2016) explain how this framework works through taking into account arrangements and processes that enable learning, adaptation and transformation.. According to the authors, there is a need to consider what resources, skills and opportunities are available on the ground so that proper localised strategies can be devised to enhance resiliency. A number of the SDG goals are also

particularly relevant to the resilience of the local communities in Sadong Jaya, in particular: Goal 2) Zero hunger; Goal 3) Good health and well-being; Goal 6) Clean water and sanitation; Goal 12) Responsible consumption and production; Goal 13) Climate action; Goal 14) Life below water; Goal 15) Life on land, and Goal 17) Partnerships.

It should be noted that this study does not use the specific index mentioned in Parsons et al. (2016). However, the resource parameters assessed in this study are similar to that in Parsons et al.'s ANDRI framework, which are essentially the five assets in the Sustainable Livelihood Framework. Both studies highlight the importance of context-specific institutional interventions to address the livelihood predicaments associated with vulnerabilities faced by the people. Nevertheless, in order to better capture the real phenomena in the study, policy should focus more on engaging the local community. Such a focus enables localised factors to be exposed, identified and addressed, and the community's resilience to be shaped. More synergic efforts should be made to design a framework that better prepares the local community for increasing levels of risk and uncertainty brought by accelerating climate change. Engaging local communities will not only foster a transformative relationship between the state and local actors, but it will also enable participatory planning for addressing the critical needs of people in relation to vulnerabilities and risks. This is expected to create more resilient and sustainable communities in the face of increasing levels of adverse climate change as well as achieve sustainable development (Berry et al., 2019).

Conclusions

The case study in Sadong Jaya, Sarawak, Malaysia shows how institutions can play a crucial role in assisting the local community to manage and even reduce disaster risk. It also highlights how communities adapt to changes in local ecosystems, which are the result of climate change and unsustainable development practices affecting their access to different capital assets. A synergic effort between the local community and the local government is crucial in developing resilient settlements with a high

adaptive capability level to deal with the dynamics of increasingly unpredictable consequences brought on by climate change.

As we are experiencing the adverse impact of climate change, some vulnerable groups are more affected than others. As highlighted in this chapter, riverine and coastal communities are being increasingly affected by more frequent and extreme weather events. This study highlights how access to physical, social, human, natural as well as financial capitals is crucial for reducing disaster risk among the vulnerable groups of the riverine and coastal communities. A strong social capital is able to connect the community with the relevant government agencies for information and assistance. This leads to the establishment and construction of fit-for-purpose infrastructure in their area. Consequently, this not only helps to prevent greater loss and damages suffered from the adverse effects of climate change, but also enhances the local community's access to labour and produce markets. In other words, accessibility for the local community to various capital assets enables its members to enhance their socio-economic opportunities. In addition, this chapter highlights how strong vertical integration would enable the community to access job opportunities outside of its current settlement. This diversification of economic activities enables local communities to improve their socio-economic wellbeing, especially when they are threatened with depleting natural resources. Addressing the challenges illustrated in this chapter calls for a comprehensive community strategy for capacity building to reduce climate change-related risks and increase the resilience of local communities.

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References

Alston, P. (2020). Philip Alston: Malaysia Backtracking on Poverty Commitment, Press Release. Available at: https://chrgj.org/2020/07/05/philip-alston-malaysia-backtracking-on-poverty-commitment/. Accessed 9 May 2021.

Berry, L., Koski, J., Verkuijl, C., Strambo, C., & Piggot, G. (2019). *Making Space: How Public Participation Shapes Environmental Decision-Making*. Stockholm Environment Institute. https://doi.org/10.2307/resrep22993

Booth, A. (2019). What Have We Learned? In *Living Standards in Southeast Asia: Changes Over the Long Twentieth Century, 1900–2015* (pp. 263–284). Amsterdam University Press. https://doi.org/10.2307/j.ctvsr51jr.13

Brown, G., & Langer, A. (2015). Does Affirmative Action Work? Lessons From Around the World. *Foreign Affairs*, *94*(2), 49–56. Available at: http://www.jstor.org/stable/24483481. Accessed 5 Mar 2021.

Byers, E., Gidden, M., Leclère, D., Balkovic, J., Burek, P., Ebi, K., Greve, P., Grey, D., Havlik, P., & Hillers, A. (2018). Global Exposure and Vulnerability to Multi-Sector Development and Climate Change Hotspots. *Environmental Research Letters*. https://doi.org/10.1088/1748-9326/aabf45

Cramer, W., Guiot, J., Fader, M., Garrabou, J., Gattuso, J. P., Iglesisas, A., Lange, M. A., Lionello, P., Llasat, M. C., Paz, S., Peñuelas, J., Snoussi, M., Toreti, A., Tsimplis, M. N., & Xoplaki, E. (2018). Climate Change and Interconnected Risks to Sustainable Development in the Mediterranean. *Nature Climate Change*. https://doi.org/10.1038/s41558-018-0299-2

Daniel, T. K. H. (2019). Climate Change in Malaysia: Trends, Contributors, Impacts, Mitigation and Adaptations. *Science and the Total Environment, 650*, 1858–1871.

Donnges, C. (2003). *Improving Access in Rural Areas: Guidelines for Integrated Rural Accessibility Planning*. International Labour Organization.

Ellis, F., & Allison, E. (2004). *Livelihood Diversification and Natural Resource Access* (LSP Working Paper 9) (pp. 1–46). Food and Agricultural Organization of the United Nations.

Gitz, V., & Meybeck, A. (2012). Risks, Vulnerabilities and Resilience in a Context of Climate Change. In A. Meybeck, J. Lankoski, S. Redfern, N. Azzu, & V. Gitz (Eds.), *Building Resilience for Adaptation to Climate Change in the Agriculture Sector, Proceedings of a Joint FAO/OECD Workshop, 23–24 April 2012*. Food and Agriculture Organization of the United Nations Organisation for Economic Co-operation and Development.

Hashim, J. H., & Hashim, Z. (2016). Climate Change, Extreme Weather Events, and Human Health Implications in the Asia Pacific Region. *Asia Pacific Journal of Public Health, 28*(2 Suppl), 8S–14S.

Intergovernmental Panel for Climate Change (IPCC). (2014). Intergovernmental Panel on Climate Change. Climate Change 2014: Impacts, Adaptations and Vulnerability. In *Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC.

Intergovernmental Panel for Climate Change (IPCC). (2018). *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming*. Intergovernmental Panel for Climate Change. Available at: https://www.ipcc.ch/sr15/. Accessed 9 May 2021.

Lama, P. D., Becker, P., & Bergstrom, J. (2017). Scrutinizing the Relationship Between Adaptation and Resilience: Longitudinal Comparative Case Studies Across Shocks in Two Nepalese Villages. *International Journal of Disaster Risk Reduction, 23*, 193–203.

Liu, P. S., & Chan, N. W. (2003). The Malaysian Flood Hazard Management Programme. *International Journal of Emergency Management, 1*(3), 205–214.

Paris, T., Singh, A., Luis, J., & Hossain, M. (2005). Labour Outmigration, Livelihood of Rice Farming Households and Women Left Behind: A Case Study in Eastern Uttar Pradesh. *Economic and Political Weekly, 40*(25), 2522–2529.

Parsons, M., Glavac, S., Hastings, P., Marshall, G., McGregor, J., McNeill, J., Morley, P., Reeve, I., & Stayner, R. (2016). Top-Down Assessment of Disaster Resilience: A Conceptual Framework Using Coping and Adaptive Capacities. *International Journal of Disaster Risk Reduction, 19*, 1–1.

Sadong Jaya Sub-District Office. (2019). *Profile and Population of Sadong Jaya*. Sadong Jaya Sub-District Office. Sarawak Government.

Scheyvens, H. (2015). *The Role of Microfinance and Microfinance Institutions in Climate Change Adaptation: Learning from Experiences in Bangladesh*. Institute for Global Environmental Strategies. https://www.jstor.org/stable/resrep02933.8

Viswanathan, K., Omar, I., Jeon, Y., Kirkley, J., Squires, D., & Susilowati, I. (2001). Fishing Skill in Developing Country Fisheries: The Kedah, Malaysia Trawl Fishery. *Marine Resource Economics*, *16*(4), 293–314. Available at: http://www.jstor.org/stable/42629339. Accessed 6 Mar 2021.

Zhang, H., & Bateman, S. (2017). Fishing Militia, the Securitization of Fishery and the South China Sea Dispute. *Contemporary Southeast Asia*, *39*(2), 288–314. Available at: http://www.jstor.org/stable/44683771. Accessed 6 Mar 2021.

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11

Reimagining Our Menu for Sustainable Development

Adam Rogers

Introduction

Over the past 60 years the modern world has struggled to end poverty while finding a balance between economic development and environmental sustainability. Its efforts have included the launch of four separate 'decades of development', numerous global conferences, dozens of declarations and an ample number of agendas dating back to the early 1960s. The most recent iteration of these attempts occurred in 2015, when four additional global agendas were added to the list. While these four (The Paris Agreement, the 2030 Agenda for Sustainable Development and the SDGs, the Sendai Framework for Disaster Risk Reduction and the Addis Ababa Action Agenda on Development Finance) seem comprehensive in their approach, they fail to adequately address the underlying problem that has been literally right under our noses for the entire time: our choice of food.

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Mammals Matter

According to an extensive study by the Union of Concerned Scientists (UCS), the production and consumption of mammal meat is the second most environmentally harmful consumer activity in the world today (Willett et al., 2019). The only other human activity that is worse for the planet is our reliance on fossil fuels and the internal combustion engine to move us and our stuff around. Thus, eating a hamburger in China that was made from a cow raised in Brazil and then transported half-way around the world has an enormously negative impact on the planet's ecosystems and should be reconsidered in any serious attempt to create a sustainable future.

For the past several millennia, human beings have enjoyed a period of relative climatic stability that has allowed us to settle, farm and create civilisations. According to the International Union of Geological Sciences (IUGS), the professional organisation in charge of defining Earth's time scale, this recent period is known as the Holocene ('entirely recent') epoch. It started about 11,700 years ago after the last major ice age (Stromberg, 2013).

Many scientists are now speculating that we are leaving the Holocene period and entering the 'Anthropocene' (from the words *anthropo* for 'man' and *cene* for 'new') – a new global environment caused by human activity (Steffen et al., 2007). The 2017 book by John W. Kress and Jeffrey K. Stine *Living in the Anthropocene: Earth in the Age of Humans* takes a vital look at this new era (Kress & Stine, 2017). The authors write that the root causes of the Anthropocene Age are the spread of agriculture, pollution and urbanisation. As we will see here, a heavy reliance on mammal meat consumption is one of the primary reasons for the unsustainable spread of agriculture. The 2020 Human Development Report (HDR) from the United Nations Development Programme (UNDP) points out that the pressures humans are collectively putting on our planetary systems – the pressures that created the Anthropocene – are manifested not just as climate change and biodiversity loss but in pollution, ocean acidification, land degradation and more (UNDP, 2020).

In October 2018, scientists from around the world warned that we need to dramatically reduce the amount of mammal meat we eat or face apocalyptic consequences. Beef consumption, in particular, needs to drop by 90 per cent, and pork consumption by about 80 per cent, if we are to restore ecological balance and increase our long-term chance of survival (Springmann, Clark, et al., 2018). The research, which was led by the University of Oxford, is the most complete to date, combining data from every country to assess the overall impact of food production on the global environment.

However, despite the urgent appeals to reduce mammal meat consumption, the trend is still moving in the opposite direction. As more countries develop, much of the world is adopting American and European standards of living with an accompanying fixation on eating mammals. In the United States, each person now eats about 260 pounds of meat per year, while the average Brit consumes about 170 pounds (The Economist, 2013).

Fuelled by rising incomes, mammal meat consumption in China grew sevenfold over the last three decades. In the early 1980s, when there were fewer than one billion Chinese, the average person ate around 30 pounds of meat per year. Today, with an additional 380 million people, it's nearly 140 pounds per person, per year. With its higher population, the country consumes twice as much mammal meat as the United States – 28 per cent of the world's total (Rossi, 2018). The three biggest exporters of beef to the Chinese market are Argentina, Brazil and Uruguay (Schuele, 2020).

Most of Africa and South Asia consumes less than 44 pounds of mammal meat a year. In all likelihood, at the current growth rates, worldwide mammal meat consumption is likely to double by 2050, according to sources at the UNFAO (2009). The planet simply cannot support the industrial production of that much meat, unless there are radical solutions discovered and implemented. One of the most effective of these solutions may involve nothing more radical than shifting our diet away from its present focus on mammals – and, if we must eat a hamburger for lunch, to choose one made from turkey rather than beef.

Revising Our Menu for the SDGs

Both food and agriculture feature prominently in the Sustainable Development Goals, because the two are interconnected and involve almost all aspects of the economy, the environment, human health and society. SDG2, for example, focuses explicitly on food by seeking to 'end hunger, achieve food security and improved nutrition and promote sustainable agriculture.' All of the goals relate in some way to challenges in the current systems of food production and consumption (Rogers, 2019), but I will herewith focus on just seven of the most obvious: Goal 2) Zero hunger; Goal 3) Good health and wellbeing; Goal 6) Clean water and sanitation; Goal 12) Responsible consumption and production; Goal 13) Climate action; Goal 14) Life below water, and Goal 15) Life on land. Goal 17 on partnerships is included as the 'meat' of the recommendations in the Conclusion.

Goal 2: Zero Hunger

Today, 815 million people are hungry and every third person is malnourished, clearly reflecting a food system out of balance (UNFAO, 2018a). The SDGs aim to end all forms of hunger and malnutrition by 2030, by making sure all people – especially children – have ongoing access to sufficient and nutritious food year round. The 2030 Agenda recognises that ending hunger will require 'sustainable agricultural practices'. It highlights that these efforts in turn will necessitate the support of small-scale farmers and allow equal access to land, technology and markets (UN, 2015).

A majority of the world's poor lives in rural areas, where farming – predominantly by smallholders – is the central economic activity. To meet the world's future food security and sustainability needs, food production must grow substantially while, at the same time, agriculture's environmental footprint must shrink significantly in developed and developing regions. Large increases in agricultural investment will be needed both to raise incomes and increase the supply of food sustainably (Brooks, 2016).

Achieving the goal of ending hunger will require a complete redesign of how our food systems work. For example, tremendous progress can be made by halting agricultural expansion, closing 'yield gaps' on

under-performing lands, increasing crop efficiency, shifting diets away from red meat like beef and pork, and reducing waste (Kovacs et al., 2015). Together, these strategies could double food production while greatly reducing the harmful environmental impacts of intensive agriculture that result from the livestock industry. Whatever approach we take, we need to produce enough healthy food and we need to do it sustainably, so that production remains secure well into the future.

Goal 3: Good Health and Wellbeing

Any discussion to achieve good health and wellbeing would fall far short of its mark without looking at how the meat industry is both creating unhealthy environments that are making us sick and polluting our bodies with carcinogens.

While good health as a Sustainabe Development Goal is primarily concerned with reducing infant mortality and providing proper healthcare where and when needed, it also addresses the need to keep all people healthy up to and through adulthood. SDG3 recognises that noncommunicable diseases are the biggest cause of premature death in the world today. Obesity and malnutrition are major culprits behind this epidemic of poor health, so switching to healthier diets at any age can turn things around, giving people longer, more enjoyable lives.

Empirical studies demonstrate that reducing or eliminating mammals from our diet can add years to our lives, while also improving the way we feel throughout those years. Researchers at Oxford University estimate that by 2020, 2.4 million deaths annually will be attributable to the consumption of mammals – as well as a $285 billion healthcare bill for those who cling to life in a hospital bed (Springman, 2018). The World Health Organization (WHO) links these deaths to diabetes, heart problems and cancer – all a result of eating beef, lamb and/or pork on a regular basis (Frank et al., 2020).

A report from the Harvard School of Public Health also determined that regularly consuming mammal meat could lead to an untimely or early death (Harvard Medical School, 2012). Their data was taken from a study that followed more than 72,000 women for 18 years. They

discovered that those who ate a Western-style diet high in red and processed meats had an increased risk of heart disease, cancer and death. Another study by the same researchers followed 121,000 men and women for 24 years. All the participants submitted information about their diets every four years. Over the course of this study, almost 24,000 of the participants died. Death rates among those who ate the most mammal meat were higher than for those who ate the least. It found that people who ate one additional 3 ounce serving of red meat daily faced a 13 per cent higher risk of premature death. If that serving was processed meat (such as bacon or hot dogs), the risk went to 20 per cent (Skerrett, 2012).

As is well established, good health and wellbeing can be achieved by eliminating or reducing our consumption of beef, pork, mutton, veal and other mammals. It is not just eating mammal meat that is unhealthy – the industrial production of it is polluting our water, our air and our bodies. The first step in promoting a healthier lifestyle is to pay attention to what we choose to eat and how government policies are subsidising and encouraging certain industries.

Goal 6: Clean Water and Sanitation

The sixth of the 17 SDGs seeks to ensure that everyone, everywhere has clean water to drink. Furthermore, access to safe water resources is recognised as a human right by the UN, calling on all countries to provide safe, clean, accessible and affordable drinking water and sanitation for all (UN, 2010).

Despite it being a human right, water scarcity affects more than 40 per cent of people in the world – an alarming figure that is projected to increase with the rise of global temperatures from climate change (Joint SDG Fund, 2021). When people can get water, it sometimes contains contaminants that can lead to adverse health effects, including gastrointestinal illness, reproductive problems and neurological disorders (USCDC, 2014).

Where are these contaminants coming from? We know that about 70 per cent of freshwater is used for agriculture – and most of it is used to grow crops that are then fed to livestock. A January 2012 report in

National Geographic pointed out that irrigating the land for cattle feed uses almost three times as much water as for all the other foods combined. On the other hand, dairy cows require much less water and their products (primarily milk and cheese) contribute the most calories to diets, but do not involve killing the cow (Scientific American, 2009).

The nitrogen and phosphorus runoff from the chemical fertilisers used for intensive agriculture needed to feed livestock is polluting freshwater aquifers around the world. In the United States alone, nitrates now contaminate the public water supplies of nearly 1700 communities at levels the National Cancer Institute says could increase the risk of cancer (Schechinger, 2018).

Removing nitrates from tap water is expensive. The city of Des Moines, Iowa, had to spend $3.7 million to build a water treatment facility for precisely this reason (City of Des Moines Water Works, 2015). In October of 2017, Hiawatha, Kansas, built a plant for $3.5 million to deal with nitrate levels that were so high that residents were warned not to drink the tap water (May, 2017). In 2005, the City of Chino, California, spent $4.6 million on an ion exchange system to deal with its dangerously high nitrate levels (Jensen et al., 2012).

This phenomenon creates costs to society that inevitably must be paid somewhere, by somebody. Either households purchase bottled water, the costs get transferred to the healthcare sector when people fall sick, or local governments respond with higher taxes to clean up the mess. In developing countries that are now starting to raise enormous herds of cattle for export, the risks are even more perilous, as local governments cannot afford to deal with the resulting problems.

Goal 12: Responsible Consumption and Production

By now, the picture is pretty clear to most people that the way the richer countries of the world are producing and consuming their daily meals is neither responsible nor practical. How we humans choose to feed ourselves should in theory nurture human health and support environmental sustainability. Doing so ensures a balance with the planet's carrying capacity, defined as the maximum number of individuals of a population

that the environment can actually support. Professor Will Steffen, Councillor of Australia's Climate Council, has said we may already be pushing the boundaries of this capacity and that the time is now to 'act with urgency' (Alcock, 2017).

Acting with urgency to achieve sustained and sustainable economic growth in line with the SDGs will necessitate a serious reduction of our ecological footprint by changing the way we produce and consume both goods and resources. We also need to look at the incredible waste that is a by-product of the current scenario for these activities. One-third of all food produced is never even eaten by people – despite the fact that 815 million people go to bed hungry every night and every third person is malnourished (UNFAO, 2019). The impact of such loss and waste worldwide is tremendous. Food loss and waste is responsible annually for $940 billion in economic losses and nearly 10 per cent of greenhouse gas emissions (UNFAO, 2016).

Goal 12 calls for a global standard for food waste at the retail and consumer levels and a reduction in food losses along the production and supply chains (including post-harvest losses) by 2030. It puts the onus on 'every country, every major city, and every company involved in food supply chains' to set food loss and waste reduction targets that will ensure sufficient attention and a positive focus.

Goal 13: Climate Action

It is hard not to turn on the news these days without hearing about the changing climate. The last time atmospheric CO_2 amounts were this high was more than three million years ago when sea levels were 15–25 metres (50–80 feet) higher than today (Lindsey, 2020). Eighty feet of difference in sea level would wipe out most of today's coastal cities, turning places like Manhattan into Atlantis. SDG13 seeks to address this challenge by calling on all countries to take urgent action to both halt the causes and to work together to adapt to the inevitable changes that have already started (UNDESA, 2021).

The United Nations Development Programme UNDP points out that the annual average economic losses from climate-related disasters are in

the hundreds of billions of dollars. This is not to mention the human impact of geo-physical disasters which are 91 per cent climate-related and between 1998 and 2017 killed 1.3 million people and left 4.4 billion injured (UNDP, 2021a).

While increased levels of carbon can occur naturally over several millennia, and are probably partly responsible for natural cycles of glaciation, this time around it is clear that the buildup is artificial and occurring much more rapidly than ever before. Human emissions and activities have caused most, if not all, of the warming observed since 1950, according to the Intergovernmental Panel on Climate Change's (IPCC) fifth assessment report (IPCC, 2014).

While energy generation, transport and construction are identified as the usual targets when governments seek to reduce emissions, the impact from food production has been somewhat overlooked. However, based on the current trend, with intensive agriculture increasingly geared toward livestock production, food production is now also a major factor to be considered. The Intergovernmental Panel on Climate Change IPCC, an intergovernmental body of the United Nations that is dedicated to providing the world with objective, scientific information relevant to understanding the scientific basis of the risk of human-induced climate change, has said the current geographic spread of the use of land and the loss of biodiversity are unprecedented in human history. The IPCC recently reported that inefficient land use contributes about one-quarter of global greenhouse gas emissions, notably CO_2 emissions from deforestation, CH4 emissions from rice and ruminant livestock and N_2O emissions from chemical fertilisers (IPCC, 2019).

Throughout much of the world, forests have been cleared to make way for livestock. The inefficient farming of cattle feed, together with methane emissions from cows and fertiliser use, creates as much greenhouse gas emissions as all the world's cars, trucks and airplanes combined (Milman, 2018). Producing a kilogram of beef (2 pounds) generates around 26 kilograms (57pounds) of carbon dioxide, the highest of all the 197 foods examined using the U.S. Department of Agriculture's (USDA) food availability data set and a literature meta-analysis of emission factors for various food types (Heller & Keoleian, 2014).

Eating a kilogram of beef is responsible for more greenhouse gas emissions and pollution than driving around for three hours while leaving all the lights on back home, according to Akifumi Ogino of the National Institute of Livestock and Grassland Science in Tsukuba, Japan. Ogino and his team looked at calf production and focused on animal management and the effects of producing and transporting feed (Fenelli, 2007).

Comprehensive research led by scientists at the Oxford Martin School found that shifting to a mostly vegetarian diet or even cutting down on meat consumption to within accepted health guidelines would reduce greenhouse gases significantly (Harvey, 2016). A 2013 report from the FAO revealed that 14.5 per cent of all human-induced emissions come from eating mammals. The report *Tackling Climate Change Through Livestock* says beef and cattle milk production account for most emissions, contributing 41 per cent and 19 per cent of the sector's emissions respectively. Pig meat production is second, contributing 9 per cent to the sector's emissions (Gerber et al., 2013).

According to the FAO study, the main sources of emissions are: feed production and processing (45 per cent of the total – with 9 per cent attributable to the expansion of pasture and feed crops into forests); fermentation from ruminants (39 per cent), and manure decomposition (10 per cent). The remainder of the carbon emissions from meat production is attributable to the processing and transportation of meat itself.

The report further states that the livestock sector can indeed make an important contribution to international efforts to curb climate change by voluntarily offsetting some of the sector's emission increases, since the worldwide demand for livestock products is expected to grow by 70 per cent by 2050 (Ibid.).

Goal 14: Life Below Water

Oceans are our friends. More than 3 billion people depend on marine and coastal biodiversity for their livelihoods, so it is no surprise it is of great concern that at least 30 per cent of the world's fish stocks are overexploited, reaching below the level at which they can produce sustainable yields. Oceans also have a calibrating effect on climate change, as they absorb about 30 per cent of the carbon dioxide produced by humans. The

bad news is we are seeing a 26 per cent rise in ocean acidification since the beginning of the industrial revolution. Through SDG14, governments worldwide have committed to taking urgent action to prevent and significantly reduce marine pollution from all sources and to sustainably manage and protect marine and coastal ecosystems (UNDP, 2021b).

It is becoming more and more difficult to grow enough crops in the now increasingly depleted soils to feed all the cows, pigs, sheep and other livestock being raised for the meat market. Farmers are thus turning to nitrogen-rich fertilisers to grow their crops. The chemicals in these fertilisers are percolating down into our freshwater aquifers and running downstream into our oceans. The result is that algae blooms are sucking all the oxygen from the water, killing all marine life. And these 'dead zones' are expanding like a giant plague: the U.S. National Oceanic and Atmospheric Administration (NOAA) announced in June 2019 that the hypoxic (or dead) zone in the Gulf of Mexico that runs along the United States coastline was 7829 square miles – about the size of the state of New Hampshire or Massachusetts. The largest ever recorded was two years earlier, in 2017, at 8776 square miles (NOAA, 2019).

More than 3 billion people depend on marine and coastal biodiversity for their livelihoods. According to the UNFAO, fish and fish products account for 17 per cent of all animal protein consumed in the world, and 26 per cent of that 17 per cent is consumed in the poorest and least developed countries. The ocean also provides an important source of income for 60 million people who work in fisheries and aquaculture. However, nearly 90 per cent of the world's marine fish stocks are now fully exploited, overexploited and/or depleted (Thompson & Kituyi, 2018). One-third of the world's fish catch is also fed directly to livestock to be inefficiently converted into beef, thereby wasting significant amounts of this precious resource. If we are not careful, this overexploitation of 'life below water' could push the regenerative capacity of the oceans past the point of no return.

SDG14 calls on all countries to prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities. One significant way to do this is by reducing or avoiding mammal meat. In doing so, we can directly contribute to the solutions necessary to restore the health of our oceans, restoring life below water to its balance within the ecosystem.

Goal 15: Life on Land

SDG 15 looks at our relationship with the land and how well we manage it for the benefit of future generations. We all know our lives depend on the health of the Earth for our sustenance and our livelihoods. The UN estimates that at least 1.6 billion people depend on forests for their livelihood and that 75 per cent of the world's poor are affected directly by land degradation (UN, 2021). The Center for International Forestry Research (CIFOR) reports that plant life provides 80 per cent of our human diet, which is why we rely on agriculture as an important economic resource. Forests account for 30 per cent of the Earth's surface and provide vital habitats for millions of species (CIFOR, 2016). Forests also are important sources of clean air and water, and are crucial for combating climate change through photosynthesis – the process through which plants convert CO2 from the air into biomass.

The quality of our land is deteriorating so rapidly that our ecosystems may soon be unable to sustain life as we know it today. The annual destruction of primary tropical rainforest – the wildest and most diverse swathes – has increased as much as 25 per cent since the 1990s. We are losing upwards of 80,000 acres of tropical rainforest daily and significantly degrading an additional 80,000 acres every day. As the trees disappear, so do some 135 plant, animal and insect species – some 50,000 species each year. Cattle ranching is one of the primary reasons for the clearing of these forests – both for the cattle themselves and to grow the crops to feed them (Thompson & Kituyi, 2018).

Just four commodities – beef, soy, palm oil and wood products – drive most tropical deforestation. Of these four, beef has by far the largest impact. Converting forest to pasture for beef cattle, largely happening in Latin America, is destroying millions of hectares of tropical forest each year – in 2018 alone the world lost 3.6 million hectares of primary rainforest, an area the size of Belgium (Weisse & Goldman, 2019).

The drive behind the incessant clearing of rainforests is both to do with a growing demand for beef and because much of the grazing land is rendered useless after a few years. The land suffers substantial losses of soil fertility and soil erosion because soil nutrients are rapidly depleted after clearing and grasses are soon replaced by less useless vegetation, causing

farmers to clear yet more rainforest to feed and pasture their cattle (Haan & Blackburn, 1997).

Data from the Brazilian Beef Exporters Association show that beef exports from that country increased 20 per cent in 2017 to 132,000 metric tons and then an additional 11 per cent in 2018 to 178,000 metric tons (Williams, 2019). How many Brazilian cows are required to produce 178,000t of beef? A steer produces a 750lb carcass after the fat and muscle are trimmed away. Remove the bones, and you get around 490 pounds of boneless trimmed beef (San Diego State University, 2020). Using these figures, the 178,000 metric tons of beef exports in 2018 translates into 392,422,827 lbs of meat. Divide that figure by 490, and we get around 800,862 cows that are slaughtered each year in Brazil alone. Consider the amount of land it takes to produce all those cows each year, and you will start to understand what is happening to the rainforest.

Goal 15 challenges the world to protect, restore and sustainably use terrestrial ecosystems, manage our forests, and halt and reverse land degradation and biodiversity loss. Eighty per cent of endangered mammals are now threatened by habitat loss due to ever expanding agriculture that feeds the few mammals that we eat. We simply must bring food production back within the limits of planetary boundaries. Reducing our consumption of mammal meat and eating a locally-based diet that is sustainably sourced is – in a nutshell – the single biggest action we can take to protect life on land. And remember:life on land includes us.

Scientists have long warned that unfamiliar pathogens will emerge more frequently from interactions among humans, livestock and wildlife, interactions that have steadily increased in scale and intensity, ultimately squeezing local ecosystems so hard that deadly viruses emerge (Berger, 2020). The novel coronavirus may be the latest to do so, and unless we relax our grip on nature, it will not be the last.

Conclusions and Recommendations

In order to ensure that humankind charts a way forward that is sustainable and equitable, we must realise that we are all in this together. Personal choices have repercussions that ripple out far beyond one's personal space,

either hurting or healing the world at large. It's all about partnership and community – looking after one another. The partnerships to support the realisation of these 17 SDGs (and most other internationally-agreed commitments for global wellbeing) must, of course, happen at the global level of nation states, but are also required of subnational levels of government like states and provinces, and of cities, communities, clubs and associations, and individuals like you and me. If we all do our part to ensure a sustainable future for our children, we will together turn things around and restore our balance with the Earth – but only if we rethink our menu and look beyond mammals for our meals. The choice is easy, and the choice is ours to make.

The 2020 Human Development Report (HDR) points out that 2020 was devastating for both planet and people: record-breaking Atlantic hurricanes, enormous wildfires in Australia, the USA, Siberia and Brazil, and a pandemic in which millions have died and many millions more have lost their chance to work, study or see their loved ones. It states that all of these catastrophic events are, for the most part, consequences of past choices. To ensure a better future, according to the report, we need to start making different choices, at the individual and policy levels. (UNDP, 2020).

A January 2019 study by the EAT-Lancet Commission on Food, Planet and Health, a collaboration between the EAT Foundation, *The Lancet*, Wellcome Trust, and the Stockholm Resilience Centre, outlined the ideal healthy diet – one that is best for the health of the individual and the planet. Thirty-seven scientists from sixteen countries (all international experts in health, nutrition and sustainability) argued that 'getting it right with food will be an important way for countries to achieve the targets of the UN Sustainable Development Goals and the Paris Agreement regarding climate change' (Willett et al., 2019).

Our individual consumer choices may not be enough to avert what *The Lancet* report calls 'catastrophic damage to the planet'. Governments also will need to encourage healthy food choices and ensure access to nutritious food. Policies and government subsidies will need to be redirected away from harmful agricultural practices and toward ones that are healthier for our bodies and our environment, and indeed our planet.

It is clear that the societal costs of mammal meat consumption are far greater than the price paid by the consumer. There is now increased

discussion by policymakers in many countries (Germany, Denmark and Sweden, for example) (Kateman, 2019) to regulate red and processed meat consumption, similar to the regulations for other carcinogens and foods with public health concerns. One approach is to regulate the industry or to outlaw certain foods – as New York City has tried to do by banning sugar-sweetened drinks in cups larger than 16 ounces (0.5 litres) (Ibid.). A more market-based approach would involve taxing red and processed meats according to their health impacts. This latter approach looks at the cost of eating meat on the global economy and how much tax consumers should pay to offset the health and environmental consequences of their diets.

Looking into the most optimal taxation levels for red and processed meats in nearly 150 countries and regions, health experts at Oxford university concluded in its 2018 study that introducing a tax on meat would produce widespread health and environmental benefits. In high-income countries, the price for beef, lamb, and pork would need to be increased by more than 20 per cent, while processed meats like sausages and hot dogs would need to more than double in price to cover their true cost to society. These researchers concluded that introducing such a health tax on these products would offset healthcare costs and likely prevent more than 220,000 deaths a year globally (Springmann, Mason-D'Croz, et al., 2018).

Some argue that if the true cost of meat production were reflected in the price of the meat itself, then only elites would be able to eat meat. If so, so be it. There are many things that are so expensive that only the rich can afford them. Just because private jets can be afforded by the super wealthy doesn't mean they should be subsidised for everyone else. Let the rich eat their expensive beef that reflects the product's true cost, while the rest of us eat more healthy alternatives.

A Transformative Change Is Needed

Achieving the vision outlined in this book will obviously require a dramatic and transformative shift within our society and the economy at large. In the United States, the mammal meat industry is responsible for 5.4 million jobs and $257 billion in wages. An estimated 527,019 people

have jobs in production and packing, import operations, sales, packaging and the direct distribution of mammal meat products. One report claims the meat industry accounts for $1.02 trillion in total economic output or, in other words, 5.6 per cent of gross domestic product (GDP) in the United States alone (NAMI, 2018).

Livestock also plays a crucial economic role for an estimated 60 per cent of rural households in developing countries – including small-holder farmers, agro-pastoralists and pastoralists. It contributes to the livelihoods of about 1.7 billion poor people. According to the UNFAO, at least 70 per cent of those employed in the sector are women (UNFAO, 2018b). Livestock, including dairy and other animal products, creates cash and in-kind incomes, and enables savings for future needs. As a result, it should be clearly recognized here that this sector – while causing harm to our health, society and the environment – also plays a major role in reducing poverty.

If everyone were to stop eating mammal meat immediately after reading this chapter, it would probably push a lot of people into poverty. However, as with all disruptive technologies, shifts in the market require economic adaptation. The suppliers and supply-chain management infrastructure would resist like they always do – but eventually, they would-have to adapt, people would need to be retrained and new jobs would have to be created. What is needed is a more sustainable alternative which can offer new technologies and thus new jobs, and an accompanying shift away from relying on the exploitation of our fellow mammals to fuel the economy.

Looking ahead, I do believe the path to inclusive prosperity will include a dramatic reduction in the production and consumption of our fellow mammals. Overcoming the complex challenges that the world is now confronting will require a political willingness to embrace the principles of sustainability and transformative action to tackle the root causes of poverty and hunger successfully. It will also require an individual willingness to be a part of the solution, and to s understand that what we choose to grow, kill and eat makes a much bigger difference than many of us realise.

References

Alcock, K. (2017). We Have No Time Left – Professor Will Steffen on Climate Change Action and Policy. *Sustainable Business Council*. Available at: https://www.sbc.org.nz/insights/2017/we-have-no-time-left. Accessed 9 May 2021.

Berger, K. (2020). The Man Who Saw the Pandemic Coming. *Nautilus*. Available at: https://nautil.us/issue/83/Intelligence/the-man-who-saw-the-pandemic-coming. Accessed 9 May 2021.

Brooks, J. (2016). Food Security and the Sustainable Development Goals. *OECD Insights Blog*. Available at: http://wp.me/p2v6oD-2rM. Accessed 9 May 2021.

CIFR (Center for International Forestry Research). (2016). How Forestry Contributes to SDGs. Available at: https://www2.cifor.org/thinkforests/facts-figures/. Accessed 9 May 2021.

City of Des Moines Water Works. (2015). Nitrate Removal Facility Fact Sheet. Available at: http://www.dmww.com/upl/documents/water-quality/lab-reports/fact-sheets/nitrate-removal-facility.pdf. Accessed 9 May 2021.

Fenelli, D. (2007, July 18). Meat Is Murder on the Environment. *New Scientist*. Available at: https://www.newscientist.com/article/mg19526134-500-meat-is-murder-on-the-environment/. Accessed 9 May 2021.

Frank, Q., Matthew, R., Judith, W. R., & Frank, H. (2020). Red and Processed Meats and Health Risks: How Strong Is the Evidence? *Diabetes Care*. https://doi.org/10.2337/dci19-0063

Gerber, P. J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., & Dijkman, J. (2013). *Tackling Climate Change Through Livestock – A Global Assessment of Emissions and Mitigation Opportunities*. Food and Agriculture Organization of the United Nations (FAO).

Haan, C., & Blackburn, H. (1997). Livestock-Environment Interactions: Issues and Options. *United Nations Food and Agriculture Organization*. Available at: http://www.fao.org/ag/againfo/resources/documents/Lxehtml/. Accessed 9 May 2021.

Harvard Medical School. (2012). What's the Beef with Meat? *Harvard Health Publishing*. Available at: https://www.health.harvard.edu/healthy-eating/whats-the-beef-with-meat. Accessed 9 May 2021.

Harvey, F. (2016). Eat Less Meat to Avoid Dangerous Global Warming, Scientists Say. *The Guardian*. Available at: https://www.theguardian.com/environment/2016/mar/21/eat-less-meat-vegetarianism-dangerous-global-warming. Accessed 21 Mar 2021.

Heller, M. C., & Keoleian, G. A. (2014). Greenhouse Gas Emission Estimates of U.S. Dietary Choices and Food Loss. *Journal of Industrial Ecology: Supporting Information*. https://doi.org/10.1111/jiec.12174

IPCC (Intergovernmental Panel on Climate Change). (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R. K. Pachauri, & L. A. Meyer (eds.)]. Available at: https://www.ipcc.ch/report/ar5/syr/. Accessed 9 May 2021.

IPCC (Intergovernmental Panel on Climate Change). (2019). P. R. Shukla, J. Skea, R. Slade, R. van Diemen, E. Haughey, J. Malley, M. Pathak, & J. Portugal Pereira (eds.) Technical Summary, 2019. In: *Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems.* Available at: https://www.ipcc.ch/srccl/. Accessed 9 May 2021.

Jensen, V. B., et al. (2012). *Technical Report 6: Drinking Water Treatment for Nitrate*. Center for Watershed Sciences, University of California. Available at: http://groundwaternitrate.ucdavis.edu/files/139107.pdf. Accessed 8 May 2021.

Joint SDG Fund. (2021). Ensure Access to Water and Sanitation for All. Available at: https://jointsdgfund.org/sustainable-development-goals/goal-6-clean-water-and-sanitation. Accessed 9 May 2021.

Kateman, B. (2019). Is a Meat Tax a Good Idea? *Forbes.* Available at: https://www.forbes.com/sites/briankateman/2019/08/27/is-a-meat-tax-a-good-idea/?sh=3b7998692d3a. Accessed 9 May 2021.

Kovacs, B., et al. (2015). Sustainable Agriculture, Forestry and Fisheries in the Bioeconomy – A Challenge for Europe. Available at: http://ec.europa.eu/research/scar/pdf/feg4-draft-15_may_2015.pdf. Accessed 10 Mar 2021.

Kress, W. J., & Stine, J. K. (2017). *Living in the Anthropocene: Earth in the Age of Humans* (p. 198). Smithsonian Books.

Lindsey, R. (2020). Climate Change: Atmospheric Carbon Dioxide. *The US National Oceanic and Atmospheric Administration*. Available at: https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide. Accessed 10 Mar 2021.

May, J. (2017). City of Hiawatha Issues High Nitrate Warning. *Hiawatha World*. Available at: https://www.hiawathaworldonline.com/news/city-of-hiawatha-issues-high-nitrate-warning/article_71208a3a-b98e-54a4-bc20-1c4b9bdd7a10.html. Accessed 10 Mar 2021.

Milman, O. (2018). Why Eating Less Meat Is the Best Thing You Can Do for the Planet in 2019. *The Guardian*. Available at: https://www.theguardian.com/environment/2018/dec/21/lifestyle-change-eat-less-meat-climate-change?CMP=fb_gu. Accessed 9 May 2021.

NAMI (The North American Meat Institute). (2018). The United States Meat Industry at a Glance. Available at: https://www.meatinstitute.org/index.php?ht=d/sp/i/47465/pid/47465. Accessed 9 May 2021.

NOAA (National Oceanic and Atmospheric Administration). (2019). Press Release: NOAA Forecasts Very Large 'Dead Zone' for Gulf of Mexico. Available at: https://www.noaa.gov/media-release/noaa-forecasts-very-large-dead-zone-for-gulf-of-mexico. Accessed 10 Mar 2021.

Rogers, A. (2019). *No Mammal Manifesto, Diet for a New and More Sustainable World*. Phoenix Press.

Rossi, M. (2018). The Chinese Are Eating More Meat than Ever Before and the Planet Can't Keep Up. *Mother Jones*. Available at: https://www.motherjones.com/environment/2018/07/the-chinese-are-eating-more-meat-than-ever-before-and-the-planet-cant-keep-up/. Accessed 11 Mar 2021.

San Diego State University. (2020). How Much Meat Can You Expect from a Fed Steer? Available at: https://extension.sdstate.edu/how-much-meat-can-you-expect-fed-steer. Accessed 6 Aug 2020.

Schechinger, A. W. (2018). America's Nitrate Habit Is Costly and Dangerous. Available at: https://www.ewg.org/research/nitratecost/. Accessed 9 May 2021.

Schuele, J. (2020). This Week in Agribusiness. *Beef Magazine*. Available at: https://www.beefmagazine.com/exports/china-s-beef-imports-continue-soar-obstacles-us-beef-increase. Accessed 9 May 2021.

Scientific American. (2009). Measuring the Daily Destruction of the World's Rainforests. Available at: https://www.scientificamerican.com/article/earth-talks-daily-destruction/. Accessed 10 May 2021.

Skerrett, P. J. (2012). Study Urges Moderation in Red Meat Intake. *Harvard Health Publishing*. Available at: https://www.health.harvard.edu/blog/study-urges-moderation-in-red-meat-intake-201203134490. Accessed 9 May 2021.

Springman, M. (2018). Tax on Meat Could Offset Health Costs. *University of Oxford News and Events*. Available at: https://www.ox.ac.uk/news/2018-11-06-tax-meat-could-offset-health-costs#. Accessed 10 May 2021.

Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., … (2018). Options for Keeping the Food System Within

Environmental Limits. *Nature.* Available at: https://www.nature.com/articles/s41586-018-0594-0. Accessed 11 Mar 2021.

Springmann, M., Mason-D'Croz, D., Robinson, S., Wiebe, K., Godfray, H. C. J., Rayner, M., et al. (2018). Health-Motivated Taxes on Red and Processed Meat: A Modelling Study on Optimal Tax Levels and Associated Health Impacts. *PLoS ONE, 13*(11), e0204139. https://doi.org/10.1371/journal.pone.0204139

Steffen, W., Crutzen, P. J., & McNeill, J. R. (2007). The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature. *AMBIO: A Journal of the Human Environment, 36*(8): 614–621. Available at: https://www.researchgate.net/profile/John_Mcneill4/publication/5610815_The_Anthropocene_Are_Humans_Now_Overwhelming_the_Great_Forces_of_Nature/links/0fcfd511e373d55e47000000/The-Anthropocene-Are-Humans-Now-Overwhelming-the-Great-Forces-of-Nature.pdf. Accessed 10 Mar 2021.

Stromberg, J. (2013). What Is the Anthropocene and Are We in It? *Smithsonian Magazine*. Available at: https://www.smithsonianmag.com/science-nature/what-is-the-anthropocene-and-are-we-in-it-164801414/. Accessed 9 May 2021.

The Economist. (2013). Meat and Greens: How Bad for the Planet Is Eating Meat? *The Economist*. Available at: https://www.economist.com/feast-and-famine/2013/12/31/meat-and-greens. Accessed 9 Mar 2021.

Thompson, P., & Kituyi, M. (2018). 90 Percent of Fish Stocks Are Used Up – Fisheries Subsidies Must Stop. *World Economic Forum*. Available at: https://www.weforum.org/agenda/2018/07/fish-stocks-are-used-up-fisheries-subsidies-must-stop/. Accessed 10 May 2021.

UN General Assembly. (2010). The Human Right to Water and Sanitation: Resolution/Adopted by the General Assembly, 3 August 2010, A/RES/64/292. Available at: https://www.refworld.org/docid/4cc926b02.html. Accessed 18 Feb 2021.

UN General Assembly. (2015). Transforming Our World: The 2030 Agenda for Sustainable Development, 21 October 2015, A/RES/70/1. Available at: https://www.refworld.org/docid/57b6e3e44.html. Accessed 10 May 2021.

UNDESA (United Nations Department of Economic and Social Affairs). (2021). Take Urgent Action to Combat Climate Change and Its Impacts. Available at: https://sdgs.un.org/goals/goal13. Accessed 10 May 2021.

UNDP (United Nations Development Programme). (2020). The Next Frontier – Human Development and the Anthropocene. Available at: http://hdr.undp.org/en/2020-report. Accessed 9 May 2021.

UNDP (United Nations Development Programme). (2021a). Goal 13: Climate Action. Available at: https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-13-climate-action.html. Accessed 10 Mar 2021.

UNDP (United Nations Development Programme). (2021b). Goal 14: Life Below Water. Available at: https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-14-life-below-water.html. Accessed 10 Mar 2021.

UNFAO (United Nations Food and Agriculture Organization). (2009). 2050: A Third More Mouths to Feed. Available at: http://www.fao.org/news/story/en/item/35571/icode/. Accessed 9 May 2021.

UNFAO (United Nations Food and Agriculture Organization). (2016). Sustainable Development Goals Target 12.3 on Food Loss and Waste: 2016 Progress Report. Available at: http://www.fao.org/save-food/news-and-multimedia/news/news-details/en/c/436985/. Accessed 9 May 2021.

UNFAO (United Nations Food and Agriculture Organization). (2018a). Transforming Food and Agriculture for the SDGs: 20 Interconnected Actions to Guide Decision-Makers. Available at: http://www.fao.org/3/I9900EN/i9900en.pdf. Accessed 10 May 2021.

UNFAO (United Nations Food and Agriculture Organization). (2018b). Decent Rural Employment. Available at: http://www.fao.org/rural-employment/agricultural-sub-sectors/livestock/en/. Accessed 10 Mar 2021.

UNFAO (United Nations Food and Agriculture Organization). (2019). *The State of Food and Agriculture 2019. Moving Forward on Food Loss and Waste Reduction*.

United Nations. (2021). Sustainably Manage Forests, Combat Desertification, Halt and Reverse Land Degradation, Halt Biodiversity Loss. Available at: https://www.un.org/sustainabledevelopment/biodiversity/. Accessed 9 May 2021.

USCDC (United States Center for Disease Control and Prevention). (2014). Water-Related Diseases and Contaminants in Public Water Systems. Available at: https://www.cdc.gov/healthywater/drinking/public/water_diseases.html. Accessed 10 Mar 2021.

Weisse, M., & Goldman, E. D. (2019). The World Lost a Belgium-Sized Area of Primary Rainforests Last Year. *World Resources Institute*. Available at: https://www.wri.org/blog/2019/04/world-lost-belgium-sized-area-primary-rainforests-last-year. Accessed 9 May 2021.

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D., DeClerck, F., Wood, A., & Jonell, M. (2019). Food in the Anthropocene: The EAT–Lancet Commission on Healthy Diets from Sustainable Food Systems. *The Lancet, 393*(10170), 447–492. Available at: https://eatforum.org/eat-lancet-commission/. Accessed 16 Mar 2021.

Williams, A. (2019). Brazil Closes 2018 with Largest-Ever Beef Volume Exports. *Global Meat News*. Available at: https://www.globalmeatnews.com/Article/2019/01/22/Largest-ever-beef-exports-by-volume-for-Brazil. Accessed 16 Mar 2021.

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