

# Advancing climate adaptation practices and solutions: emerging research priorities

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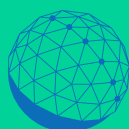
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## Abstract

This paper builds on insights from Adaptation Futures 2016: Practices and Solutions – the largest gathering of adaptation experts to date – to identify research priorities at a time when adaptation is scaling up and moving from planning to implementation around the world. It traces the evolution of adaptation research over time, reflects on how it has evolved, maps what it looks like today, anticipates research directions and gaps, and articulates new research priorities. A historical overview distinguishes between four “generations” of adaptation research: resistance and description, acceptance and norms, progress and policy, and acceleration and implementation. It presents the research questions that define each of these generations. The paper then proposes research priorities to advance the current, fourth generation of adaptation research, starting from the key messages of Adaptation Futures 2016, supplemented by insights from almost 200 responses to a post-conference questionnaire and more in-depth responses from 18 adaptation “champions” to an online survey. Descriptive, normative, policy and implementation research priorities are proposed for each of the conference’s five key messages and for cross-cutting considerations. The aim is to inform and inspire adaptation researchers, research users and research funders, and to contribute to the development of the Global Center on Adaptation.



# 1. Introduction

Over the past two decades, interest in climate adaptation has increased substantially, leading to the emergence of a new field of research, aimed at both understanding and informing adaptation. Since 2010, climate adaptation experts have met every two years under the Adaptation Futures banner to take stock of progress, lessons learned, and outstanding questions in adaptation research and action.

The most recent conference, *Adaptation Futures 2016: Practices and Solutions*, was held in Rotterdam, the Netherlands, on 10–13 May. It convened more than 1700 experts from over 100 countries, including more than 600 adaptation scholars, 400 policy-makers, 100 private sector representatives, and 400 practitioners, making it the largest adaptation-specific gathering of experts to date.

Adaptation Futures 2016 was organized around seven themes and three cross-cutting issues. The themes were primarily sectoral in focus, while the cross-cutting issues have implications for adaptation practice across themes (Figure 1). The focus of the conference on practices and solutions reflects an ongoing shift in the adaptation community from assessing risk and developing plans towards taking concrete action. But, as shown in the cartoon on this report’s cover, the conference also demonstrated the breadth of the climate adaptation community and the diversity of approaches to adaptation practices and solutions.

**Figure 1: Themes and cross-cutting issues at Adaptation Futures 2016**



The variety of sessions on each theme and cross-cutting issue captured a broad range of insights, and pointed to key innovations needed within particular adaptation sectors, as well as adaptation research goals more broadly. The following key messages were distilled from this rich output (Kehler Siebert et al. 2017):

1. We are creating risks faster than we are reducing them.
2. Diverse partnerships are vitally important.
3. The private sector has a key role in advancing adaptation.
4. Research on adaptation and research for adaptation are mutually reinforcing.
5. There needs to be a shift from measuring process to measuring progress

As an additional conference output, and to contribute to the development of the Global Center on Adaptation, this report identifies emerging research priorities to advance adaptation practices and solutions. The purpose of this exercise is to inform and inspire adaptation researchers, research users and research funders.

The focus on adaptation research “priorities” as opposed to a more conventional research “agenda” is intentional. An agenda describes an underlying and often unified, complete programme; priorities are issues of most pressing concern. Priorities are by definition subjective in that they are set by individuals and institutions with differing mandates, purpose and world views. Thus, this report does not intend to be the final word on what research must be done next, but rather to start a conversation.

This report takes stock of where adaptation research has come from, and where it appears to be heading. This is done by looking at the evolution of adaptation research over time, reflecting on how it has evolved, mapping what it looks like today, anticipating research directions and gaps, and articulating new research priorities.

In presenting a historical overview of adaptation research priorities, Section 2 distinguishes between four “generations” of adaptation research: resistance and description, acceptance and norms, progress and policy, and acceleration and implementation. It presents the research questions that define each of these generations.

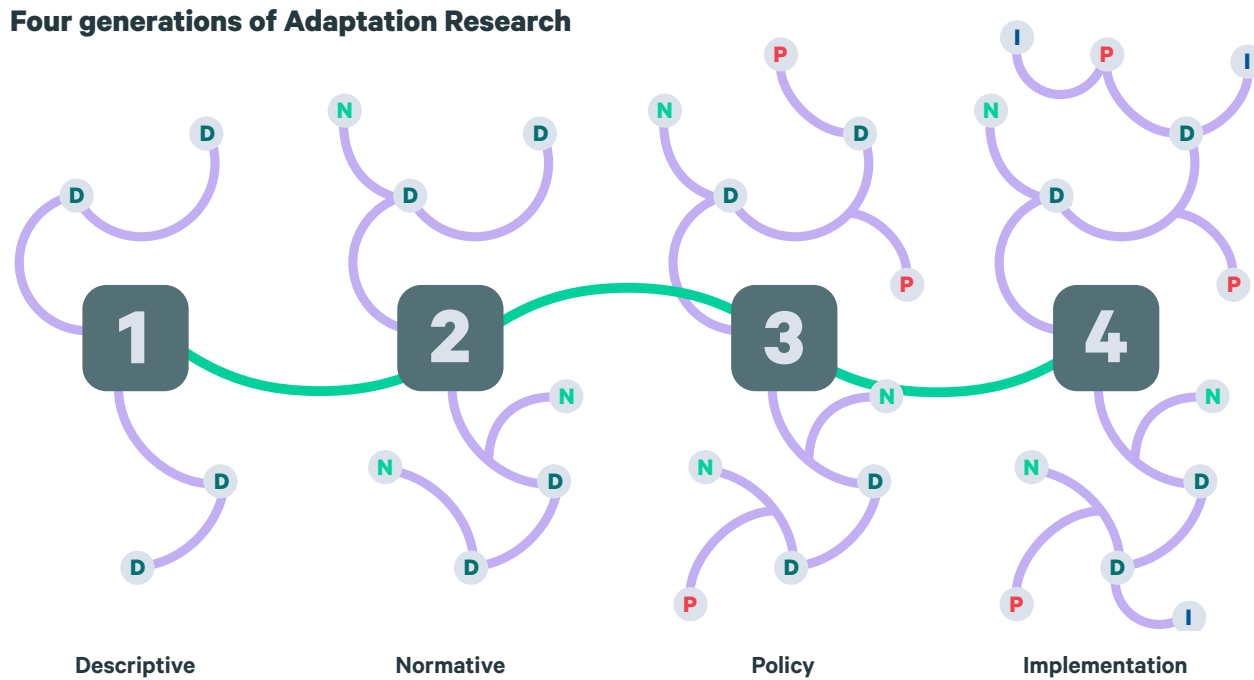
Section 3 then proposes research priorities to advance the current, fourth generation of adaptation research. It draws from the Adaptation Futures 2016 meeting report (de Pater and van Steenis 2016), the responses of almost 200 conference participants to a post-conference online questionnaire, and the responses of 18 adaptation “champions” to an online survey. Descriptive, normative, policy and implementation research priorities are proposed for each of the five key messages and for the cross-cutting considerations.

Finally, Section 4 draws conclusions and presents recommendations for researchers, research users and research funders.

2. A historical overview of adaptation research priorities

Since the emergence of adaptation as a distinct response to climate change in the mid-1990s, adaptation policy, practice and research have co-evolved, shaping and informing one another. The goal of this section is to summarize key developments in adaptation policy and research. It distinguishes between four adaptation research generations, characterized by broadening the focus of work to include descriptive, normative, policy and, later, implementation questions, summarized in Table 1. The ambition of this exercise is not to be comprehensive, but rather to give a sense of how adaptation policy and research have evolved, in order to better understand adaptation research as a unique area of inquiry, and explore directions for future work.

Figure 2: The four generations of adaptation research. As climate change adaptation research has continued to develop as a field of inquiry, each generation has built on the last, beginning with descriptive questions and adding normative, policy, and implementation questions at each subsequent stage.



## 2.1 First-generation adaptation research: Resistance and description

The early years of the United Nations Framework Convention on Climate Change (UNFCCC) saw limited attention to adaptation for a variety of reasons. Whereas mitigation refers to actions devised for reducing emissions of greenhouse gases in order to “prevent dangerous anthropogenic interference with the climate system” (UNFCCC Article 2), adaptation was not defined in the convention text. In fact, the word’s meaning has always been the source of academic and policy debate (Schipper and Burton 2008).

Foremost, there was concern that discussing adaptation could detract from the international focus on mitigation (Burton 1996; Pielke 1998), or that attention to adaptation from developed countries may be seen as an admission of responsibility in causing the climate problem (Verheyen 2002), potentially opening liability floodgates.

Furthermore, the need for climate adaptation must be underscored by scientific evidence that climate change is both occurring and that impacts are experienced. While the Intergovernmental Panel on Climate Change (IPCC) *Fifth Assessment Report* demonstrated with certainty that anthropogenic climate change is occurring (IPCC 2014, p.48), the same level of certainty was not present in early IPCC reports. This lack of scientific agreement on anthropogenic climate change stifled interest in adaptation (Schipper 2006). These issues made adaptation a political non-starter at the highest levels, and early mentions of adaptation in official UNFCCC texts were seen as deliberately vague (Burton et al. 2002).

Still, despite the concerns about moral hazard vis-à-vis mitigation, the limited scientific evidence, and the lack of political support, climate adaptation began to emerge as a productive and important area of research. The main focus of first-generation adaptation research was to better understand the impacts of climatic change on specific communities (Carter et al. 1994; Smith and Lazo 2001), as a basis for identifying adaptation options.

While this work was fruitful and necessary, it quickly became clear that adaptation posed a unique set of questions and dilemmas beyond the scope of impact assessment. Indeed, as Burton et al. (2002) argue, first-generation adaptation research had trouble incorporating important policy conditions that influence adaptation outcomes, was often unable to consider the range of adaptation options, and tended to neglect the roles of diverse stakeholders in pursuing adaptation.

Overall, the first generation of adaptation research was primarily descriptive. In the face of political resistance and scientific uncertainty, the priority of adaptation researchers was to better understand the future of climate impacts, to determine which impacts may be no longer avoidable, and begin to explore the possibility of adapting to those impacts. Adaptation policy focused on understanding future risks, but climate impacts appeared distant, reducing the urgency of adaptation planning and implementation.

## 2.2 Second-generation adaptation research: Acceptance and norms

Over time, and in part due to the work of first-generation adaptation researchers, the international discussion regarding climate change adaptation began to shift. The first key instance of this change came in 2001, with the release of the IPCC’s Third Assessment Report, as well as the 7th session of the Conference of the Parties (COP 7) to the UNFCCC in Marrakech. In both contexts, climate change was recognized as a problem of development, as opposed to a global environmental issue that would influence all parties equally. Descriptive research made it clearer that developing countries would suffer the most from climate change, and the Least Developed Countries (LDCs) were particularly vulnerable (Adger et al. 2003).

With that recognition came the introduction of three multilateral funds established to manage adaptation funding and the initiation of National Adaptation Programmes of Action (NAPAs). Still, despite these augmented efforts to bring adaptation to the climate agenda, the emphasis of the IPCC reports and COP negotiations remained mostly on mitigation (Kates 2000).

In parallel to these advances, the adaptation research community began to look more carefully at adaptation as a field of inquiry. Seminal papers were written to explore what adaptation was, including



what people were adapting to, who was adapting, and how they were adapting (Smit et al. 2000; Adger et al. 2005). Likewise, an adaptation vocabulary was developed, defining core concepts such as sensitivity, vulnerability, resilience and adaptive capacity (Smit et al. 1999; Adger 2003; Smit and Wandel 2006), though many remain contested today.

Adaptive capacity in particular developed into a key area for innovative research. Defined as the potential for an individual or community to pursue an adaptive behaviour, adaptive capacity is inherently social in nature, and represents a critical nexus between social capital, politics, economics, and geophysical conditions. Case study work emerged quickly on this topic (e.g. Cross and Barker 1992; Mortimore 1998; Huq 2001; Adger et al. 2001; Roncoli et al. 2001; Berkes and Jolly 2001; Smith et al. 2003) and the interaction between social and environmental factors became a strength of the adaptation field.

Likewise, work began to emerge that asked difficult questions about adaptation outcomes. Several authors suggested that research was necessary to identify feasible and desirable adaptation outcomes, both from technical and social perspectives (Adger et al. 2003). There was also critical thinking about what might be a desirable balance between adaptation and mitigation efforts, as well as between adaptation and development (Klein et al. 2005).

These efforts culminated in 2007, when the IPCC Fourth Assessment report was published in the lead-up to COP 13 in Bali. The report, which stated that the warming of the climate is unequivocal, and that climate change impacts are already taking place, identified adaptation needs in different sectors and regions. The COP 13 outcome, the Bali Action Plan, raised the political status of adaptation by including adaptation as a key “pillar” of climate action, alongside mitigation, technology transfer, and finance.

In this way, the Bali Action Plan demarcates a pivotal moment for adaptation, recognizing its crucial importance and how it is fundamentally intertwined with questions of poverty, political disenfranchisement, social marginalization, and other social factors. In this sense, second-generation adaptation research continued to build on the *descriptive* work of first-generation research – incorporating social dimensions in new and important ways – while beginning to ask new *normative* questions. Researchers began to look introspectively at adaptation research, asking what the field should be concerned with and what successful adaptation looked like.

## 2.3 Third-generation adaptation research: Progress and policy

While Bali represented a key moment for the recognition of adaptation, the emergence of new institutions and actors in adaptation governance coincided primarily with the Cancún Climate Change Conference in 2010 (COP 16). The resulting Cancún Adaptation Framework promoted adaptation action with the same level of priority as mitigation. Through the framework, countries established the Green Climate Fund (GCF); agreed on mechanisms to promote the transfer of finance and technologies for mitigation and adaptation in developing countries; established a process for preparing National Adaptation Plans (NAPs); put in place an Adaptation Committee to offer technical support and share information; and agreed on a work programme on “loss and damage” associated with climate impacts in particularly vulnerable countries.

Following these policy developments and the concomitant mobilization of funding to pursue adaptation action, adaptation research again underwent significant transformation. No longer a peripheral concern to the climate policy community, adaptation research began to garner attention from a wide variety of academic disciplines, issue areas and stakeholders. Adaptation researchers began to explore the role of climate adaptation in cities, agricultural production, freshwater provision, and public health. Risk assessment and disaster risk reduction continued to play large roles as well, while strong research cores developed in adaptation governance and adaptation finance, investment and business.

Climate finance also emerged as a key research area, as a prerequisite for most adaptation research and action and the heart of the North–South debate within the UNFCCC climate negotiations. It has long been clear that substantial investments would be necessary to adapt to climate change, and researchers began to estimate these costs (The World Bank 2010; Agrawala, Bosello, et al. 2011). A debate also emerged about the efficacy of certain financial institutions for handling adaptation finance, including institutions that have found success distributing funding for mitigation efforts (Möhner and Klein 2007).



Technical work that continues to evolve and improve has provided crucial information about adaptation finance flows (Buchner et al. 2011; Atteridge and Canales 2017), addressed issues with the amount and type of finance provided (Ciplet et al. 2015; UNEP 2016), and documented reporting and transparency problems (AdaptationWatch 2015; 2016). Recently, scholars have been increasingly interested in the potential of the private sector to contribute to climate adaptation financing (Agrawala, Carraro, et al. 2011; Pauw 2015), and more critical work is emerging to explore linkages between finance institutions and trust and legitimacy in international climate negotiations (Ballesteros et al. 2010; Grasso 2010; Ciplet 2015).

Third-generation adaptation research has thus been characterized by growing concern for adaptation *policy*, in conjunction with the *descriptive* and *normative* questions of earlier generations. While information is still needed about climate risks, and adaptation researchers continue to debate the role of climate adaptation generally, new levels of attention are being paid to policy and financial mechanisms to encourage and coordinate adaptation action around the globe.

## 2.4 Fourth-generation adaptation research: Acceleration and implementation?

The 2015 Paris Agreement charted new territory for global cooperation to address climate change. In the national climate plans, known as Intended Nationally Determined Contributions (INDCs), which countries submitted before the COP, many countries included adaptation action along with mitigation commitments. The agreement itself outlines a “global goal on adaptation”, framing adaptation as a global challenge faced by all, with local, subnational, national, regional and international dimensions. The IPCC’s Fifth Assessment Report, meanwhile, which informed the Paris negotiations, stipulated that adaptation is increasingly part of planning processes (IPCC 2014). Information about implementation is still limited, but is being called for more than ever before.

These developments define the emerging fourth generation of adaptation research. As with prior generations, we are likely to see the expansion of adaptation research, this time with a new focus on *implementation* questions, while continuing to build on past areas of inquiry that gave adaptation research its distinct character. Other research priority reports have begun to explore what adaptation research may look like in the age of implementation. Of particular note are the *PROVIA Research Priorities on Vulnerability, Impacts and Adaptation: Responding to the Climate Challenge* (Rosenzweig and Horton 2013). Adaptation Futures 2016 exemplifies a similar spirit in its focus on “practices and solutions”.

To capture this important moment and take stock of the ongoing work in the field, the authors of this report conducted a brief survey among several particularly prominent adaptation “champions”. The survey was distributed to 30 individuals, 18 of whom completed it in full, for an excellent response rate of 60%. Respondents were asked to identify which conference themes or cross-cutting issues they believed were most critical for 1) research, 2) policy, and 3) practice (Figure 3), and to identify areas of work they felt to be underemphasized (Figure 4).

In terms of research, our survey respondents identified cities and infrastructure as the most important area for future work, followed closely by institutions and governance, and disaster risk reduction. One potential reason for the strong interest in cities may be the unique challenge that urban living poses for adaptation. Livelihood diversification and environmental restoration has long been an interest of adaptation researchers, but these well-discussed areas do not translate neatly into the urban context. As such, more work is necessary to understand what adaptation means for city dwellers and the infrastructure that helps urban hubs to function.

Disaster risk reduction emerged as the central priority for policy research, again followed by institutions and governance. This is unsurprising, given the centrality of calls among policy makers for more comprehensive risk modelling, incorporating multiple sources of risk, and examining impacts across sectors and scales.

From an implementation perspective, disaster risk reduction and cities and infrastructure were again prominent concerns, followed by a need for risk assessment and adaptation planning. In addition to the

Figure 3: Themes and cross-cutting issues important for research, policy and practice

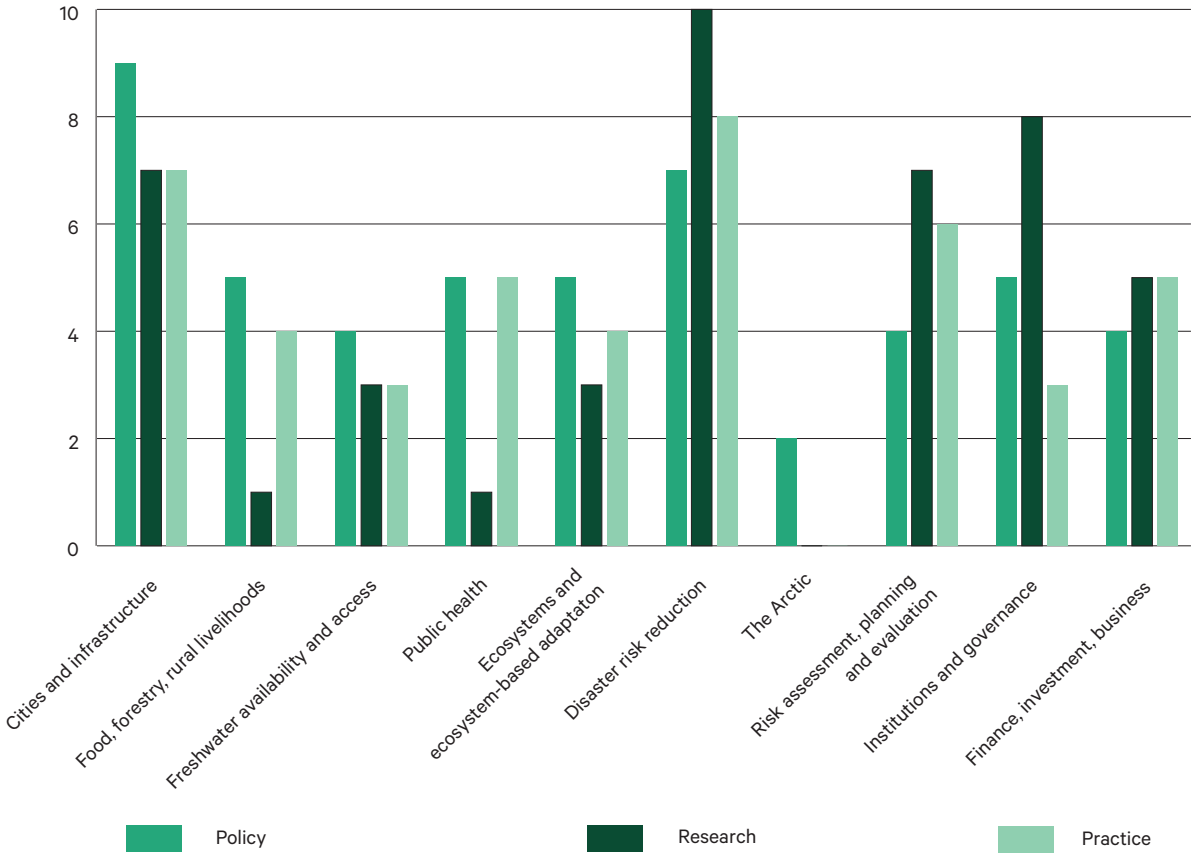
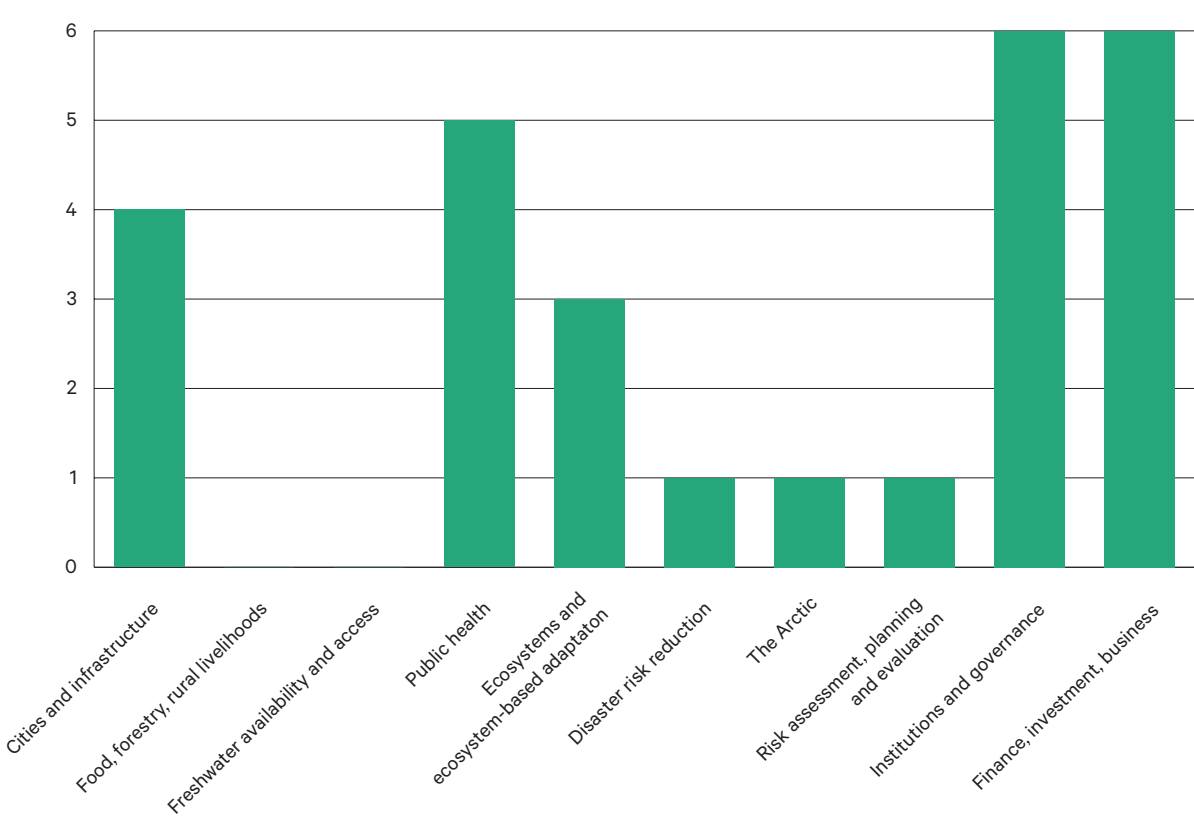


Figure 4: Areas of work that are underemphasized in adaptation research



key roles of cities and disaster risk reduction discussed above, this indicates a growing need for more comprehensive adaptation planning, which is likely to be built on strong policy learning practices and some manner of adaptation mainstreaming.

Finally, institutions and governance, finance, investment and business, and public health were each identified as potential research gaps by our survey participants. As cross-cutting issues, it is little surprise that institutions and governance and finance, investment and business appear in this underemphasized category. While research has continued provide key contextual detail and moved in the direction of implementation, more work is necessary to understand broader processes that influence adaptation at higher levels. A similar argument regarding the cross-cutting nature of public health can be made, considering that concerns for the health of individuals are to some degree fundamental to the adaptation dialogue.

Overall, while these results are far from comprehensive, they are instructive in that they underscore the growing focus on implementation during the fourth generation of adaptation research, while continuing to underscore the need for research into descriptive, normative and policy questions. The field has expanded markedly and is working with urgency to transform adaptation research into adaptation action.

In light of this development, adaptation research field is in great need of coordination. Questions being asked by adaptation researchers are more complex and numerous – the field continues to move forward to new and pressing topics, while simultaneously building on historic strengths. This is a deeply important time for adaptation researchers, where we must not only take stock of the diverse ongoing research occurring across our ranks, but collectively chart a course forward that capitalizes on our strengths.

The next section proposes priorities for future adaptation research, without addressing the question of who would be best placed to coordinate it. The newly established Global Center on Adaptation may be well placed to manage the collective direction of this complex, fragmented research field, and to create action informed by research.

**Table 1: Adaptation research priorities and areas of focus over time**

	First Generation	Second Generation	Third Generation	Fourth Generation
<b>Descriptive questions</b>	<ul style="list-style-type: none"> <li>• What are the potential impacts of climate change?</li> <li>• Who is going to be affected?</li> <li>• Is adaptation possible?</li> <li>• What would be the costs and benefits?</li> </ul>	<ul style="list-style-type: none"> <li>• How do social factors influence vulnerability to climate change?</li> <li>• What role does adaptive capacity play, and how can it be improved?</li> </ul>	<ul style="list-style-type: none"> <li>• Which factors exacerbate or reduce vulnerability?</li> <li>• What climate and risk data are needed for adaptation planning, and at what scales?</li> </ul>	<ul style="list-style-type: none"> <li>• How does adaptation actually work on the ground?</li> <li>• Which successful adaptation actions are replicable and scalable?</li> </ul>
<b>Normative questions</b>		<ul style="list-style-type: none"> <li>• What does successful adaptation mean?</li> <li>• What should be the balance of adaptation and mitigation?</li> </ul>	<ul style="list-style-type: none"> <li>• How can adaptation be equitable and meet the needs of poor and marginalized people?</li> </ul>	<ul style="list-style-type: none"> <li>• Should adaptation challenge underlying social, political and economic structures and drive transformative change?</li> </ul>
<b>Policy questions</b>			<ul style="list-style-type: none"> <li>• What policies, institutions, tools and resources are needed to support adaptation?</li> <li>• How can priorities for adaptation support be set?</li> <li>• How does adaptation align with other global, national and local goals?</li> </ul>	<ul style="list-style-type: none"> <li>• When does adaptation require specific policies and institutions, and when is it best mainstreamed into existing activities?</li> <li>• What role do the private sector and other non-state actors play in adaptation implementation and governance?</li> </ul>
<b>Implementation questions</b>				<ul style="list-style-type: none"> <li>• What technical knowledge is necessary to engage successfully in climate adaptation?</li> <li>• How do we best measure the outcomes of adaptation projects and programmes?</li> <li>• How do we learn from failure?</li> </ul>

### 3. Priorities for research to advance adaptation practices and solutions

The demand for adaptation research today is as high as the need to adapt to the dangerous and costly effects of climate change. As the fourth generation of adaptation research gets under way, efforts are necessary to coordinate work across the field, so that research can inspire action, and climate-resilient futures may become reality. Complementing existing research agendas, this section places adaptation research in historical context, and identifies numerous research priorities for the field moving forward.

Drawing on the historical overview presented above, priorities are labelled as being primarily descriptive, normative, policy, or implementation-oriented. These priorities are intended to inform and inspire researchers, research funders, and research users, and are meant to be further developed or adapted to meet the knowledge needs of a variety of audiences, including specific sectors, regions and disciplines.

The section is structured around the five key messages of Adaptation Futures 2016, shown in Section 1. Adaptation Futures 2016 is arguably representative of the adaptation research field as a whole, and provides useful insights on current orientations and topics of interest. In addition, research priorities are presented for cross-cutting considerations – priorities that have relevance for multiple key messages. Expectedly, the growing focus on practices and solutions within adaptation research means that *implementation* research questions are consistently a priority, while *descriptive*, *normative*, and *policy* questions are included where relevant.

#### 3.1 We are creating risks faster than we are reducing them

*While adaptation experts have made important progress in identifying challenges, collecting data and documenting lessons and successes, climate and other environmental changes are working faster. Adaptation needs to be more radical, bolder, more experimental and deliberately aligned with other agendas.*

This key message comes from Ian Burton, Professor Emeritus at the University of Toronto, who said it during the final plenary of Adaptation Futures 2016. To many, Burton's line resonates with two fundamental questions about adaptation action. How do we know if we are doing enough? And, perhaps more concerning, what if we aren't? From a research perspective, this comment underscores the fact that risks are interconnected, and adaptation must grapple with multiple risks if it is to succeed. It also begins to ask difficult questions about the efficacy of adaptation, and raise concomitant concerns regarding futures where adaptation has not gone far enough.

Understanding risk has long been a central component of adaptation research, and it is abundantly clear this focus is still needed. Questions remain about the degree of risk faced by vulnerable communities, and adaptation practitioners continue to clamour for improved risk assessment at finer scales. Several sessions at Adaptation Futures 2016 also highlighted the fact that climate change is one of many processes that generate risk – alongside socio-economic risks, political risk and risks generated by other types of environmental change – and that risks are unlikely to be distributed evenly across nations or communities. In this regard, a need has emerged to explore multiple sources of risk generation, paying particular attention to how risks from climate change are reduced or exacerbated by other biophysical or social processes, including across borders.

Relatedly, adaptation research must begin to consider effective responses to multiple risks. Scholars should continue to explore activities aimed at reducing socio-economic risks, in order to support comprehensive adaptation solutions that build deep social resilience. In this regard, consistent and synergistic policies are necessary that cover a variety of risks felt by all relevant sectors and actors. Researchers will be instrumental in helping to develop these complex policies and updating current adaptation planning approaches. Likewise, it is important to note that transboundary risks will require transboundary solutions. Work is needed to explore options for collaboration and adaptation policy coherence across borders.

Importantly, Burton's comment also raises serious questions about a future in which the limits to adaptation have been reached. In the event that risk continues to grow faster than it is reduced, there will be a critical need for researchers' contributions both on loss and damage, and on how to achieve transformational change. Adaptation research will also have to answer difficult questions about how to handle increasingly adverse extreme weather events, climate-related migration, conflict and resource scarcity. There is a growing need for scenarios for low-carbon and climate-resilient futures and, closely related, for deliberation about how societies wish to evolve, and what goals and values they prioritize.

Alongside these emerging needs, there is also space for researchers to explore the roles of context, power and equality in climate adaptation. While adaptation researchers have been keenly aware of the importance of local context, more work is needed to place adaptation action in global context, paying attention to the roles played by political economic forces, globalization, and power in guiding the adaptation agenda. Climate justice researchers will have much to say on this topic, as will political theorists, international relations scholars, and researchers focused on the operations of global governance institutions.

### Research priorities

Necessary work related to growing climate risks will have contributions across all four adaptation research priority areas. *Descriptively*, there is a great deal of work to be done modelling future and current risks created by climate change and other forces, as well as the interactions between those risks. From a *policy* perspective, researchers have a role to play in analysing policy coherence across sectors and borders, as well as effective strategies for managing multiple risks and trade-offs among them. There are substantial *normative* components to this work, primarily concerned with coping with loss and damage, imagining alternative futures, and interrogating the roles of power, political economy, and climate justice broadly. Finally, research is needed to embed risk assessment and risk management in the *implementation* not only of adaptation, but of a broader set of policies and plans, particularly in the context of development as well as multi-sectoral and transboundary risks.

## 3.2 Diverse partnerships are vitally important

*Bottom-up and top-down, business and communities, global and local policy – all layers and levels of actors must share information and experiences to develop a common vision for adaptation. Adaptation research and policy should not operate in silos, but connect with poverty eradication efforts, disaster risk reduction, and sectoral planning and development. In a globalizing world, actors and issues increasingly depend on one another. At Adaptation Futures 2016, for instance, there were discussions of the need to recognize and adapt to transnational climate risks to supply chains, and of potential nature-based adaptation solutions in urban areas.*

As climate adaptation continues to expand, it is becoming increasingly central to involve a diverse set of actors who work on multiple issues and scales. Fundamentally, this key message is about the silos that separate adaptation experts. Adaptation Futures 2016 highlighted barriers between knowledge generation and use, underdeveloped linkages that could bring together related policy domains, and broad struggles to pursue adaptation across multiple scales. Successful adaptation requires critically assessing the role of silos, recognizing that stand-alone adaptation research and institutions have an appropriate role, but they cannot operate in isolation. This is key not only to those developing new knowledge, but also to those set to benefit from this knowledge: countries and international organizations, local and regional authorities, civil society, businesses and the financial sector.

One clear opportunity for improvement is the nexus between adaptation researchers, and practitioners focused on adaptation action. There is a need to better understand how knowledge is transmitted and diffused, and the role that communication plays in policy learning. It is also increasingly recognized that effective research-practitioner engagement operates in both directions and requires true collaboration and mutual learning. By drawing on insights from a variety of perspectives and contexts, including practitioners, researchers can produce higher-quality work and build relationships that will facilitate research uptake.

Similarly, meaningful collaboration is necessary among more policy-oriented actors, including between state and non-state stakeholders, and across a variety of sectors and policy domains. Robust adaptation policy cannot be produced without meaningful input from the different people who could be affected, or whose engagement is needed for implementation. Research is necessary to better understand the relationships between communities, civil society, and policy-makers, and the conditions that foster meaningful dialogue. As presenter Lisa Dilling, from the University of Colorado, put it: “collaboration needs to be planned,” as there are many barriers that can hinder productive stakeholder engagement.

At the same time, a recurring theme at Adaptation Futures 2016 was the prospect of “mainstreaming” adaptation – searching for synergies across relevant domestic policy areas and international policy priorities. Work is necessary to identify where connections may exist, or where policy goals may be in conflict and need revision. Climate adaptation is unique in that it requires excellent coordination from both diverse policy sectors, and across global, national and local scales. Researchers are well equipped to inform important progress in this area.

Moving forward, there are several gaps that require attention in concert with these needs. First, reflection is required on the role of the silo in adaptation research and practice. Scholars need to evaluate the efficacy of either learning to move between knowledge silos, or operating completely in their absence. The former suggests an important role for knowledge brokers and boundary organizations, while the latter will call for adaptation generalists who possess a broad corpus of knowledge. Second, important questions remain about how adaptation expertise can be combined with critical contextual knowledge and insights from vulnerable communities. Including a diversity of partners in the future of adaptation will continue to raise the issue of who adaptation is for, and what their role in pursuing adaptation should be.

Finally, as we increase the number and type of voices represented in the adaptation dialogue, more work is needed to understand the roles of new partners. Non-governmental organizations and civil society have major contributions to make, and private actors and small-to-medium enterprises are increasingly held up as potentially key players in the adaptation arena. Overall, research is necessary that both helps to foster connections and learning between a growing diversity of actors, and that explores the various roles, synergies and potential conflicts posed by working radically across issue areas, policy domains and scales.

### Research priorities

The critical questions for adaptation research related to diverse partnerships are likely to be focused primarily on *policy* and on *implementation*. In the *policy* domain, scholars must explore the relationships between different policy sectors and scales, and identify barriers to collaboration and ways to improve policy coherence. Also within this category is work related to policy learning and adaptive governance, which should build on insights from other adaptation policy research. In keeping with broader adaptation research trends, *implementation*-focused scholarship is of growing importance. Adaptation researchers should investigate the conditions under which productive collaboration between diverse actors is possible, including how diverse representation can be translated into diverse input. This includes both governance research, and a deeper understanding of power dynamics and social psychology. Last, there is *normative* work to be done here, concerned with which actors should be involved with adaptation, what their various roles need be, and how to deal with conflicting interests.

## 3.3 The private sector has a key role in advancing adaptation

*Companies develop new technologies and services to help people adapt to climate change; provide insurance to build resilience to climate-related shocks, and invest in adaptation measures of their own. The private sector is increasingly interested in contributing to adaptation, but it is important to address key differences in the priorities and approaches of government, businesses and researchers. When infrastructure was discussed at Adaptation Futures 2016, for instance, the business community highlighted investment and development opportunities, while others emphasized the need for “climate-proofing” and the role of infrastructure in risk reduction.*

Governments are identifying adaptation priorities and crafting national strategies, but the effort required far exceeds what the public sector alone can achieve, in developing and developed countries alike. This has made it a priority to engage the private sector in adaptation.

Like development more broadly, private-sector activities can reduce or exacerbate vulnerability to climate change. They can contribute to adaptation through climate-smart agriculture, ecotourism, improved water management, social enterprises, finance schemes and more – or they can disrupt livelihoods, harm ecosystems, or concentrate people and property in high-risk areas, for instance. Adaptation outcomes from private sector engagement also depend on the type of actors. Large multinational corporations function on a very different level and scale than small enterprises, which form the bulk of the private sector worldwide.

Businesses can engage in adaptation in several ways. They can adapt for their own benefit – to secure their supply chains, or “climate-proof” their operations. This is becoming more evident in global supply chains, as global corporations are increasingly concerned about how extreme weather events can disrupt production at manufacturing sites, causing ripple effects across just-in-time delivery systems for retailers half the world away. The private sector can also invest in activities that support adaptation more broadly, including as a public good. Engagement can occur via public-private partnerships, for instance, or through corporate social responsibility (CSR) programmes. For many companies, CSR is still the main avenue for adaptation activities, and while these activities are beneficial, they are likely to be limited in scope. Thus, there is a growing emphasis on scaling up private-sector investment in adaptation by raising awareness of market opportunities to provide services or goods that support adaptation, in both developing and developed countries.

Several events at Adaptation Futures 2016 emphasized that businesses are good at managing risks, which may be important for improving the management of climate risk. However, as was also pointed out, there is a discrepancy between the long-term approaches taken by researchers and the shorter-term focus of most companies. Work is necessary to identify the links between long-term and short-term interests.

Another key issue discussed at Adaptation Futures was whether the private sector should mainstream adaptation in existing activities, or focus on adaptation-specific investments. While a good answer would be both, more knowledge is needed to develop effective approaches, tools and methods to guide the private sector in developing adaptation strategies. Specific issues such as global trade and global financial flows and their exposure to climate change impacts have also been flagged as potential issues by adaptation experts.

An important question in this context is how to mobilize private-sector investment in adaptation. Studies have identified barriers such as low awareness of climate change impacts and inadequate enforcement of existing policies, but more research is needed. Policy-makers are also trying to understand how to build enabling environments to increase private-sector investment in adaptation, and researchers are identifying successful policy interventions and options for replication and upscaling. However, this problem has multiple layers, includes many actors, financial instruments and policies, across on multiple scales. A structured approach towards a workable framework is currently lacking.

From businesses’ perspective, a specific need that was highlighted are adaptation metrics, measuring both quantitative and qualitative outcomes, that can express results in terms of costs, risks and benefits. This is seen as crucial for making the business case for adaptation, particularly from a risk management perspective. There is not only a need for evidence-based models, but also for better communication and outreach.

## Research priorities

With the increasing involvement of the private sector, critical questions and priorities for further research on its role in adaptation are likely to focus on *policy* and governance aspects of private-sector involvement. Is there a discrepancy between the discourse on the private sector and its actual actions and accomplishments? More specifically, issues such as climate risk disclosure and best practices, and the role of public-private partnerships in advancing adaptation, are expected to gain prominence. From



a *normative* point of view, there are important questions about the appropriate role of the private sector relative to the public sector in meeting adaptation needs, and the extent to which public investments should focus on leveraging private investment or directly funding adaptation. Research also has a role to play in informing debates within the business community about how to build a business case for adaptation, which could require challenging norms about short- vs. long-term gains and developing new narratives about companies' engagement with the communities in which they operate.

### 3.4 Research on adaptation and research for adaptation are mutually reinforcing

*Adaptation research is largely applied, but it also relies on theoretical framings and underpinnings. Better understanding of the process of adaptation – including what works and what doesn't – leads to better support for adaptation planning and decision-making. Adaptation Futures 2016 showed the importance of social science approaches in creating this reinforcing dynamic of adaptation research, as it helps to bridge the gap between problem-oriented research and decision support. A research agenda promoting successful adaptation practices and solutions must include both research on adaptation and research for adaptation, and encourage interactions among researchers, policy-makers and practitioners, including business as a prominent and comparatively new adaptation actor.*

Successful adaptation practices rely on the availability of knowledge about current and expected climate impacts, and about the options that exist to address these impacts. Several sessions at Adaptation Futures 2016 presented research that contributes to this knowledge. However, the growing body of knowledge is not necessarily leading to better adaptation policies or actions. This concern was also discussed at Adaptation Futures 2016, where it was argued that much current research meant to inform adaptation fails to account for the complexity and unpredictability of decision-making.

To complement traditional, problem-oriented adaptation research, two types of research are needed to put the growing body of knowledge to better use: research *for* adaptation that takes engagement with decision-makers – rather than climate data and information – as its starting point, and research *on* adaptation that aims to explain and, where possible, predict adaptation processes and their outcomes. These two types of research are complementary and mutually reinforcing, and explicitly solution-oriented.

Decision-driven research for adaptation goes beyond the user or stakeholder involvement typically seen in much adaptation research today. Useful as it is, such involvement tends to rely on the often-mistaken assumption that knowledge is the predominant or only bottleneck to adaptation decision-making. Deeper engagement with decision-makers serves to understand not only their knowledge needs, but also how they perceive climate risk and how they make decisions, cognisant of the conflicts and opportunities within the decision-making environment. This kind of engagement requires building networks and creating new analytical methods and problem-solving approaches – the expertise of social scientists.

Research on adaptation aims to explain how and why adaptation decisions are made or not made, and to determine what works and what does not work, and why. Here, adaptation and adaptation actors are the subject of study, rather than the intended beneficiaries. Research on adaptation is nothing new: descriptive research on adaptation addressed similar questions and served to frame adaptation research for years to come. The difference now is that as adaptation action is being planned and initiated, there is a much stronger empirical basis to address these questions, including the international institutional and finance regime that is being developed to support adaptation action.

Research on adaptation also includes analysis of possible limits to adaptation, including how they might be avoided. Reliance on “incremental” adaptation may no longer suffice to avoid limits to adaptation, giving rise to research questions on the need and potential of more radical, “transformative” adaptation approaches.

### Research priorities

Adaptation research requires both a broad focus and disciplinary depth. Unlike research for adaptation, which attracts a range of different disciplines, research on adaptation tends to be the domain of social scientists and economists. As adaptation action emerges around the world, research on adaptation can increasingly rely on practical experience, allowing for the analysis and upscaling of lessons beyond individual cases.

*Descriptive, normative, policy and implementation* questions include how people handle risk and uncertainty in their decision-making, and how they are best assessed and communicated to facilitate rather than impede decision-making. Another priority is research on knowledge-sharing and social learning: how does it happen, and how can it contribute to better adaptation decisions?

## 3.5 There needs to be a shift from measuring process to measuring progress

*Adaptation metrics are crucial for evaluating the cost, risk and benefits of adaptation, but various sessions at Adaptation Futures 2016 showed that such metrics are not sufficient. We need to understand what matters most to people, communities and other intended beneficiaries. Monitoring and evaluation (M&E) frameworks should encompass both numbers and narratives, and shift from “monitoring and reporting” – which tends to emphasize process – to “monitoring and learning”. This shift requires a stronger focus on the nature of outcomes and on the development of actionable knowledge.*

There were several sessions at the Adaptation Futures conference focused on monitoring and evaluation frameworks. One of these sessions summarized barriers for these frameworks, including missing data to assess the trends, difficulties in assessing the baseline for adaptation, and lack of clarity about the desired outcome of adaptation. The session concluded that the necessary next steps should move from measuring process to focus on effectiveness, engage stakeholders and quality of information. This leads to the fundamental question: How do we know if we are doing what we are supposed to do? It also underscores key questions about the role of accountability and transparency for effective adaptation.

Accountability means giving account of how specific duties were performed or progress was made towards a specific goal. This emphasizes the need for clarity about what is expected of and by each actor. Accountability also requires transparency, so there is a close link between the two in practice. For accountability to fulfil its potential, mutual accountability between donors and beneficiaries has been linked to effective adaptation. Effectiveness, on the other hand, is currently discussed almost exclusively in terms of whether the intervention has achieved its stated objectives, rather than whether the objectives were the right ones in the context, what kind of lasting change was produced, or whether the beneficiaries were those most in need of support. There are several high-level procedural guidelines for how adaptation projects should be undertaken. While these principles aim to inform the adaptation process, they in fact say little about either the anticipated or desired impacts of adaptation activities.

Due to its localized context, the purpose and character of adaptation itself is framed in several very different ways. Thus, what we consider effective adaptation depends, in the first instance, on how we define what it is we are trying to achieve. This raises several questions about the learning process and the need for good (and bad) examples. Therefore, any one set of indicators for effectiveness would have limited utility, since adaptation activities involve a very wide range of sectors and stakeholders. However, while no “one size fits all” measure of effectiveness seems appropriate for adaptation, a universal set of questions or considerations that can be used to guide and to assess adaptation activities may be possible, re-emphasizing accountability as key in increasing the success of adaptation.

In addition to learning from good examples, it is important to recognize maladaptation as a key risk to be avoided. Intentional adaptation policies or measures can result in maladaptation if they create the wrong incentives, leading people to make choices that increase their own vulnerability in the longer term, or that of others. Issues such as coordination and alignment between individual measures, and the importance of understanding impacts over different geographical and temporal scales, are currently not sufficiently captured in monitoring and evaluation frameworks. These imply certain important parameters or questions that relate to effectiveness and should thus be considered when assessing adaptation decision-making and/or outcomes.

Growing awareness of maladaptation and counter-effective interventions in particular has led to criticism of approaches that measure process and that place too much emphasis on measurable outcomes alone. The criticism has been that such approaches take too narrow a view of impacts, depend on avoided impacts being visible and measurable, and also imply that there is an existing record of impacts over time that can be measured.

There is a need for bottom-up network-building based on local case studies that provide information on questions such as “what went right?” and “what went wrong?” This could provide a narrative that complements traditional monitoring and evaluation frameworks, and an increased focus on progress in terms of learning was advocated as key to increase effectiveness of adaptation by the conference participants. Actors are calling for adaptation to be programmed as an ongoing process that supports and encapsulates iterative cycles of learning and experimentation, rather than focusing on predetermined outcomes, in order to increase accountability. This reflects the recognition that numbers alone, while important, need to be complemented by information that captures how the situation of beneficiaries has changed, and how that change has come about.

### Research priorities

In terms of future research priorities, questions related to measuring progress are likely to focus on *implementation*. In addition to developing and applying quantitative metrics that inform the assessment of adaptation costs and benefits over time, there is a need for action-based research that analyses the best (and worst) adaptation practices. The conceptual challenge relates to defining adaptation and its interpretation to increase consistency of what is being compared between cases, both qualitatively and quantitatively. From a *policy* perspective, governance questions around how to link the local and subnational with the global and transnational are likely to gain prominence. As climate change impacts are becoming more visible and increasingly borderless, complex linkages between global adaptation and local implementation should be better explored.

## 3.6 Cross-cutting considerations

While the key messages distilled from Adaptation Futures 2016 are excellent motivators for research priorities, not all questions fit neatly within these five categories. Indeed, there are several cross-cutting questions that transcend the conference key messages and will necessarily accompany the other research needs highlighted in this section.

First, issues of **information and uncertainty** continue to be of concern for adaptation researchers. It is an uncontroversial position that adaptation policy-makers and practitioners require robust climate modelling information, more complete risk analyses, and data that is useful to a variety of practitioners operating on multiple scales. Researchers have an obvious role to fill in providing these critical pieces of information, and continuing to foster learning and knowledge building by working closely with end-users of climate information. Importantly, however, adaptation experts are also aware that decisions sometimes need to be made quickly, and rigorous scientific or policy analysis may not always be available. These cases are common in the adaptation arena, and researchers must do a better job of addressing uncertainty in their work. This means both being able to communicate uncertainties within climate models and risk assessments to users, and working to produce sound policy analyses and recommendations when information is incomplete.

Second, there is much work to be done regarding **incentives** for actors to engage in adaptation. Fundamentally, it is crucial to know who acts for adaptation and why – what incentive structures are in place that encourage and enable some actors to successfully engage, while others remain on the sidelines. This is critical as the diversity of actors in the adaptation arena continues to grow. Researchers will be needed to better understand currently existing incentive structures that may prevent successful adaptation or lead to maladaptation, and to propose alternatives aimed at encouraging key partners, such as businesses, to become more involved.

Finally, there is a gap in research regarding the various **roles and responsibilities** held by different adaptation actors. While related to incentives, this cross-cutting question is less about encouraging actors, and more about examining who is best placed to contribute to what. Research in this area, then, will be focused on

the relationships between institutions, researchers, policy-makers and implementers. Work is necessary to analyse existing networks of adaptation actors, and to think critically about more optimal arrangements, keeping both efficacy and equity in mind.

### Research priorities

These cross-cutting questions have important implications in the descriptive, normative, policy and implementation research priority areas. Descriptively, researchers should continue to contribute to ongoing endeavours aimed at producing better climate modelling information and risk analyses. The ability to effectively address uncertainty and encourage learning and knowledge-building has clear implications for policy, while understanding diverse incentive structures is of relevance for implementation. Finally, there is compelling normative work to be done regarding the responsibilities of different actors and critically examining the roles they ought to take during the adaptation process.

## 4. Conclusions

As global mean temperatures continue to rise, making climate change impacts virtually certain, adaptation research has become indispensable. With the adoption of the Paris Agreement, adaptation has moved decidedly from discussion to action, and so has adaptation research. The fourth generation of adaptation research will increasingly focus on the implementation of adaptation and the effort to build a climate-resilient future. The growing political support for adaptation and interest in implementation research has been accompanied by an increasing sense of urgency in the climate change community. More than ever, adaptation experts are suggesting that adaptation is not an activity for the future, but rather a need that must be addressed now.

Given these developments, the role of adaptation researchers is more diverse, complex and critical. Efforts are strongly needed to coordinate action across the field, so that research everywhere may contribute meaningfully to climate adaptation goals. The purpose of this report has been to spur discussion in this direction by articulating a set of adaptation research priorities for the fourth generation of climate adaptation research. These priorities, and the example questions presented in Table 2, are meant to be indicative, not exhaustive.

Expectedly, a prime area of concern for this generation of adaptation research is to focus on implementation-related questions. Adaptation researchers have a critical role to play in understanding the conditions that make adaptation successful, including the incorporation of climate and risk data into adaptation planning, the meaningful engagement of diverse stakeholders, the role of private-sector actors in promoting adaptation, and how to leverage the technical knowledge of relevant experts on the ground. This technical focus of contemporary adaptation work creates new challenges for adaptation researchers, who will need to fill knowledge gaps as they become evident. In this context, adaptation research will need to remain agile and responsive, very attuned to urgent questions and concerns.

At the same time, this departure into the realm of implementation does not mean that earlier descriptive, policy or normative questions should be ignored. Indeed, a key function of research is to ask questions people did not realize to ask, and draw attention to problems that may have previously been ignored. The process of more basic inquiry will need to continue in tandem with more practical work. This will be a difficult balance to strike, especially given the fact that researchers will not have the luxury of observing, reflecting, learning, and then sharing results. Adaptation research should build on its historical strengths in identifying climatic risks and socially induced vulnerabilities, asking difficult normative questions about roles, responsibilities and transformative changes, and working with policy processes to produce effective and equitable climate adaptation policy.

Finally, collaboration and coordination will be critical for the future of adaptation research. If the hope is that research is useful to policy-makers, planners and other practitioners, more care should be taken to collaborate with those actors from the earliest phases of the research process. Ongoing research will need to pay close attention to the way that work is disseminated and communicated, particularly focusing on maintaining scientific rigour while maintaining readability for lay-persons and policy-makers.

Likewise, better collaboration is needed among adaptation researchers themselves. As the field continues to expand, adaptation research is likelier to be done outside the specialized adaptation community. In this context, efforts are necessary to connect with experts in other fields dealing with similar issues. Relatedly, adaptation research may be able to take lessons from seemingly unrelated areas of work. For example, public health responses to disease emergence may have a lot to teach about decision-making in the face of uncertainty, while medicine and surgery have long traditions of grappling with high-risk situations. In this way, the future of adaptation research will mean continuing to work with more partners more productively.

Moving forward, it is our hope that this report will continue to encourage discussion about the trajectory of adaptation research broadly. To this end, we hope the work will be useful to researchers, research funders, and users of adaptation research alike.

**Table 2: Priorities for the fourth generation of adaptation research**

	<b>Descriptive questions</b>	<b>Normative questions</b>	<b>Policy questions</b>	<b>Implementation questions</b>
<b>Key message 1: We are creating risks faster than we are reducing them.</b>	<ul style="list-style-type: none"> <li>• What current and future risks are faced by communities, generated by climate change and other forces?</li> </ul>	<ul style="list-style-type: none"> <li>• What should be done in the face of inevitable loss and damage?</li> <li>• If transformative change is necessary, what structures do we seek to change, and how?</li> </ul>	<ul style="list-style-type: none"> <li>• Are policies coherent across borders and sectors?</li> </ul>	<ul style="list-style-type: none"> <li>• How can risk assessment inform adaptation planning?</li> <li>• How could multi-sectoral risks and transboundary risks be considered in adaptation plans?</li> </ul>
<b>Key message 2: Diverse partnerships are vitally important</b>	<ul style="list-style-type: none"> <li>• Who will be affected by climate change impacts and/or by adaptation measures?</li> <li>• Which capacities exist to adapt to impacts?</li> </ul>	<ul style="list-style-type: none"> <li>• Which stakeholders should be involved in adaptation action, and what would be their responsibilities?</li> </ul>	<ul style="list-style-type: none"> <li>• How can partnerships inform policy learning and adaptive governance?</li> <li>• What governance structures and policies are needed to enable meaningful stakeholder participation and collaboration?</li> </ul>	<ul style="list-style-type: none"> <li>• How do we create conditions for productive collaboration among diverse stakeholders, recognizing power imbalances and potentially conflicting interests?</li> </ul>
<b>Key message 3: The private sector has a key role in advancing adaptation</b>	<ul style="list-style-type: none"> <li>• How is the private sector already contributing to adaptation or maladaptation?</li> <li>• How could climate impacts affect businesses, and how might adaptation measures benefit them?</li> </ul>	<ul style="list-style-type: none"> <li>• What role should private investment play in supporting adaptation?</li> <li>• Do differing incentive structures pose issues for the ability of private actors to engage?</li> </ul>	<ul style="list-style-type: none"> <li>• What are the best regulatory approaches for requiring climate risk disclosure?</li> <li>• How can governments create an enabling environment for private investment in adaptation?</li> <li>• What policy or regulatory options stimulate adaptation or maladaptation?</li> </ul>	<ul style="list-style-type: none"> <li>• What is the role of public-private partnerships in advancing adaptation action?</li> <li>• How can businesses reduce climate risk within their own supply chains?</li> <li>• How can businesses best seize market opportunities related to adaptation products and services?</li> </ul>
<b>Key message 4: Research on adaptation and research for adaptation are mutually reinforcing</b>	<ul style="list-style-type: none"> <li>• How do actors in different contexts make decisions, and how does climate information fit in?</li> <li>• How do these actors deal with risk and uncertainty?</li> </ul>	<ul style="list-style-type: none"> <li>• What does desirable social learning look like?</li> <li>• What is the appropriate role of researchers in guiding or steering discussions about adaptation?</li> </ul>	<ul style="list-style-type: none"> <li>• How can uncertainty be assessed and communicated without it becoming a policy constraint?</li> <li>• How can policy facilitate social learning?</li> </ul>	<ul style="list-style-type: none"> <li>• How does research on adaptation improve our ability to engage in adaptation?</li> <li>• What practical steps can we take to communicate climate research and adaptation knowledge so as to increase uptake and public engagement?</li> </ul>
<b>Key message 5: There needs to be a shift from measuring process to measuring progress</b>	<ul style="list-style-type: none"> <li>• Are adaptation actions reducing or increasing vulnerability to climate risks?</li> </ul>	<ul style="list-style-type: none"> <li>• What constitutes effective adaptation?</li> <li>• How do we define success, within individual projects or programmes and more broadly?</li> <li>• Which metrics should be used to evaluate the success of adaptation?</li> </ul>	<ul style="list-style-type: none"> <li>• What policies, regulations or tools can support monitoring and evaluation?</li> <li>• What policies are in place that help or hinder reflection on failed adaptation initiatives?</li> </ul>	<ul style="list-style-type: none"> <li>• How can action-based research and narratives promote more successful adaptation implementation?</li> </ul>
<b>Cross-cutting considerations</b>	<ul style="list-style-type: none"> <li>• What information is still needed by climate or risk modellers?</li> <li>• How does adaptation actually work on the ground? What is replicable and scalable?</li> </ul>	<ul style="list-style-type: none"> <li>• Which actors should be involved in adaptation?</li> <li>• What should their respective roles be in the adaptation process?</li> </ul>	<ul style="list-style-type: none"> <li>• How can uncertainty be better addressed within the policy context?</li> <li>• How can policy learning be encouraged?</li> </ul>	<ul style="list-style-type: none"> <li>• What diverse incentive structures exist that promote or prevent the success of adaptation projects?</li> </ul>

## References

- AdaptationWatch (2015). *Toward Mutual Accountability: The 2015 Adaptation Finance Transparency Gap Report*. <http://www.adaptationwatch.org>.
- AdaptationWatch (2016). *Towards Transparency: The 2016 Adaptation Finance Transparency Gap Report*. <http://www.adaptationwatch.org>.
- Adger, W. N. (2003). Social capital, collective action, and adaptation to climate change. *Economic Geography*, 79(4), 387–404. DOI:10.1111/j.1944-8287.2003.tb00220.x.
- Adger, W. N., Arnell, N. W. and Tompkins, E. L. (2005). Successful adaptation to climate change across scales. *Global Environmental Change*, 15(2), 77–86. DOI:10.1016/j.gloenvcha.2004.12.005.
- Adger, W. N., Huq, S., Brown, K., Conway, D. and Hulme, M. (2003). Adaptation to climate change in the developing world. *Progress in Development Studies*, 3(3), 179–95. DOI:10.1191/1464993403ps060oa.
- Adger, W. N., Kelly, P. M., Ninh, N. H. (2001). *Living with Environmental Change: Social Vulnerability, Adaptation and Resilience in Vietnam*. Routledge, London.
- Agrawala, S., Bosello, F., Carraro, C., De Bruin, K., De Cian, E., Dellink, R. and Lanzi, E. (2011). Plan or react? Analysis of adaptation costs and benefits using integrated assessment models. *Climate Change Economics*, 2(3), 175–208. DOI:10.1142/S2010007811000267.
- Agrawala, S., Carraro, M., Kingsmill, N., Lanzi, E., Mullan, M. and Prudent-Richard, G. (2011). *Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks*. OECD Environment Working Papers, No. 39. Organisation for Economic Co-operation and Development, Paris. DOI:10.1787/5kg221jkg7-en.
- Anderson, J. W. (1998). *The Kyoto Protocol on Climate Change: Background, Unresolved Issues and Next Steps*. Resources for the Future, Washington, DC.
- Atteridge, A. and Canales, N. (2017). *Climate Finance in the Pacific: An Overview of Flows to the Region's Small Island Developing States*. SEI Working Paper No. 2017-04. Stockholm Environment Institute, Stockholm. <https://www.sei-international.org/publications>.
- Ballesteros, A., Nakhooda, S., Werksman, J., Hurlburt, K. (2010). Power, responsibility, and accountability: rethinking the legitimacy of institutions for climate finance. *Climate Law*, 1(2), 261–312. DOI:10.3233/CL-2010-013.
- Berkes, F., Jolly, D. (2001). Adapting to climate change: social-ecological resilience in a Canadian Western Arctic community. *Conservation Ecology*, 5(2), 18. DOI:10.5751/ES-00342-050218.
- Buchner, B., Falconer, A., Hervé-Mignucci, M., Trabacchi, C. and Brinkman, M. (2011). *The Landscape of Climate Finance*. Climate Policy Initiative, Venice, Italy. [http://www.climatepolicyinitiative.org/generic\\_datas/view/publication/117](http://www.climatepolicyinitiative.org/generic_datas/view/publication/117).
- Burton, I. (1996). The growth of adaptation capacity: practice and policy. In *Adapting to Climate Change*. J. B. Smith, N. Bhatti, G. V. Menzhulin, R. Benioff, M. Campos, B. Jallow, F. Rijsberman, M. I. Budyko, and R. K. Dixon (eds.). Springer New York, New York, NY. 55–67. DOI:10.1007/978-1-4613-8471-7\_6.
- Burton, I., Huq, S., Lim, B., Pilifosova, O. and Schipper, E. L. (2002). From impacts assessment to adaptation priorities: the shaping of adaptation policy. *Climate Policy*, 2(2–3), 145–59. DOI:10.1016/S1469-3062(02)00038-4.
- Carter, T. R., Parry, M. L., Harasawa, H. and Nishioka, S., eds. (1994). *IPCC Technical Guidelines for Assessing Climate Change Impacts and Adaptations*. Report of Working Group II of the Intergovernmental Panel on Climate Change. University College London, UK, and Center for Global Environmental Research, National Institute for Environmental Studies, Japan. <https://docs.google.com/open?id=0B1gFp6loo3akVU0Qm9XVUVmSTQ>.
- Ciplet, D. (2015). Rethinking cooperation: inequality and consent in international climate change politics. *Global Governance: A Review of Multilateralism and International Organizations*, 21(2), 247–274.
- Ciplet, D., Roberts, J.T., Khan, M.R. (2015). *Power in a Warming World: The New Global Politics of Climate Change and the Remaking of Environmental Inequality*. MIT Press, Cambridge, MA, US.
- Cross, N., Barker, R., eds. (1992). *At the Desert's Edge: Oral Histories from the Sahel*. Panos Publications, London.
- de Pater, F. and van Steenis, O. (2016). *Adaptation Futures 2016: Practices and Solutions*. Meeting report for the 4th international climate change adaptation conference, Rotterdam, 10–13 May 2016. <http://www.adaptationfutures2016.org>.
- Grasso, M. (2010). An ethical approach to climate adaptation finance. *Global Environmental Change*, 20(1), 74–81. DOI:10.1016/j.gloenvcha.2009.10.006.
- Huq, S. (2001). Climate change and Bangladesh. *Science*, 294(5547), 1617. DOI:10.1126/science.294.5547.1617.
- IPCC (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, and L. A. Meyer (eds.). Intergovernmental Panel on Climate Change, Geneva. <http://www.ipcc.ch/report/ar5/syr/>.



- Kates, R. W. (2000). Cautionary tales: Adaptation and the global poor. *Climatic Change*, 45(1), 5–17. DOI:10.1023/A:1005672413880.
- Kehler Siebert, C., Klein, R. J. T., Biskupska, N., Dickin, S., Piman, T. and Vulturius, G. (2017). *Adaptation Futures 2016: Practices and Solutions 2016 – Conference Synthesis*. <http://www.adaptationfutures2016.org>.
- Klein, R.J.T., Schipper, E.L.F., Dessai, S. (2005). Integrating mitigation and adaptation into climate and development policy: three research questions. *Environmental Science and Policy* 8(6), 579–588. DOI:10.1016/j.envsci.2005.06.010.
- Möhner, A., Klein, R.J.T. (2007). *The Global Environment Facility: Funding for Adaptation or Adapting to Funds*. Climate and Energy Programme Working Paper, Stockholm Environment Institute, Stockholm.
- Mortimore, M.J. (1998). *Roots in the African Dust*. Cambridge University Press, Cambridge, UK, DOI:10.1017/CBO9780511560064.
- Pauw, W. P. (2015). Not a panacea: private-sector engagement in adaptation and adaptation finance in developing countries. *Climate Policy*, 15(5), 583–603. DOI:10.1080/14693062.2014.953906.
- Pielke, R. A. (1998). Rethinking the role of adaptation in climate policy. *Global Environmental Change*, 8(2), 159–70. DOI:10.1016/S0959-3780(98)00011-9.
- Roncoli, C., Ingram, K., Kirshen, P. (2001). The costs and risks of coping with drought: livelihood impacts and farmers' responses in Burkina Faso. *Climate Research*, 19(2), 119–132. DOI:10.3354/cr019119.
- Schipper, E. L. F. (2006). Conceptual history of adaptation in the UNFCCC process. *Review of European Community and International Environmental Law*, 15(1), 82–92. DOI:10.1111/j.1467-9388.2006.00501.x.
- Schipper, E. L. F. and Burton, I., eds. (2008). *The Earthscan Reader on Adaptation to Climate Change*. Routledge, London.
- Shue, H. (1999). Global environment and international inequality. *International Affairs*, 75(3), 531–545. DOI:10.1111/1468-2346.00092.
- Smit, B., Burton, I., Klein, R.J.T., Street, R. (1999). The science of adaptation: a framework for assessment. *Mitigation and Adaptation Strategies for Global Change*, 4(3–4), 199–213. DOI:10.1023/A:1009652531101.
- Smit, B., Burton, I., Klein, R. J. T. and Wandel, J. (2000). An anatomy of adaptation to climate change and variability. *Climatic Change*, 45(1), 223–51. DOI:10.1023/A:1005661622966.
- Smit B., Pilifosova, O., Burton, I., Challenger, B., Huq, H., Klein, R.J.T., Yohe, G. (2001). Adaptation to climate change in the context of sustainable development and equity. In: *Climate Change 2001: Impacts, Adaptation and Vulnerability*, McCarthy, J.J., Canziani, O.F., Leary, N.A., Dokken, D.J., White, K.S. (eds.), Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK, 877–912.
- Smit, B., Wandel, J. (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, 16(3), 282–292. doi:10.1016/j.gloenvcha.2006.03.008.
- Smith, J. B., Klein, R. J. T., Huq, S., eds. (2003). *Climate Change, Adaptive Capacity and Development*. Imperial College Press, London.
- Smith, J. B. and Lazo, J. K. (2001). A summary of climate change impact assessments from the U.S. Country Studies Program. *Climatic Change*, 50(1–2), 1–29. DOI:10.1023/A:1010642529072.
- The World Bank (2010). *Economics of Adaptation to Climate Change: Social Synthesis Report*. 63912. Washington, DC. <http://documents.worldbank.org/curated/en/853971468160501931/Economics-of-adaptation-to-climate-change-social-synthesis-report>.
- UNEP (2016). The Adaptation Finance Gap Report 2016. United Nations Environment Programme, Nairobi. <https://climateanalytics.org/publications/2016/the-adaptation-gap-report-2016/>
- Verheyen, R. (2002). Adaptation to the impacts of anthropogenic climate change – the international legal framework. *Review of European Community and International Environmental Law*, 11(2), 129–43. DOI:10.1111/1467-9388.00312.





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