

The London School of Economics and Political Science



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OF ECONOMICS AND
POLITICAL SCIENCE ■

Assessing the implementation progress of adaptation to climate change

Timo L. Leiter

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of the London School of Economics and Political Science for the degree of

Doctor of Philosophy

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Word count (excluding references and Annexes as per the regulations cited below)

Chapter 1	12,631 words
Chapter 2	7,746 words
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Chapter 9	899 words
Total	~60,000 words

Permitted according to LSE'S Regulations for Research Degrees (June 2022, para 51.1) are 100,000 words excluding bibliography and Annexes.

Abstract

2023 is set to be the warmest year on record.¹ Extreme weather events are getting more severe and more frequent, making adaptation to climate change ever more important. Literature on climate adaptation has strongly increased in quantitative output, but only a fraction of it focuses on actual implementation and its effects. Little empirical evidence is available on whether we are adapting. This knowledge gap has been referred to as a **'grand challenge'** of adaptation research (Berrang-Ford et al., 2019). To improve our understanding of global progress on adaptation, this thesis includes novel empirical accounts of the United Nations (UN) climate change negotiations through multi-year participant observation, examining the rule-setting process for disclosure of adaptation information and the decisions taken on climate adaptation since the adoption of the Paris Agreement in 2015. This thesis also examines whether countries are tracking the implementation of their National Adaptation Plans (NAPs) and to what extent adaptation projects are implemented by the multilateral funds under the UN Framework Convention on Climate Change (UNFCCC), namely the Adaptation Fund, the Global Environment Facility, and the Green Climate Fund. These evidence-based accounts are contrasted to assessments based on countries' stated intentions which are shown to overestimate progress by up to a factor of four. This thesis also includes contributions to two global environmental assessments, the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) and the Adaptation Gap Report of the UN Environment Programme (UNEP). Its findings are highly policy relevant including in the context of the Global Goal on Adaptation and its framework. This thesis produced novel findings and generated two new datasets including an inventory of over 100 policy documents in more than ten languages. It makes significant contributions to the 'grand challenge' of better understanding global progress on adaptation.

¹ <https://wmo.int/news/media-centre/2023-shatters-climate-records-major-impacts>

Included articles

This PhD thesis includes the following **single-authored journal articles**:

Leiter, T. (2023). What influences transparency rules in global environmental governance? Insights from transparency under the Paris Agreement. Chapter 4 of this thesis – prepared for submission to a leading environmental politics journal.

Leiter, T. (2023b). Nationally determined contributions (NDCs) as a governance instrument – accounting for politics, negotiation progress, and related mechanisms under the Paris Agreement. *Environmental Politics*, published online 19 September 2023.
<https://www.tandfonline.com/doi/full/10.1080/09644016.2023.2252312>

Leiter, T. (2022). Too little, too slow? Climate Adaptation at the United Nations Climate Change Negotiations since the Adoption of the Paris Agreement. *Carbon & Climate Law Review*, 16(4), 243-258. <https://cclr.lexxion.eu/article/CCLR/2022/4/5>

Leiter, T. (2021). Do governments track the implementation of national climate change adaptation plans? An evidence-based global stocktake of monitoring and evaluation systems. *Environmental Science & Policy*, 125, 179-188.
<https://www.sciencedirect.com/science/article/pii/S1462901121002379>

- This article provides the empirical basis for section “17.5.2.4 Empirical Evidence of National Adaptation M&E Systems” in the IPCC Sixth Assessment Report, Working Group II, Chapter 17. Table 17.9 in the report draws on Tables 2 & 3 of the article.

I also contributed to the following **co-authored articles**:

Berrang-Ford, L., (...) Leiter, T. (...) et al. (2021). A systematic global stocktake of evidence on human adaptation to climate change. *Nature Climate Change*, 11, 989-1000.
<https://www.nature.com/articles/s41558-021-01170-y>

- This article provides the empirical basis for section “16.3.2 Adaptation-related Responses by Human Systems” in the IPCC Sixth Assessment Report, Working Group II, Chapter 16.
- I am within the top 10% by contribution of the over 120 authors who together form the Global Adaptation Mapping Initiative

Hughes, H., (...) Leiter, T. (...) et al. (2021). Global environmental agreement-making: Upping the methodological and ethical stakes of studying negotiations. *Earth System Governance*, 21, 100121. <https://www.sciencedirect.com/science/article/pii/S2589811621000252>

In addition, I also **co-authored a book chapter** documenting experiences and observations from studying global environmental negotiations:

Langlet, A., Leiter, T., Tessnow-von Wysocki, I., & Thew, H. (2023). Experiences. Reflecting and Comparing Research on Negotiations. In: Vadrot, A., & Hughes, H. (Eds.): *Conducting Research on Global Environmental Agreement-Making*, pp.249-266. Cambridge University Press.
<https://www.cambridge.org/core/books/abs/conducting-research-on-global-environmental-agreementmaking/experiences/C0C17ADB820EC490BCA4FA3D8CB9E542>

Further publications written during my PhD studies, including submissions to UNFCCC, technical papers and a commentary co-published in the journal *Evaluation* are cited in this thesis and included in the reference list (e.g. Leiter et al., 2019; Leiter et al., 2021; Leiter et al., 2022a/b; Leiter, 2023a).

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List of Acronyms and Abbreviations

AR	Assessment Report (of the IPCC)
AR5	Fifth Assessment Report of the IPCC
AR6	Sixth Assessment Report of the IPCC
CLA	Coordinating Lead Author of an IPCC report chapter
CO ₂	Carbon dioxide
COP	Conference of the Parties
EEA	European Environment Agency
ETF	Enhanced Transparency Framework (under the Paris Agreement)
EU	European Union
GGA	Global Goal on Adaptation (under the Paris Agreement)
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (Germany's state-owned agency for international development cooperation)
IDS	Institute of Development Studies
IIED	International Institute for Environment and Development
IPCC	Intergovernmental Panel on Climate Change
LDC	Least Developed Country
M&E	Monitoring & Evaluation
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution (under the Paris Agreement)
NGO	Non-government organisations
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
SDG	Sustainable Development Goal
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States of America
SAR	Second Assessment Report (of the IPCC)
TAR	Third Assessment Report (of the IPCC)
WMO	World Meteorological Organization

Notes on Formatting

Quotation marks

- All direct quotes are indicated in double quotation marks ("Quote")
- Single quotation marks are only used if a word or a pair of words is being emphasised. For example, in the sentence: "The term 'adaptation' first appeared in...."
- It is worth noting that in my native language German, only double quotation marks are being used. The occasional use of single quotation marks in this thesis is my attempt at adapting to what seems to be common in British punctuation. However, all direct quotes in this thesis are in double quotation marks.

Included articles

- All three single-authored articles that have been published during my PhD were published as gold open access under a Creative Commons licence which makes it possible to include them in their final layout in this thesis.
- One implication is that the numbering of Figures and Tables in each article is independent of the numbering in this thesis. This is being accounted for in the List of Figures and in the List of Tables.

Citation style

- This thesis follows the APA referencing style.
- The published articles use the style of the respective journal.
- Chapter 4 uses the style of the targeted journal, but its reference list is still partly in APA style.

Reference list

- The reference list includes all references that are cited in this thesis including those of the published research articles except for references cited in chapter 3 (my contributions to the IPCC AR6). References of chapter 3 are included in the reference list of chapter 17 of the IPCC (2022a, pp.2622-2654) which has not been added to this thesis due to its length.
- If a reference has more than five authors, it is listed as "First author, et al."
- URLs are only included for references that are not journal articles, books or edited volumes.

Acknowledgements

This PhD thesis is the result of a long and fruitful journey (see Prologue). It would not have been possible without the love and support from my family, especially my parents and their partners, and my grandparents who started saving for my education when I was still a child.

I also owe a lot to my closest friends and fellow PhD students who have always provided me with support, joy and inspiration.

A big thank you goes to my two supervisors, Declan Conway and Tim Forsyth, for their guidance, valuable feedback and trusted relationship over these five years. I would also like to thank all my former mentors, especially Bernd Siebenhüner who suggested in 2007 that I should focus my studies on adaptation to climate change. I am also grateful to all the professors, tutors, and friends at each of the four universities I studied at – they have all contributed to making this thesis possible. I am also immensely grateful to the many close colleagues, friends and mentors at Germany's international development agency (GIZ) of whom I have learned so much and who enabled me to excel in my job and thereby to lay the groundwork for this thesis.

In addition to GIZ, I am also very grateful for the close and trustful collaboration with the adaptation team at the International Institute for Sustainable Development (especially the secretariat of the NAP Global Network), UNEP and its Copenhagen Climate Centre, and the Adaptation Division of the UNFCCC secretariat.

Furthermore, I learned a lot from the stories of local residents, officials and scientists in the many developing countries that my job at GIZ enabled me to travel to. Hearing their first-hand accounts about the impacts of climate change and how they affect their livelihoods was very insightful and a powerful reminder of the importance of effective adaptation and mitigation.

At LSE, I am especially thankful to the management team and colleagues of the Grantham Research Institute where I always felt a sense of purpose and belonging. I am also very grateful for the opportunity to learn from some truly outstanding professors from several LSE departments during the coursework phase of the PhD programme.

Special thanks go to my PhD examiners Aarti Gupta and Ben Orlove for thoroughly engaging with my thesis and for their very good questions and comments during the examination. Their feedback has been very valuable and will inform my future publications.

Finally, I would like to express my deep gratitude to the UK Economic and Social Research Council for funding my PhD studies.

Prologue

Oldenburg, Germany, 2007

In spring of 2007, I sat in the office of Prof. Bernd Siebenhüner at the University of Oldenburg in Northwest Germany. I had chosen to study in Oldenburg, 400 km away from home, because the University of Oldenburg was a pioneer in environmental and sustainability studies, offering degree programmes that were unique at the time in Germany. In 2006, I had become a research assistant to Prof. Siebenhüner, having earlier followed his call for volunteers to support the *Berlin Conference on the Human Dimensions of Global Environmental Change* in December 2005. Now, in 2007, I was about to complete the undergraduate part of my studies and was planning to undertake a master's degree in Australia. The meeting with Bernd was about potential topics for my Master thesis. Bernd suggested looking into adaptation to climate change since, as he explained, most research on climate change had focused on mitigation while adaptation was understudied. His recommendation would come to shape the direction of my career and had a profound impact on my life.

Sydney, Australia, 2010

When I started working on my Master thesis, the two books commonly read in adaptation courses were “The Earthscan Reader on Adaptation to Climate Change” edited by Lisa Schipper and Ian Burton (2009), and the book “Adaptation to Climate Change – From resilience to transformation” by Mark Pelling (2011). The Earthscan reader included a selection of eminent articles that evolved from the first approximately 15 years of dedicated scholarship on this topic, including an article on adaptation in developing countries co-authored by Declan Conway. Little did I know that Declan would become my PhD supervisor eight years later. I also certainly didn't anticipate that I would write a successor article to Lisa Schipper's contribution to the Earthscan reader (Schipper, 2006) through my review of adaptation in the UN climate change negotiations since the adoption of the Paris Agreement (Leiter, 2022 – Chapter 6 of this thesis).

Among the articles I cited in my Master thesis, one stood out for its unique perspective. It was an article exploring three historical cases of human adaptation, authored by Ben Orlove (2005) who has kindly agreed to serve as one of my PhD examiners.

Frankfurt, Germany, 2011

Having completed my master's degree in Australia and my German degree, I was keen to pursue a PhD. To bridge the time until the next intake in the winter term, I applied for an internship at GIZ, Germany's state-owned implementing agency for international development. The project I applied to (“Inventory of Methods for Adaptation to Climate Change”) connected government officials from emerging economies. The job was really exciting – many of these partner countries had just begun looking into adaptation and we developed knowledge products and facilitated peer learning. What was intended as just a six-months internship became a fulfilling job for more than six years.

Nairobi, Kenya – 9th Community-based Adaptation Conference, 27 April 2015

I had just completed my first single-authored journal article and had been invited by the International Institute for Environment and Development (IIED) to present its findings at the opening plenary of the 9th Community-based Adaptation (CBA) conference. That year's CBA conference was on the theme of 'Measuring and enhancing effective adaptation'¹, the topic I had specialised in. During a coffee break, a participant approached me in the hallway, and we talked about adaptation monitoring and evaluation. He gave me his card. It was Tim Forsyth, a Professor at LSE.

¹ <https://www.iied.org/cba9-9th-international-conference-community-based-adaptation-cba9>

Shanghai, China, August 2015

After co-facilitating the “Regional training workshop on national adaptation plans (NAPs) for the Asian region” in Yangon, Myanmar in August 2015 organised by the Least Developed Countries Expert Group under UNFCCC, I visited a friend who worked in Shanghai. Following the encounter with Tim, I explored LSE’s website and decided to apply for a PhD programme – but it wasn’t to be for the time being.

Eschborn, Germany, Headquarters of GIZ, autumn 2015

By now I had been almost four years in GIZ’s climate policy team and was increasingly being asked what field office I would aim to move to (it is common at GIZ to shift every few years between head office and field office). I had been reluctant to switch jobs since I had been working closely with GIZ’s delegation to UNFCCC including participating in the UN climate change negotiations in Bonn in the session before the crucial Paris COP in December 2015. I told my boss that I didn’t want to switch jobs at such a pivotal moment. Yet, through an unexpected request from the Tanzanian government, an opportunity arose to support Tanzania in its National Adaptation Plan (NAP) process. Tanzania had been the first LDC and the first country outside Europe I had travelled to at age 18, and I felt an emotional connection.

Pretoria, South Africa, 12 March 2016

Since 2013, I had been closely collaborating with South Africa’s Department for Environmental Affairs and had helped to design the adaptation section of its annual National Climate Change Report (Harvey et al., 2017). A close friend of mine whom I had consulted about the job offer in Tanzania argued that I couldn’t miss this opportunity. He was right, and I am very grateful for his advice. So, on that day, I submitted my application from a hotel lobby in Pretoria. The PhD had to wait.

Dar es Salaam, Tanzania, 28 March 2017

I had just been a few months into my new position heading GIZ’s support to the Tanzanian government on national adaptation planning when we received a meeting request from the DFID-funded research project “Future Climate for Africa”. On 28 March, its principal investigator came to our office. It was Declan Conway. Little did he know that I was planning to apply to LSE once my post in Dar es Salaam was completed.

London, 19 December 2017

Shortly before the Christmas holidays, I managed to schedule a trip to London to meet with Michal Nachmany – a veteran staff member of the Grantham Research Institute at LSE who invited Declan along for lunch. At that lunch, I asked Declan out of the blue whether he’d be willing to be my PhD supervisor. He agreed, and I prepared my research proposal in the few weeks that were left until the application deadline.

Amman, Jordan, 27 March 2018

One morning after a capacity building workshop on NAPs for government officials in Jordan, having had a terrible night suffering from food poisoning, I received an email confirming a PhD scholarship from the UK Economic and Social Research Council. Securing funding was vital to realize my PhD. All pieces had come together. I collapsed back to bed.

I finally registered as a PhD student at LSE in September 2018.

1 Introduction

1.1 Setting the scene

During the final months of writing this thesis between June and September 2023, extreme weather events were in the news practically every day. Southern Europe and Northern Africa experienced the highest temperatures ever recorded¹; Greece suffered from the largest wildfire ever recorded in the European Union just to be followed by torrential rains which in some locations amounted to 1.5 years of rainfall purring down in a single day.² Since June 2023, Canada has experienced its worst wildfire season with more than 15 million hectares affected, six times the 10-year average of 2.5 million hectares.³ Meanwhile, in the Southern Hemisphere where it is winter at this time of year, Argentina, Chile and Paraguay have been gripped by a ‘winter heat wave’ reaching 30°C in Buenos Aires, breaking an eighty-one year old record.⁴ Montevideo, the capital of Uruguay, is battling a historic drought that threatens the water supply of its residents.⁵ This list is far from exhaustive.

According to the World Meteorological Organisation (WMO), June 2023 had the hottest week on record and July 2023 was the hottest month ever recorded – closely followed by August 2023 as the second warmest month and the hottest ever August (WMO, 2023a; WMO, 2023b).⁶ The speed at which one record breaks the previous one and the increasing magnitude by which records are broken is certainly a reason for concern. These adverse effects of climate change reinforce the urgency for peaking greenhouse gas emissions from human activities before 2030 – a situation that is far away from where current climate policies are projected to lead to (UNEP, 2022a). The synthesis report of the technical phase of the first Global Stocktake under the Paris Agreement confirms: “global emissions are not in line with modelled global mitigation pathways consistent with the temperature goal of the Paris Agreement” (UNFCCC, 2023, paragraph 9). “Not in line” is a diplomatic understatement of just how far off the global community is from remaining within a carbon budget that is consistent with limiting global warming even to 2°C above pre-industrial levels (see 1.2).

In addition to the much-needed transformation of energy, transport, housing and food systems, “increased adaptation action as well as enhanced efforts to avert, minimize and address loss and damage are urgently needed to reduce and respond to increasing impacts” (UNFCCC, 2023, paragraph 29). In this context, it is puzzling how little is known about how effective implemented adaptation actions have been. While literature on adaptation has exploded in quantitative output (see 1.3.3), only a fraction of it has studied actual adaptation and even less literature has examined the impacts of adaptation actions (see e.g. the findings of the Global Adaptation Mapping Initiative in Berrang-Ford et al., 2021). In addition, critical narratives of adaptation have increased in recent years, highlighting how vulnerable populations are failed by initiatives that shift rather than reduce

¹ The Independent, 20 June 2023: “European heatwave - latest updates as red alerts and record temperatures continue”. <https://www.independent.co.uk/news/world/europe/europe-heatwave-weather-temperatures-latest-b2378620.html>

² WMO, 12 September 2023: “Storm Daniel leads to extreme rain and floods in Mediterranean, heavy loss of life in Libya”. <https://public.wmo.int/en/media/news/storm-daniel-leads-extreme-rain-and-floods-mediterranean-heavy-loss-of-life-libya>

³ CBC News, 4 September 2023: “World on Fire: 2023 is Canada's worst wildfire season on record — and it's not over yet”. <https://www.cbc.ca/radio/ideas/world-on-fire-canada-s-worst-wildfire-season-on-record-1.6946472>

⁴ New York Times, 3 August 2023: “Heat Wave Grips Portions of South America in the Middle of Winter”. <https://www.nytimes.com/2023/08/03/world/americas/south-america-chile-heat-wave-winter.html>

⁵ Reuters, 30 June 2023: „In parched Uruguay, tensions rise as water levels fall”. <https://www.reuters.com/world/americas/parched-uruguay-tensions-rise-water-levels-fall-2023-06-30/>

⁶ Copernicus, 6 September 2023: “August 2023 second warmest month closes the warmest summer”. <https://climate.copernicus.eu/august-2023-second-warmest-month-closes-warmest-summer>

vulnerability, or how actions in the name of adaptation serve to uphold the interests of powerful groups and maintain structures that perpetuate inequality (see 1.3.5).

Despite a burgeoning body of literature on adaptation and despite billions spent on what supposedly helps vulnerable people to better deal with the adverse effects of climate change, little is known about the implementation progress of adaptation and its outcomes. The first Global Stocktake under the Paris Agreement did not change this situation. This deficit points to the inherent challenges of assessing adaptation, from contestations of its scope and meaning over difficulties in measuring the dynamic states of vulnerability and resilience, to the potential of maladaptation (see 1.3.4, 1.3.6, and 2.3.3).

Research that aims to assess adaptation progress at the national or global level has often reverted to analysing easy-to-access policy documents and country submissions to the United Nations (UN) that merely contain statements of intent rather than examining evidence of actual practices. As one of my research articles shows, such intention-based assessments can lead to substantially overestimating actual government action – in the case I examined, the difference was up to a factor of four (Leiter, 2021a). My research also shows that simplistic indicators, including some of the indicators of the UN Sustainable Development Goals, can lead to a false sense of achievement (ibid.). Furthermore, research of the UN climate change negotiations, the central site of global agreement-making on this matter, also often relies on remote document analysis rather than on observations of the actual negotiation processes and politics that shape the outcome.

While the need for research that advances understanding of the implementation of adaptation has repeatedly been pointed out (see 1.5.1), advances on this ‘grand challenge’ of adaptation research have been slow. I have therefore devoted my PhD to address this gap, especially in regard to the understudied areas of implementation by national governments and globally at the UN climate change negotiations. This PhD thesis contains my original single-authored articles published in *Environmental Science & Policy*, *Environmental Politics*, *Carbon & Climate Law Review*, and one prepared for a leading environmental politics journal. In addition, I have contributed to two co-authored articles and participated in two large international research projects, the Global Adaptation Mapping Initiative and a collaboration under the Earth System Governance project.⁷

This introduction chapter provides detailed background that could not be included in the research articles due to their word limitation, but that is essential for studying the implementation progress of adaptation. It systematically introduces the topic beginning with a brief recap of the underlying policy problem (climate change) followed by an overview of the evolution of the concept of adaptation, its origins and critiques, how it has been influenced by the IPCC and UNFCCC, and how it relates to other concepts, especially vulnerability and resilience. The chapter concludes by presenting the rationale for the research topic and outlines the structure of the thesis.

1.2 Climate change

This PhD thesis – and indeed the entire field of adaptation to anthropogenic climate change⁸ – would not exist if humanity had not ‘interfered with the climate system’ – to paraphrase from the United Nations Framework Convention on Climate Change (UNFCCC) of 1992. Humanity has, since the industrial revolution, engaged in activities that lead to an increase in the concentration of greenhouse gases (GHGs) in the atmosphere, mainly through burning of fossil fuels and from land

⁷ The primary outputs that I contributed to are an article in *Nature Climate Change* (Berrang-Ford et al., 2021) and a book chapter published by Cambridge University Press (Langlet et al., 2023).

⁸ In contrast to human adaptation to changes in climatic conditions before the industrial revolution, see e.g. Orlove (2005).

use change including deforestation (see Figure 1). Greenhouse gases in the atmosphere reflect light back to the Earth's surface that would otherwise transcend into space. Increases of GHG concentrations in the atmosphere therefore cause the Earth's surface to warm.⁹ This way, humans literally 'turn up the heat'¹⁰ and cause changes to the climate system that have far reaching impacts for life on Earth (IPCC, 2022a). The role of the atmosphere for regulating Earth's surface temperature and the function of greenhouse gases was already discovered in the 19th century by Joseph Fourier and John Tyndall (Weart, 2008). While today's climate models are far more comprehensive and draw on decades of satellite observations¹¹, the physics of climate change and its possible magnitude have long been understood.

Awareness for climate change and its likely consequences gathered momentum during the 1980s which led to the establishment of the **Intergovernmental Panel on Climate Change (IPCC)** in 1988 under the World Meteorological Organisation (WMO) and under the United Nations Environment Programme (UNEP).¹² The first report of the IPCC published in 1990 called for negotiations to develop a global treaty on climate change which was reiterated by the 2nd World Climate Conference a few months later (Bodansky, 1992). In her speech at that conference, UK's then prime minister Margaret Thatcher¹³ said on 6 November 1990¹⁴:

"But the threat to our world comes not only from tyrants and their tanks. It can be more insidious though less visible. The danger of global warming is as yet unseen, but real enough for us to make changes and sacrifices, so that we do not live at the expense of future generations.

Our ability to come together to stop or limit damage to the world's environment will be perhaps the greatest test of how far we can act as a world community. No-one should underestimate the imagination that will be required, nor the scientific effort, nor the unprecedented co-operation we shall have to show. We shall need statesmanship of a rare order. It's because we know that, that we are here today."

Thirty years onwards tyrants and their tanks still present a threat to our world, and we definitely do live at the expense of future generations. The statement that climate change presents the greatest test to humanity has since been repeated many times. Yet, over thirty years later, we still have not passed the test.¹⁵ On the contrary, global GHG emissions have risen rapidly (see Figure 1). In fact, 42% of historical cumulative net CO₂ emissions since 1850 occurred in the three decades that followed the above quoted speech (IPCC, 2023, section 2.1.1). GHG emissions continue to rise, albeit at a lower annual growth rate (1.3% per year between 2010 and 2019 compared to 2.1% per year between 2000 and 2009) (ibid.). National climate legislation has contributed to slowing GHG

⁹ Details of this mechanism are described in introductory guides to climate change such as by Archer & Rahmstorf (2009, Chapter 2) and Rahmstorf & Schellnhuber (2019, Chapter 1).

¹⁰ A series of reports commissioned by the World Bank under the title "Turn down the heat" warns of the risks of a '4°C World' (World Bank, 2012).

¹¹ Edwards (2011) reviews the history of climate modelling.

¹² For an account of the historic developments that led to the establishment of the IPCC, see Agrawala (1998).

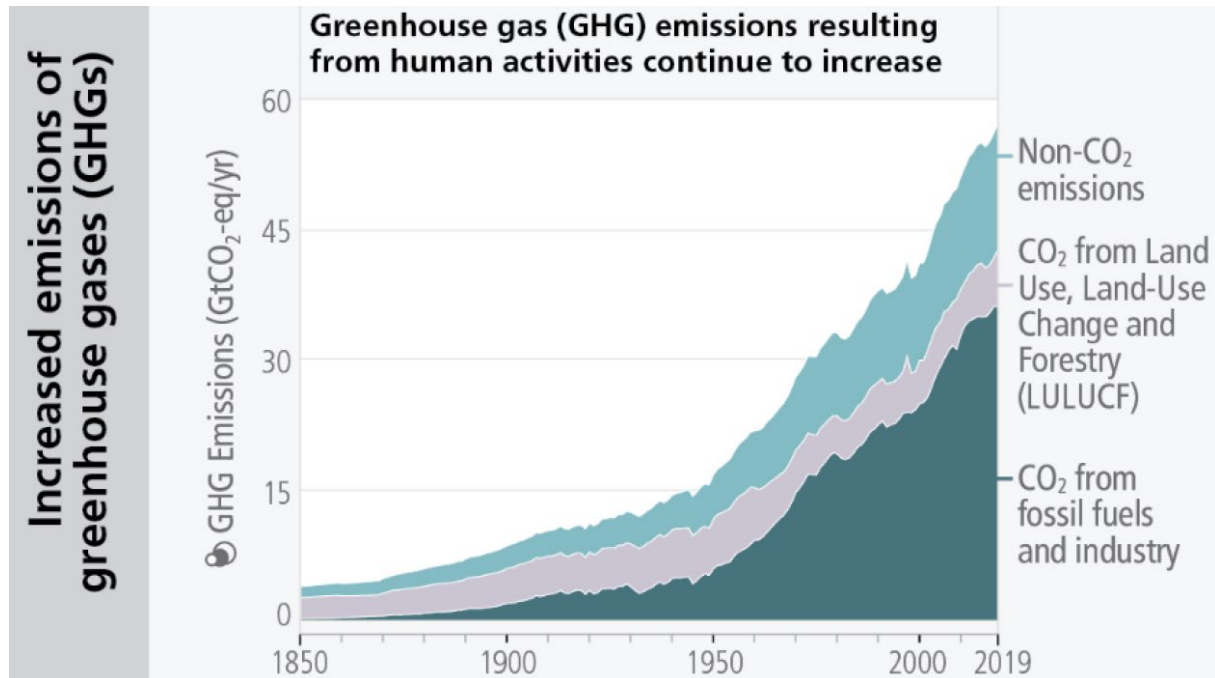
¹³ As Declan Conway recalls, "Tom Wigley gave a seminar in No. 10 in 1988 which generated a lot of momentum". Margaret Thatcher supported the establishment of the Hadley Centre for Climate Science.

¹⁴ Speech provided online by the Margaret Thatcher Foundation, accessed 29 July 2023: <https://www.margaretthatcher.org/document/108237>

¹⁵ The notion of „we“ lays the responsibility collectively on every single human being, even though a small minority of humanity is responsible for the great majority of cumulative GHG emissions (in 2019, the top 10% of emitting individuals accounted for almost half of global emissions; Chancel, 2022). Moreover, as Michael Mann points out in his book "The New Climate War" (Mann, 2021), the climate crisis cannot be effectively addressed by actions at the individual level. It requires systemic changes in energy generation, transportation, agriculture and land use.

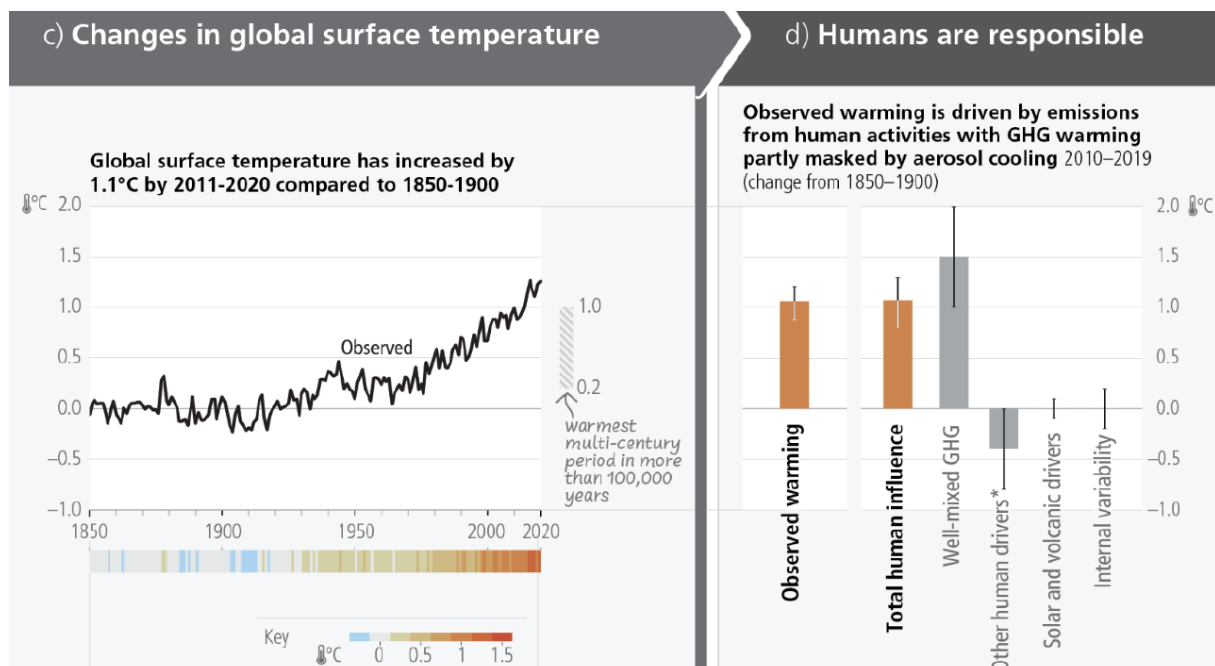
emission growth, causing a total emission reduction since 1999 that is approximately equivalent to one year's worth of global CO₂ output (Eskander & Fankhauser, 2020). Yet, far more is needed to pass the test (see below).

Figure 1: Greenhouse gas emissions from human activities since 1850.



Source: IPCC (2023, Figure 2.1 Panel a)

Figure 2: Changes in global surface temperature and attribution to human causes.



Source: IPCC (2023, Figure 2.1 Panels c and d).

As a result of the human interference with the climate system, global surface temperature has increased by 1.1°C in the decade 2010-2019 compared with 1850-1900 (see Figure 2 and IPCC, 2023, p.6). The warming is fully attributable to human causes (see Figure 2, Panel d), leaving the IPCC to conclude: “Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming” (ibid, headline message of section 2.1).

At the current level of warming, observed impacts are already intense. Extreme marine heatwaves described as “off the charts” were recorded in the North Atlantic Ocean while “global average sea surface temperatures reached unprecedented levels for June” (Copernicus Programme, 2023). At the same time, “Antarctic Sea ice reached its lowest extent for June since satellite observations began, at 17% below average” (WMO, 2023a). In the Arctic, the trend of declining sea ice volume¹⁶ is strongly negative – so strong that a scholar coined the term “Arctic death spiral”¹⁷. In fact, the decline in Arctic Sea ice has been so profound that “our planet has actually changed colour” – from glaring white to absorbing dark (Wadhams, 2017, p.2). Since darker surfaces absorb more energy from the sun, this change contributes to an acceleration of warming and is one of the feedback loops that drive the Arctic death spiral.¹⁸

„We are the first generation to feel the impact of climate change and the last generation that can do something about it.”

Barack Obama, Remarks at the U.N. Climate Change Summit (“Ban Ki-moon Summit”), 23 September 2014¹⁹

To pass the test of combating climate change, global emissions would need to fall by more than 40% by 2030 relative to 1990 levels for a 50% chance of limiting warming to 1.5°C by 2100 without overshoot (IPCC, 2022b). In contrast, the full implementation of countries’ current climate pledges is estimated to result in less than 4% of emission reductions by 2030 relative to 1990 (UNFCCC, 2022a). In fact, UNEP’s Emissions Gap Report shows that global GHG emissions continue to grow and have already surpassed the pre-pandemic level (UNEP, 2022a). Meanwhile, according to a recent analysis by WMO, a temperature increase of 1.5°C above pre-industrial levels is more likely than not (66%) to be temporarily breached **already by 2027** (WMO, 2023c).

Where does this leave us? First, at the realisation that tackling the climate crisis is urgent²⁰, very serious, and that decisions this decade are decisive if the temperature targets of the Paris Agreement are to be met (IPCC, 2022b).²¹ Second, at the need to acknowledge that the global adaptation gap defined as “the difference between actually implemented adaptation and a societally set goal” (UNEP, 2022b, p.VIII) cannot be closed in the absence of strong GHG emission reductions. In short: we cannot adapt our way out of the climate crisis. As temperature continues to rise, adaptation limits will be increasingly reached, making adaptation costly or even impossible (see IPCC, 2022a, section 16.4). This crucial linkage between mitigation and adaptation is recognized in the Paris Agreement in Article 7.4 (UNFCCC, 2015). Hence, while this PhD thesis focuses on implementation progress of adaptation, any progress needs to be considered against current and projected GHG emission levels and the associated climate change impacts.

¹⁶ Ice volume is a more robust and more significant indicator than average surface area.

¹⁷ It shows that the monthly Arctic Sea ice volume has been steadily declining since 1979 – see <https://www.arcticdeathspiral.org/>

¹⁸ For details how sea ice formation is affected by warming and on the various feedback loops that accelerate the decline in ice coverage and volume, see Wadhams (2017).

¹⁹ Obama attributes the quote to an unnamed American governor. Speech available at: <https://obamawhitehouse.archives.gov/the-press-office/2014/09/23/remarks-president-un-climate-change-summit>

²⁰ Wilson & Orlove (2021) examined the effects of urgency on decision making.

²¹ Noting that the two temperature targets of 1.5°C and 2°C of warming are associated with substantially different levels of adverse climate impacts (Schleussner et al., 2016).

1.3 Adaptation to climate change

1.3.1 Origins of the term ‘adaptation’

While ‘adaptation’ has been an established term in climate literature and policy for over twenty-five years, settlement on this particular term was far from self-evident. In the 19th century, the term was used over twenty times by Charles Darwin in his 1859 book “On the Origin of Species” to describe the process of evolution (Orlove, 2009). The term acquired negative connotations later that century when Darwin’s theories were purported to equally apply to the social realm (‘social Darwinism’) which was widely discredited (Burton, 1994). Gilbert White, an American geographer and pioneer of the field of hazard studies, therefore rejected the term in his pioneering 1945 book on flood management in favour of ‘human adjustment’ (Schipper & Burton, 2009). Notwithstanding these reservations, the term ‘adaptation’ became more commonly used in the climate change context by the 1980s, especially in the United States (US). For instance, the proceedings of a workshop that was held in 1988 by the independent think tank Resources for the Future in collaboration with US research and government agencies was entitled “Greenhouse Warming: Abatement²² and Adaptation” (Rosenberg et al., 1988). One of the chapters in the report discusses “Strategies for adaptation to greenhouse warming” in developing countries (Jodha, 1988).

Ben Orlove, who traced the origins of the concept of adaptation (Orlove, 2009), describes that its intention was captured in one of five activities foreseen by a draft resolution of WMO and UNEP for the establishment of the IPCC, but the resolution did not mention the term as such. Only the Second Assessment Report of the IPCC in 1997 carried ‘adaptation’ in the title of one of its Working Groups, and even then, it was a misnomer according to Robert Kates (1997) since less than 4% of the report was devoted to adaptation. It was only for the Third Assessment Report of the IPCC in 2001 to define adaptation in its glossary (IPCC, 2001).²³ The definition centers on the term of ‘adjustment’ similar to what had been proposed in 1945 by Gilbert White. It is also noteworthy that the term ‘adaptation’ was initially often used in plural (‘adaptations’), including in the title of the Working Group II report of the Second Assessment Report of the IPCC in 1995. The usage of the plural might have come from the way the term was used in the earlier concept of ‘environmental adaptations’. However, by the turn of the millennium it had become common to use it in singular in the climate change context, including in the title of the Working Group II contribution to the Third Assessment Report in 2001. Using its singular form has since remained the dominant practice.

1.3.2 Evolution of the concept of adaptation to climate change: 1980s until early 2000s

The meaning of the concept of adaptation changed over time, partly reflecting the evolution of the public debate and the state of knowledge on climate change. In the 1980s and early 1990s, a key research question was what the impacts of climate change would be, and if they would be severe enough to demand action. One of the two rationales for research on adaptation therefore was to estimate to what extent adaptation was likely to happen in order to determine the net impacts of climate change (Smithers & Smit, 1997; Smit et al., 2000). In fact, some scholars at the time still held the view that climate change would occur slowly and gradually, and that adaptation would therefore occur automatically. For instance, in response to a pioneering paper by Paul Waggoner who argued in 1992 “that the time has come to think of adaptation” (1992, p.137), Tarlock (1992, p. 181) countered: “The gradual nature of global climate change gives societies the luxury of carefully considering a wide menu of response options”. Regardless of whether the latter was still a reasonable position after the publication of the First Assessment Report of the IPCC in 1990, it

²² At the time, what today is commonly referred to as ‘mitigation’ was more commonly called ‘abatement’ or ‘limitation’.

²³ The glossary of the Second Assessment Report contains an entry for “adaptability” (IPCC, 1995, Appendix B).

certainly demonstrates ignorance towards the circumstances of developing countries. A more nuanced argument in this regard was that “today’s climatic variations do not allow the luxury of contemplating possible climate changes several decades hence” (Smithers & Smit, 1997, p. 130). The latter refers to what Ian Burton (2004) termed the “adaptation deficit” of developing countries to climate variability and leaves open that climate impacts might warrant additional action in the future. Evidently, the debate had not yet reached the stage where the influence of climate change on sustainable development was considered to be a crucial factor.

Indeed, research at the end of the 1980s and in the 1990s about possible responses to global warming largely concentrated on mitigation of GHG emissions. Research on adaptation was discouraged from two opposing ends: those who argued that adaptation would be smooth and taking place autonomously – as exemplified by the above quote from Tarlock (1992) – and those who argued that addressing adaptation would be diverting attention away from mitigation (Kates referred to these two positions as “Adaptationists” and “Preventionists”; Kates, 1997). In fact, Burton (1994) describes that in the early 1990s “it was dangerous to talk too enthusiastically of adaptation” since the speaker would be suspected of seeking to avoid mitigation (p.14). Pielke (1998) outlines three further reasons that hampered adaptation research: high uncertainty about the scale of impacts to adapt to, engagement in adaptation research being perceived as ‘passive acceptance’ rather than an active response, and lack of clarity on how to use adaptation as a bargaining chip in global negotiations. By the turn of the millennium, it had become more widely accepted that adaptation was *complementary* rather than in opposition to mitigation, a shift that was reinforced through the Third Assessment Report of the IPCC in 2001.

At the global policy arena, the UNFCCC from 1992 used the term ‘adaptation’ but did not define it (United Nations, 1992). Australia and New Zealand had proposed “to develop a research and policy framework on adaptation that would, among other things, elaborate an agreed definition of adaptation”, but the proposal was not taken up (Schipper, 2006, p.88). For the time being, the focus remained on mitigation. The first treaty under the UNFCCC, the Kyoto Protocol from 1997, was practically exclusively devoted to mitigation. The first Conference of the Parties (COP) to the UNFCCC in 1995 defined three stages of adaptation which can be summarised as I.) Planning and knowledge generation, II.) Preparations to enable action, and III.) Implementation of measures (UNFCCC, 1995, Decision 11/CP.1). Interestingly, the decision text basically states that the time for stages II and III had not yet come in 1995, and that a future COP might decide when to move to the next stage. Indeed, adaptation was only substantially taken up six years later at COP7 through the Marrakesh Accords which established two dedicated funds for adaptation in developing countries under the Global Environment Facility that were mandated to fund capacity building and pilot projects on adaptation (UNFCCC, 2001, Decision 5/CP.7 and Decision 7/CP.7).

1.3.3 Evolution of literature on adaptation to climate change







The initial focus on impact assessments in the late 1980s and the 1990s was followed by what Burton et al. (2002) describe as a ‘second generation’ of adaptation research starting at the turn of the millennium. Burton et al. characterise this second generation as having a stronger focus on “policy” by which they mean a systematic process towards action (rather than national adaptation policy and governance). An influential initiative in this regard was the “Adaptation Policy Framework” published by the United Nations Development Programme (UNDP) in 2005 (Lim et al., 2005)²⁴ which presents a stepwise approach towards adaptation action with detailed guidance for each step. The significance of this work was on the one-hand the shift towards facilitating action and on the other hand an agenda setting for the importance of adaptation in international development cooperation. The

²⁴ According to Burton et al. (2002), a draft of the policy framework was available earlier as Burton & Lim (2001).

latter also became a focus of the adaptation and development research communities (e.g., Kates, 2000; Adger et al., 2003; and, for instance, a special issue in the *IDS Bulletin* Vol.35(3) in 2004).

A team of the Stockholm Environment Institute categorised adaptation research into four generations (Klein et al., 2017; see Table 1). The first one is practically identical to Burton et al.'s (2002) description of the first generation. Klein et al. mention "policy" as a new focus of the third rather than the second generation which corresponds to what would today be understood under "adaptation policy" (i.e. national and subnational adaptation policy and governance, see e.g. Massey & Huitema, 2013). The time periods of these generations broadly align with a systematic mapping of the adaptation literature by Nalau & Verrall (2021) who distinguish three periods: 'early research' (1978–2010), 'emerging research' (2011–2015) and 'latest research' (2016–2020). Overall, while some of the details of the categorizations could be debated, the generations shown in Table 1 provide a good approximation of the evolution of adaptation literature over time. Additional influential topics not covered in Table 1 are aspects of justice (e.g. Paavola & Adger, 2006), maladaptation (e.g. Barnett & O'Neill, 2010), community-based adaptation (e.g. Forsyth, 2013), ecosystem-based adaptation (Jones et al., 2012) and, more recently, locally-led adaptation (Vincent, 2023) (see Orlove, 2022 for a detailed account of the evolution of adaptation literature). Table 1 also shows how these generations relate to the publication dates of IPCC Assessment Reports and of the Paris Agreement (cf. section 1.3.7 on the influence of the IPCC and UNFCCC on adaptation research and policy).

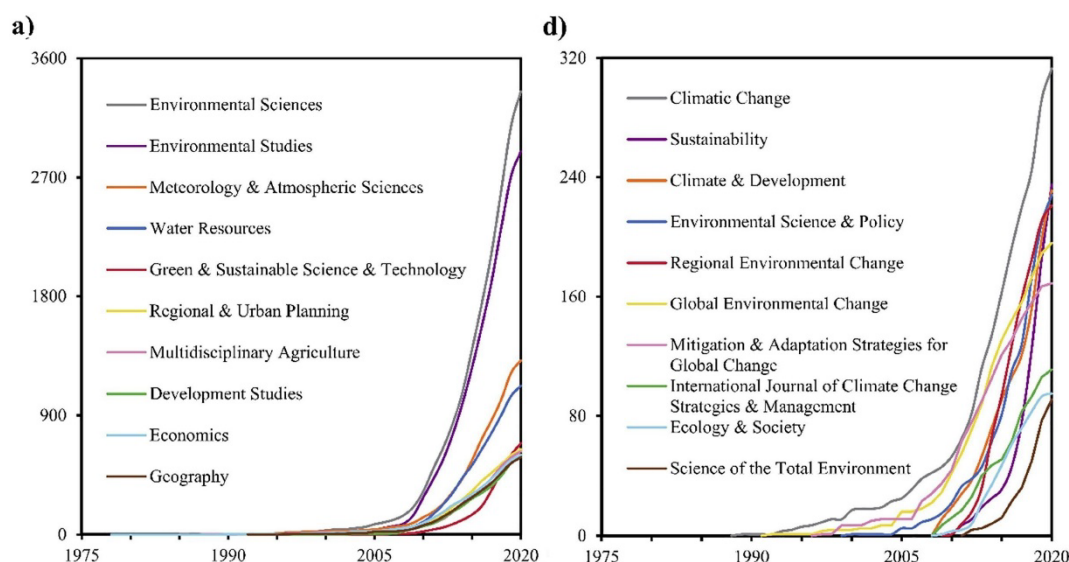
Table 1: Generations of adaptation research.

	Generation of adaptation research					
Authors	First	Second	Third	Fourth		
Burton et al. (2002)	~1995-2001	Starting ~2001	N/A	N/A		
	Focus on impact assessments	Focus on “Policy” (meaning: a systematic process towards action)				
Klein et al. (2017)	1990s	Starting ~2001	Starting ~2010	Starting ~2016		
(Selected entries of their Table 1; partly shortened to fit this Table)	Mainly descriptive : <ul style="list-style-type: none">• Potential impacts• Who is affected?• Possibility of adaptation	<ul style="list-style-type: none">• Social factors• Adaptive capacity New: normative aspects <ul style="list-style-type: none">• What does successful adaptation mean?	<ul style="list-style-type: none">• What drives or reduces vulnerability?• Adaptation planning New: policy questions <ul style="list-style-type: none">• What is needed to support adaptation?	<ul style="list-style-type: none">• How does adaptation work?• Transformative change• Mainstreaming• Non-state actors New: implementation <ul style="list-style-type: none">• Knowledge for implementation• How to measure outcomes		
Key events ²⁵	 SAR	 TAR	 AR4	 AR5	 Paris Agreement	 AR6

²⁵ SAR = Second Assessment Report (1995); TAR = Third Assessment Report (2001); AR = Assessment Report

Regarding quantitative development, literature on adaptation to climate change begun to slowly gather pace at the end of the 1990s and grew rapidly from around 2005 onwards, reaching a 540% increase in the period 2006–2010 compared to the previous five years (Nalau & Verrall, 2021). Between 2009 and 2019, it continued its rapid growth at a rate of about 20% per year (Sietsma et al., 2021). Nalau & Verrall (2021) estimate an even higher average annual growth rate of 28.5%. Figure 3 shows the at times exponential growth of the adaptation literature broken down by subject area (left panel) and by the ten journals with the highest quantity of identified articles (right panel). At its average growth rate, Nalau & Verrall (2021) predict that the adaptation literature will have doubled again in size by early 2022. This explosive growth creates a challenge for filtering for high quality research, detecting truly novel insights and synthesising findings across several thousand papers. It has therefore been suggested to use new technologies such as machine learning and language models (Biesbroek et al., 2020), as have been employed by Sietsma et al. (2021) in their mapping of the adaptation literature.

Figure 3: Growth of the adaptation literature by subject area and by journals with the highest quantity of related output for the period 1978-2020.



Source: Diagram adopted from Nalau & Verrall (2021), Figure 1, Panels a) and d).

1.3.4 Definitions and interpretations of adaptation to climate change

The definition of adaptation in the IPCC Assessment Reports has remained almost identical since its first introduction in 2001 – only nuances have changed.²⁶ Its **four core elements** are:

1. **Adjustment** (since AR5: *process of adjustment*)
2. “to **actual or expected climate and its effects**” (TAR and AR4 still contained the word ‘stimuli’ after ‘climate’; it was dropped from AR5 onwards)
3. “in **natural or human systems**” (AR5 and AR6 use separate sentences when referring to natural and human systems. The latest modification in AR6 accounts for the fact that natural systems cannot anticipate future change).
4. “to **moderate harm or exploit beneficial opportunities**” (AR5 also included: “or avoid harm”)

²⁶ The definitions are identical in the TAR and AR4 (IPCC, 2001, p. 982, and identical in: IPCC, 2007, p.869). Between AR5 and AR6, the definition only changed slightly in regard to the parts that apply to human systems and to natural systems (see IPCC, 2014b, p.1758; and IPCC, 2022a, p.2898).

The role of the IPCC and critiques of its definition are further discussed in section 1.3.7.

The influential article “An anatomy of adaptation to climate change and variability” (Smit et al., 2000), partly building on the earlier article “Human adaptation to climate variability and change” (Smithers & Smit, 1997), used the following questions to further dissect adaptation:

- Adaptation to what?
- Who or what adapts?
- How does adaptation occur?
- How good is adaptation?²⁷

Mark Pelling adopted the first three questions in the introduction of his influential book “Adaptation to climate change. From resilience to transformation” and added as a fourth question: “What are the limits to adaptation?” (Pelling, 2011, p.13) (see section 1.3.6 on limits to adaptation).

The continuity of IPCC’s definition of adaptation over a twenty-year timespan and the simple appeal of the above listed questions might suggest broad agreement on the concept of adaptation, its scope and meaning. But quite the contrary, there has been a strong debate and very different views of adaptation continue to coexist. The main **points of contention** are:

- Whether risk is primarily or exclusively determined by biophysical changes or rather by factors that make people vulnerable to these changes
- How adaptation relates to development
- Whether adaptation aims at reducing climate change impacts or also at reducing economic and social inequalities and injustices
- Whether adaptation is about impacts caused by human-induced climatic change or also covering historic climate variability

These points of contention are discussed in the following paragraphs.

In the 1990s, research tried to establish the impacts that climate change would cause. In doing so, it typically followed what Silke Beck (2011) calls “the scenario-driven impact assessment approach” where climate impacts are purely a function of biophysical changes without considering any contextual factors. In other words, the assessments were based on a “linear causality between physical change and impacts” (Beck, 2011, p.300).²⁸ By the end of the 1990s, the importance of **social vulnerability** for determining the impacts of climate change began to be recognised. Neil Adger, whose writings had a strong influence on the development of the field of adaptation²⁹, wrote that this new perspective:

“emphasizes the social dimensions of vulnerability following the tradition of analysis of vulnerability to hazards, food insecurity and as a dimension of entitlements. This is in contrast to the predominant views on vulnerability to the impacts of climate change which concentrate on the physical dimensions of the issue.” (Adger, 1999, p.249)

As a consequence of this work and its consolidation in the following years, the Fourth Assessment Report (AR4) of the IPCC placed vulnerability at the centre of its Working Group II contribution. A new body of literature on vulnerability assessment subsequently emerged (Kelly & Adger, 2000; Fussler & Klein, 2006; see section 2.3.3).

²⁷ In their article, the scope of this question was limited to *ex-ante* assessments (appraisal of options), not covering how good the *implementation* of adaptation is. See chapter 2.2 in this thesis for further discussion.

²⁸ This approach is strongly visible in the TAR whose Working Group II report listed under section 1.4.3 “Key determinants of impacts” the following: Magnitude of Change, Rate of Change, Transient Scenarios, Climate Variability and Extreme Events, Thresholds, Surprises, and Nonlinear, Complex and Discontinuous Responses (IPCC, 2001).

²⁹ Neil Adger, Ian Burton and Karen O'Brien were recognized with the Frontiers of Knowledge Award for incorporating the social dimension into climate change research: <https://www.bbva.com/en/neil-adger-ian-burton-and-karen-obrien-recognized-with-frontiers-of-knowledge-award-for-incorporating-the-social-dimension-to-climate-change/>

The concern with social vulnerability arose in the context of developing countries. In a review of the relationship between adaptation and development, Ayers & Dodman (2010) identified three types of adaptation:

- 'Stand-alone' adaptation that does not consider development aspects
- 'adaptation plus development', where development is 'climate proofed'; and
- 'adaptation as development', where development is seen to lead to adaptation

Another systematic review of 30 articles published between 2010 and 2015 arrives at a very similar classification (Sherman et al., 2016). While the 'stand-alone' adaptation approach could miss addressing the underlying drivers of vulnerability, Ayers & Dodman caution that "the 'development first' approach frequently fails to give sufficient (if any) weight to the longer term climate implications on project areas, thereby affecting the ultimate sustainability of the adaptation intervention" (p.166).³⁰ The implication of these different approaches is pointed out by Sherman et al. (2016): "the different framings of the relationship between adaptation and development result in diverse and sometimes contradictory messages regarding adaptation design, implementation, funding, monitoring, and evaluation" (p.707).

Connected to the debate about the relationship between adaptation and development is the question what aim or objective adaptation should have. Under the IPCC definition, it is "adjusting to actual or expected climate and its effects" (see above). In contrast, the very first sentence of Mark Pelling's 2011 book reads: "Climate change adaptation is an opportunity for social reform" (p.3). It is worth quoting its first paragraph in full:

"Climate change adaptation is an opportunity for social reform, for the questioning of values that drive inequalities in development and our unsustainable relationship with the environment. But this outcome is by no means certain and growing evidence suggests that too often adaptation is imagined as a non-political, technological domain and enacted in a defensive rather than a progressive spirit. Adaptation has been framed in terms of identifying what is to be preserved and what is expendable, rather than what can be reformed or gained." (p.3).

Indeed, a common critique has been that adaptation is approached merely as a technical challenge, thereby depoliticising it and avoiding debates about contesting the status quo. An interesting example is the first adaptation strategy of the European Union from 2013³¹. A discourse analysis of the strategy found:

"a tension between the declared ambition to act on adaptation and implicit suggestions that nothing really has to change, and the challenge can be addressed by market and technological innovations, and by mainstreaming adaptation into existing sectoral policies. The policy discourse effectively serves to depoliticize choices societies make in response to climate change, presenting adaptation as a non-political issue." (Remling, 2018, p.477).

The influence of **framing** on the meaning and practice of adaptation has been confirmed by several studies, not only based on document analysis, but also through interviews with officials from different levels of government (e.g., Juhola et al., 2011; Fünfgeld & McEvoy, 2014). In the 2000s, adaptation was often presented as a "tame technical problem" (Dewulf, 2015) and dominated by a "techno-scientific problematization" (Oppermann, 2011). A review of 558 articles published until 2012 in four leading climate change journals³² found that 70% conceptualized adaptation as an adjustment to climate stimuli (Basset & Fogelman, 2013), i.e. corresponding to the IPCC definition

³⁰ Nick Brooks likewise highlighted the frequent lack of consideration for longer-term and higher-end climate impacts which led our Adaptation Gap Report author team to add the recommendation "6. Plan for higher-end impacts" to the implementation chapter in 2021 (Leiter et al., 2021, p.49).

³¹ The EU has since published its second adaptation strategy in 2021.

³² *Global Environmental Change, Climatic Change, Climate and Development, and Mitigation and Adaptation Strategies for Global Change*

and to the ‘stand-alone’ approach identified by Ayers & Dodman (2010) and by Sherman et al. (2016). During the 2010s, a growing body of literature has pointed to the importance of power and the influence of politics on adaptation, and that adaptation takes place in a social and political context and is therefore subject to political economy (Eriksen et al., 2015; Nightingale, 2017; Sovacool et al., 2015). Today, it is generally recognized that adaptation is an ongoing change process, but different framings including ‘technological fixes’ remain common (see next section).

The fourth point of contention is whether the scope of adaptation would be limited to climatic changes that exceed the range of historic climate variability. The background to this debate is that many vulnerable communities in developing countries have not been well prepared to deal with variations in climate in the first place, even in the absence of additional impacts caused by human-induced climate change. Burton (2004) refers to this gap as the ‘adaptation deficit’. Yet, a consequence of the scenario-driven approach to impact assessments has been that “the definition of adaptation is narrowed to include only responses to climatic changes resulting from anthropogenic greenhouse gas emissions” (Beck, 2011, p.300). The distinction between climate variability and climate change is also relevant because the UNFCCC requires developed countries to assist developing countries “in meeting the cost of adaptation to those adverse effects [that are caused by climate change]”, but not those of climate variability (United Nations, 1992, Article 4.4). A debate has since ensued about the scientific possibility and practicality of this distinction, with some arguing that it would be a ‘lost cause’ (e.g. Pelling, 2011, p.7³³). However, having exceeded 1.1°C of average global surface warming already by 2019 (IPCC, 2021, p.5), climate impacts are by now often measurably exceeding historic variability (see examples and sources in section 1.2). Attribution science has made significant advances to the point that robust methods are available for rapid attribution assessments that are routinely being carried out, for example, by the World Weather Attribution initiative³⁴ (van Oldenborgh et al., 2021; see also the Cross-Working Group Box ATTRIBUTION in the AR6 WGII report: IPCC, 2022a, p.149-152).³⁵ Hence, as the intensity of climate impacts continues to increase, the debate about the difference between climate variability and human-induced climatic change has somewhat dissipated, even though the wording in the 1992 UNFCCC remains as is.

While the fourth of the above listed points of contention might be less relevant today than it was ten or twenty years ago, the other three contentions continue to influence the debate over adaptation. Meanwhile, the concept of adaptation has evolved in response to critiques and newer aspects are now frequently alluded to, especially equity, maladaptation, and transformative change, even though conceptual ambiguity persists (see section 1.3.6). While differences in interpretations and in practical application remain, it has been argued that the openness of the concept of adaptation to different interpretations is part of its attraction (e.g. Pelling, 2011, p.8). In this regard, adaptation might function as a boundary object³⁶ that connects different disciplines and enables collaboration. The following section provides an overview of more recent critical narratives on adaptation.

1.3.5 Critical views on adaptation

The section above has already outlined critical views on the IPCC definition of adaptation. In recent years, critical perspectives on adaptation have become more widespread and have increasingly been demonstrated through empirical case studies. Critique has been expressed from different theoretical angles, including from political ecology, development studies, sociology, science studies, justice and

³³ Pelling further writes “Climate change is also a slippery concept to demonstrate empirically” (ibid.) – a statement that scientists would certainly object to.

³⁴ For details about this initiative, see: <https://www.worldweatherattribution.org/about/>

³⁵ Despite the advances in attribution science, Lahsen & Ribot (2022) caution that its assessments can be used to distract from underlying social drivers of inequality by blaming climate change as an external force that causes ‘natural disasters’.

³⁶ On the nature of ‘boundary objects’, see Star & Griesemer (1989).

gender studies. A common feature of critical narratives on adaptation is asking *for whom* adaptation works, who benefits, and whether adaptation agendas might leave some groups worse off. Orlove (2022) writes: “critical narratives disaggregate adaptation into different human groups and into different consequences, whereas orderly narratives typically examine collectivities as wholes” (p.567). Critical narratives can be summarised under at least seven lines of critique:

1. Ignoring power, agency and political and social processes
2. Non-inclusive and illegitimate adaptation actions
3. Not reaching the most vulnerable or those most in need
4. Justice and equity concerns
5. Maladaptation
6. Ideology of economic growth and of steady progress
7. Dominant discourses constraining other knowledge systems and approaches

These lines of critique are often interlinked. For example, power is of overarching importance for understanding who gets to benefit, whose voices are heard, and therefore whom the outcomes benefit and whether matters of justice and equity are addressed. Table 2 lists exemplary cases of critical narratives and references along the seven lines of critique. The critiques have often been documented empirically through case studies in developing countries.

Table 2: Critical narratives on adaptation to climate change.

Lines of critique	Cases	References
1. Power Here: Elite capture of adaptation by powerful groups who use it to justify their agenda and enforce their interests	‘Adaptation’ is used to advance particular interests which are presented by those in power as ‘without alternative’.	Paprocki (2018)
	“Powerful institutions and interests (...) are appropriating the cause of the vulnerable, depoliticising the adaptation agenda, and promoting innovations in finance and markets as solutions to climate risks” (p.1179).	Barnett (2020)
	Policies adopted under “the pretext of adaptation serv[ing] to expand the state’s control of populations rather than reduce core vulnerabilities” (p.296)	Turhan et al. (2015)
2. Non-inclusive and illegitimate adaptation	Local residents are excluded and top-down adaptation strategies increase their vulnerability	Mikulewicz (2020)
	Resistance to top-down adaptation measures	Brink et al. (2023)
Combination of: 1. Power, 3. Not reaching the most vulnerable, 4. Justice and equity	Adaptation just leading to a redistribution rather than a reduction of vulnerability, resulting in those who are most vulnerable and least powerful to lose out	Atteridge & Remling (2018)
	‘Climate gentrification’: “Vulnerability is also [re]produced as underprivileged households are displaced by wealthier ones seeking to reduce their physical exposure to climate change threats.” (p.4).	Thomas & Warner (2019)
	Adaptation reproducing, and being stabilized by, existing gender roles that benefit men	Carr (2008)
5. Maladaptation	Encroachment upon protected areas in the name of human adaptation ³⁷	Sovacool et al. (2015)
6. Ideology of economic growth	Economic growth presented as a prerequisite for effective adaptation while causing a trade-off	Thomas (2023)

³⁷ The article cites the case of a marine protected area in Tanzania. However, there may be cases where a limited human engagement in protected areas might help Indigenous groups to deal with climate impacts.

7. Constraining knowledge systems and ways of knowing	Excluding other types of knowing, especially in the context of the dominant dichotomy between mitigation and adaptation	Nightingale et al. (2020); Orlove et al. (2023)
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Critical narratives have had an important influence on discourses of what ‘successful’ adaptation means (Orlove, 2022). For example, Carr (2008) points to a trade-off between durable adaptation actions based in existing cultural norms (gender roles in his case study from central Ghana) and those that would challenge existing structures, would face broad resistance and might therefore be less likely to be successfully deployed. Further to these lines of critique, a general critique of the adaptation literature has been its tendency of self-referencing and ignoring other bodies of literature. This point is further discussed in section 1.3.8.

1.3.6 Maladaptation, transformational adaptation, and adaptation limits

This section briefly reviews three aspects of adaptation that have gained prominence since 2010: maladaptation, transformational adaptation, and adaptation limits.

The term ‘**maladaptation**’ was already used in adaptation research in the 1990s (e.g. Smithers & Smit, 1997, p.131) but only gained broader attention in the most recent decade, notably with an editorial essay in *Global Environmental Change* in 2010 (Barnett & O’Neill, 2010). Maladaptation refers to adverse effects or negative side-effects of adaptation actions. Several typologies of maladaptation have been proposed which commonly include: i) Increases of greenhouse gas emissions, ii) shifting or increasing vulnerability, iii) hampering sustainable development (e.g. Juhola et al., 2016; Magnan, 2014). An important contribution from literature on maladaptation is recognising that the worst possible outcome of an adaptation action is not ineffectiveness, but causing harm (Schipper, 2020). This recognition reinforces critical studies that point to unequal benefits of adaptation and to a tendency of redistribution rather than reduction of vulnerability (Atteridge & Remling, 2018). Recent research points out that maladaptation is not a binary variable, but that actions fall on a continuum of possible outcomes along several dimensions of potential maladaptation (Reckien et al., 2023). Accordingly, there have been calls for greater attention to maladaptation in theory and practice of adaptation (e.g. Magnan et al., 2016).

The Working Group II contribution of the IPCC Sixth Assessment Report has addressed maladaptation in detail within the context of what effective adaptation looks like (IPCC, 2022a, Chapter 17.5.1). While it is important to consider potential negative outcomes, notions of maladaptation have also been “serving as a basis for extreme caution that at times borders on inaction” (Orlove, 2022, p.569), an unfortunate outcome that should be avoided.

Among the profound critiques of adaptation is that it is often framed or interpreted as a technical and apolitical process and limited to fixing symptoms rather than addressing the underlying root causes of vulnerability (see section 1.3.4). As O’Brien (2012) puts it:

this “current framing (...) fails to engage with the real ‘adaptive challenge’ of climate change, i.e. a questioning of the assumptions, beliefs, values, commitments, loyalties and interests that have created the structures, systems and behaviours that contribute to anthropogenic climate change, social vulnerability and other environmental problems in the first place.” (p.668).

O’Brien therefore calls for a shift from (technical) adaptation to deliberate transformation. The respective chapter in the IPCC Special Report “Managing the Risks of Extreme Events and Disasters”, of which O’Brien was one of the coordinating lead authors, adopted **transformational adaptation** as one approach to adaptation (IPCC, 2012, sections 8.6.2.3 and 8.6.3). Transformational adaptation was introduced as being linked to, but distinct from, vulnerability reduction (IPCC, 2012, Figure

SPM.2, p.6). This distinction raises the question what transformation would aim at if its underlying purpose was not vulnerability reduction, which would be somewhat at odds with calls for overriding priority to vulnerability reduction (e.g. by Ribot, 2011). Transformational adaptation was also presented as the opposite of ‘incremental adaptation’. This dichotomy gave rise to an often repeated but simplistic view of adaptation actions being either ‘incremental, isolated and slow’ or ‘transformational, wide ranging and fast’. Termeer et al. (2017) point to the contradictions within this narrative: “organisation science suggests that achieving all three simultaneously [high depth, scope and speed of change] is virtually impossible because of the inherent trade-offs between them” (p.563). Referring to Thomas Kuhn’s work, they point out that “Transformational changes (...) are best understood as a gradual process that can take many years” (ibid.).

Based on, amongst others, the work by Termeer et al. (2017) and the results of the Global Adaptation Mapping Initiative (Berrang-Ford et al., 2021), the IPCC Sixth Assessment Report adopted four dimensions to determine the “Transformative potential of adaptation”: depth, scope, speed and limits (IPCC, 2022a, Table 16.1, p.2435). It found that “Most observed adaptation is fragmented, small in scale, [and] incremental (...) (high confidence)” (IPCC, 2022a, p.20). A useful contribution of the concept of transformational adaptation therefore is highlighting that adaptation has to be implemented at scale and as a default part of all relevant planning and decision-making processes if it is to match the scale of climate risks. At the same time, transformational adaptation has acquired buzz word character similar to resilience and has created “a new area of conceptual ambiguity” (Orlove, 2022, p. 562). Most recently, it has been mentioned in the so-called ‘cover decision’ of COP27 in November 2022 which states:

“Urges Parties to adopt a transformational approach to enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change” (UNFCCC, 2022b, Decision 1/CP.27, paragraph 21).

However, this wording simply mentions the term alongside the three components of the Global Goal on Adaptation as established in Article 7.1 of the Paris Agreement. There is no agreed definition of transformational adaptation under the UNFCCC or the Paris Agreement. Similarly, an analysis of board meetings and documents from the Green Climate Fund found that “while the transformational potential of proposals featured prominently in deliberations, there was no unified vision or clear definition of transformation” (Kuhl et al., 2023; see also Bertilsson, 2023). In fact, the term has become so *on vogue* that all global climate fund secretariats have published brochures advocating how transformative their funded projects would be (see Kasdan et al., 2021).³⁸ Yet, Kuhl et al. (2023) question in how far global institutions that follow ‘liberal logics’ could lead to structural change in the sense imagined by O’Brien (2012). Based on an *ex-ante* analysis of 125 Green Climate Fund projects, Puri et al. (2022) find adaptation projects to have transformative potential, but at low average scores across eight components of their proposed framework of transformative change. Overall, attention needs to be paid to how transformational adaptation is interpreted, who determines its meaning, and what implicit assumptions are included (Forsyth, 2021).

An essential and highly consequential question is to what extent adaptation is actually possible. Literature has distinguished between barriers that hamper implementation but can in principle be overcome, and absolute **limits** beyond which adaptation is no longer possible (Eisenack et al., 2014). The Sixth Assessment Report distinguishes the latter into **soft and hard limits**. Hard limits are defined as “No adaptive actions are possible to avoid intolerable risks” whereas soft limits mean that “Options may exist but are currently not available to avoid intolerable risks through adaptive action” (IPCC, 2022a, p.2898). An example of hard limits are physiological limits of the human body in relation to combinations of extreme heat and humidity at which survival without protection is no longer possible (Sherwood & Huber, 2010). The AR6 determined that “Hard limits to adaptation have been reached in some ecosystems (high confidence)” and that limits will increasingly be reached as

³⁸ Among the reasons for doing so are the need to demonstrate relevance to donors, a desire to show responsiveness to UNFCCC decisions, and the competition for public funds among global climate funds.

global temperatures increased further (IPCC, 2022a, p.26). The existence of adaptation limits, both soft and hard, therefore, reinforces the need for rapid and deep cuts in greenhouse gas emissions (see 1.2).

Despite being a relatively intuitive concept, “the problem of limits is not widely considered in policy” (Berkhout & Dow, 2023, p.1), likely precisely because it challenges the illusion that we could ‘simply adapt’. Ignorance of adaptation limits is also observable in ‘fatalistic’ perspectives which assume that mitigation will not succeed and subsequently “call for an increased level of attention to adaptation to climate change” (Engels & Marotzke, 2023, p.3) – as if adaptation was a new response option that had not been already considered and as if adaptation would not face challenges and limits. To strengthen future research on adaptation limits, Berkhout & Dow (2023) propose several research directions including on the dimensions and dynamics of limits and on “ethics and justice challenges underpinning adaptation limits”.

1.3.7 The role of the IPCC and the UNFCCC in shaping the concept of adaptation

The IPCC and the UNFCCC “have greatly influenced the direction of thinking as well as policy on climate change adaptation” (Pelling, 2011, p.8). Both organisations have been “assuring adaptation a central place in global climate thinking and action but also shaping and constraining it” (Orlove, 2022, p.540). The evolution of the concept of adaptation can therefore not be understood without considering the role and procedures of these two institutions, and how they shape how knowledge gets produced, how agreement is reached, and who might be left out. Orlove (2022) describes three general constraints on knowledge generation under these two institutions:

1. Involvement is constrained to national governments (UNFCCC) and researchers (IPCC)
2. Decision making under UNFCCC is by consensus only; in the IPCC it is by consensus regarding the summary for policymakers
3. The IPCC predominantly sources its inputs from academic journals and predominantly in English language.

The first constraint means that many groups of society might not be represented. In addition to local populations whose concerns might not be represented well by national governments, people living outside of functioning democracies will have little influence on the policy direction and decisions of their country’s officials at UNFCCC negotiations. Furthermore, definitions of ‘global’ problems “may suppress a number of important differences and insights at the local level that can either contribute to understanding the nature of risks, or indicate the local meaning attached to environmental changes often referred to as problems” (Forsyth, 2003, p.171). Similarly, Beck (2011) points out that the reliance on global models (especially under the scenario-based impact assessment approach of the first two IPCC Assessment Reports) “detaches various knowledge sources from their regional contexts” (p.300). This constraint could therefore hamper the consideration of diverse knowledge systems which are being called for to “avoid treating climate change as a merely technical problem” (Orlove et al., 2023, p.1431).

The second constraint (decision making by consensus) means that agreement is often limited to the lowest common denominator and that every government can threaten to halt agreement if its special interests are not accounted for. For example, during the Trump administration, the US in a coalition with Russia and Saudi Arabia blocked welcoming the IPCC Special Report on 1.5°C Warming at the 2018 UN climate change conference (COP24) in Poland.³⁹ The third constraint means that local knowledge and experiences of climate impacts and of implementation might be missed (Pelling,

³⁹ I observed this first-hand at COP24, and a similar move by the same countries a year later at COP25 in Madrid, Spain. For details, see the news report by Jean Chemnick, E&E News on December 10, 2018; accessed 29 August 2023 from: <https://www.scientificamerican.com/article/u-s-stands-with-russia-and-saudi-arabia-against-climate-science/>

2011, p.9), even though the IPCC has encouraged considering sources outside of scientific publications in its two most recent assessment cycles.

The IPCC has been emphasising that it is driven by science and politically neutral. In a 2010 brochure, it highlights right at the beginning: “One of the most important principles of the IPCC is to be policy relevant, but not policy prescriptive” (IPCC, 2010). However, as science and technology studies have shown, assessment reports like those of the IPCC do not present a form of rational expert consensus but provide authority to some knowledge over others (Forsyth, 2015a). IPCC’s knowledge production has been influenced by a belief in the linear model of expertise which excludes alternative framings of adaptation (Beck, 2011; see section 1.3.4). While the IPCC maintains to be non-prescriptive, this position is somewhat at odds with the aim to be more policy relevant and ‘solution-oriented’ (Kowarsch et al., 2017). It remains to be seen if and how the upcoming seventh assessment cycle will be living up to this challenge.

Overall, the IPCC has been very influential “as both a stimulus and a resource for research on adaptation” (Pelling, 2011, p.8). Even though IPCC’s definition of adaptation has remained largely constant since 2001, the underlying concepts and emphases have advanced significantly. The most recent Sixth Assessment report has elevated the importance of equity and justice throughout the adaptation cycle⁴⁰ and both terms have been mentioned for the first time (justice) and the first time in a significant quantity (equity) in the Summary for Policymakers of the Working Group II report (see Orlove, 2022, Table 1). At the same time, the dichotomy of mitigation and adaptation has siloed both approaches and constrained alternative framings (Nightingale et al., 2020).

1.3.8 Relation to other disciplines

A final aspect to be addressed in this introductory section is the relation between adaptation and other bodies of literature. Dovers & Hezri (2010) observed that the adaptation literature “has rapidly become large enough that a tendency of self-referencing has developed” (p.212). Pelling (2011) similarly criticises that:

“The IPCC process has also been constrained by its slow recognition of the full contribution to climate change debates to be made from parallel disciplines or policy areas that may cover very similar ground but not use the language of climate change or publish in climate change associated journals.” (p.9).

Disciplines with particular relevance are disaster risk reduction and development studies, especially literature on social vulnerability, livelihoods, food security and well-being, as well as sector-specific literature e.g., on water resources management, agriculture and rural development (e.g., Thomalla et al., 2006; Carr, 2019). In regard to policy processes, Dovers & Hezri (2010) emphasise the potential to learn from literature on public policy, institutional change, and sustainable development.

A review of the adaptation concept in climate change journals until 2012 found “there is much *déjà vu* and a little bit of something new in the conceptualization of adaptation” (Bassett & Fogelman, 2013, 51). In the spirit of sustainability science as “a field defined by the problems it addresses rather than by the disciplines it employs” (Clark, 2007, p.1737), the adaptation community should embrace insights from related bodies of literature and avoid cementing its own silo. Acting accordingly is not necessarily straightforward, however, since different disciplines use different terminologies or attach different meanings to seemingly identical concepts like resilience or vulnerability (see next section). Yet, some meaningful advances have been made in reconciling adaptation literature with related disciplines. For example, the IPCC Special Report on Managing the Risks from Extreme Events and Disasters to Advance Climate Change Adaptation (IPCC, 2012) connected adaptation and disaster risk reduction and led to a reconceptualization in the following AR5 Working Group II report that centres around the concept of risk (see Figure 5). In a similar spirit, Swart et al. (2014) call for a science of

⁴⁰ See IPCC (2022a), Chapter 1, section 1.4 including Figure 1.7.

adaptation that studies adaptation “from different angles and adopting different disciplinary perspectives, grounded in and requiring expertise from the forefront of both natural and social disciplinary sciences” (p.5).

1.4 Concepts related to adaptation to climate change

1.4.1 Common concepts related to adaptation

Adaptation to climate change has been closely linked to a number of adjacent concepts, especially ones describing the factors that influence the consequences of climate change for people and ecosystems. Since the first phase of adaptation literature in the 1990s there has been debate and sometimes confusion about the relation between different concepts and their meaning. Smithers & Smit (1997) write of a “somewhat confused picture” (p.134). Since then, numerous publications have discussed the relationship between adaptation-related concepts. A special issue in the journal *Global Environmental Change* in 2006 (Volume 16, Issue 3) has been especially influential. Most influential has been how the IPCC assessment process arranged the relation and meaning of concepts (cf. 1.3.7). Indeed, a systematic review of the evolution of the concept of vulnerability found that “the phases of preparation of the IPCC reports are very rich in methodological and terminological developments, while after publication, the literature shows evident signs of propagation of the proposed concepts” (Guipponi & Biscaro, 2015, p.1). Between the Fourth and the Fifth Assessment Report of the IPCC, a major conceptual shift took place in the Working Group II reports:

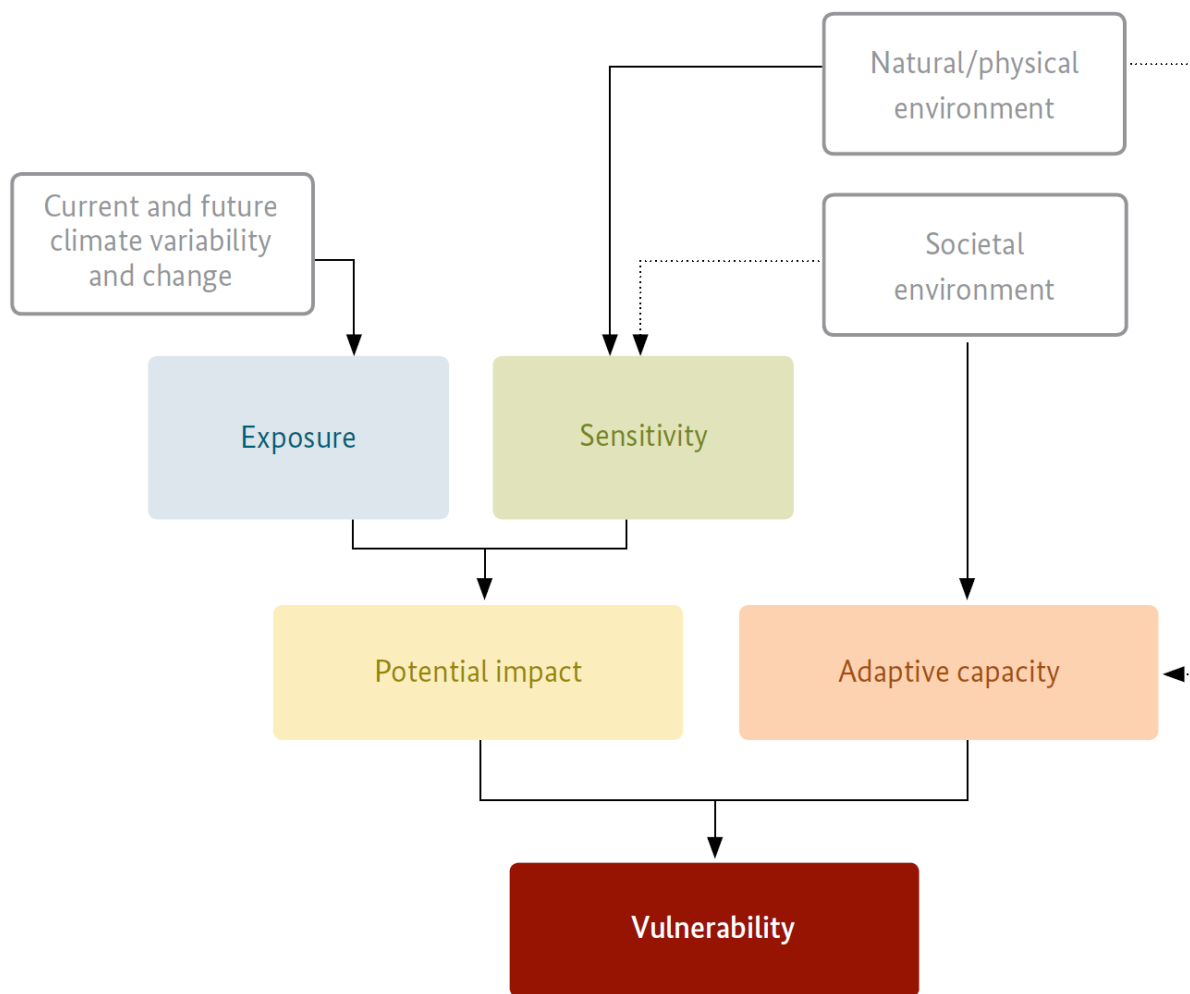
- AR4 (2007): **Vulnerability** as the leading concept associated with adaptation (see Figure 4)
 - Vulnerability as a function of exposure, sensitivity and adaptive capacity
- AR5 (2014): **Risk** as the leading concept associated with adaptation (see Figure 5)⁴¹
 - Risk as a function of hazard, exposure, and vulnerability

This shift reflects the integration of concepts and terminology from disaster risk reduction (see section 1.3.8). In this context, ‘climate stimuli’ was dropped in favour of ‘hazard’ and is no longer listed in the AR6 glossary (IPCC, 2022a, Annex II). Other concepts such as ‘coping’ and ‘sensitivity’ have declined in attention. A concept that has been very influential despite its notable absence from the above listed IPCC conceptualisations is **resilience**. The frequency of the term ‘resilience’ in research and policy fora has dramatically increased during the last ten years, and the relationship between these two concepts has been very contested. Section 1.4.4 looks into this debate more closely. While a detailed review of each concept is beyond the scope of this PhD thesis⁴², this section provides an overview of the concepts of vulnerability and resilience which are of relevance for assessing the implementation of adaptation.

⁴¹ AR6 contains some additions to the AR5 operationalisation which are outline in IPCC (2022a), Chapter 1.3.

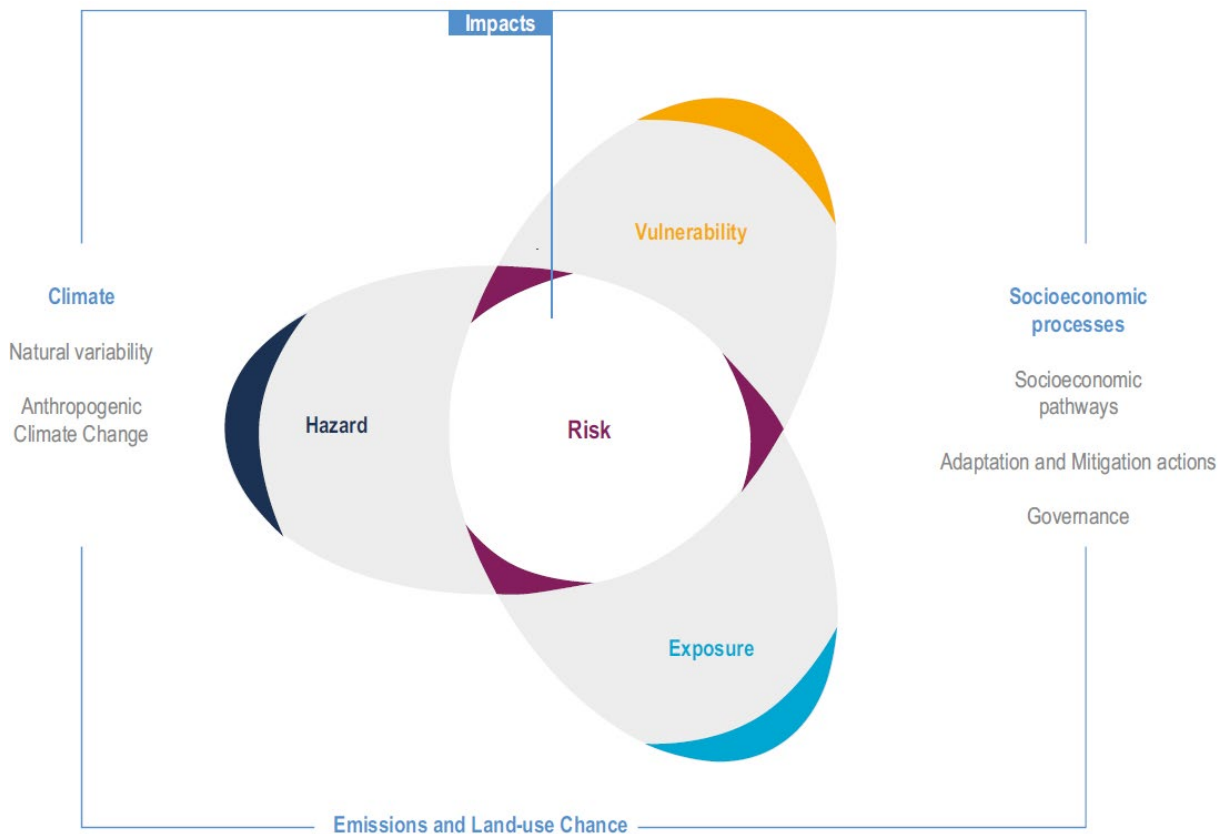
⁴² In fact, such a review could constitute a PhD thesis on its own. For instance, Aditya Bahadur from IIED (formerly ODI and IDS) did his PhD on the concept of climate resilience (see e.g., Bahadur et al., 2010).

Figure 4: Relation of concepts in the Fourth Assessment Report, Working Group II.



Source: Diagram adopted from adelphi, EURAC & GIZ (2014, Figure 1, p.20) based on IPCC (2007).

Figure 5: Relation of concepts in the Fifth Assessment Report, Working Group II.



Source: Diagram adopted from IPCC (2022a), Figure 1.5(a), p.146.

1.4.2 Vulnerability

Vulnerability is a central concept in environmental change research. Within the social sciences, it has its roots in human geography ('natural hazards' research) and in poverty research (Forsyth, 2015b). Vulnerability carries different meanings and has been operationalised in a variety of ways by different disciplines (Adger, 2006). Füssel (2007) proposed a classification scheme that distinguishes between socioeconomic and biophysical domains and between internal and external spheres. The different vulnerability approaches, e.g. from political ecology or 'natural hazards' research can then be classified according to which of these four aspects they include (see Table 2 in Füssel, 2007). Among the approaches that focus more on the social domain, a distinction can be made between those that emphasise either structural factors (e.g. economic development or colonialism) or the role of human agency (Forsyth, 2015b). The latter group of approaches include Sustainable Livelihoods Approaches and have been inspired by Amartya Sen's capability approach.

Two prominent and fundamentally different framings of climate vulnerability are:

- **'End-point vulnerability'**, i.e. where vulnerability is the linear result of climate hazards. This understanding of vulnerability is primarily based on biophysical factors. It corresponds to what Beck (2011) refers to as 'scenario-based impact assessment model'.
- **'Starting point' or 'contextual' vulnerability** where vulnerability is "based on a processual and multidimensional view of climate–society interactions" (O'Brien et al., 2007, p.76). In this framing, vulnerability is determined by a range of contextual factors that interact with climatic change.

The conceptualisation of vulnerability in the IPCC AR4 in 2007 followed an end-point vulnerability framing (vulnerability is literally ‘at the end’ of the diagram shown in Figure 4). Contextual vulnerability framings, on the other hand, can explain why people are differently affected by similar climate hazards. Key themes that explain this differential vulnerability are resource access, governance, culture, and knowledge (Thomas et al., 2019).

Forsyth (2015b) emphasises the need to interrogate implicit assumptions in framings of risk and vulnerability and the need to base understandings of vulnerability and risk on inclusive approaches that engage those whose vulnerability is intended to be improved (see also Forsyth, 2018). In fact, critical literature on adaptation has pointed out that framings of vulnerability can be used against those who are actually vulnerable (Thomas & Warner, 2019; see section 1.3.5). Conway et al. (2019) also stress the need for bottom-up assessments of climate risk to complement the traditional top-down assessment approach that is based on global climate models.

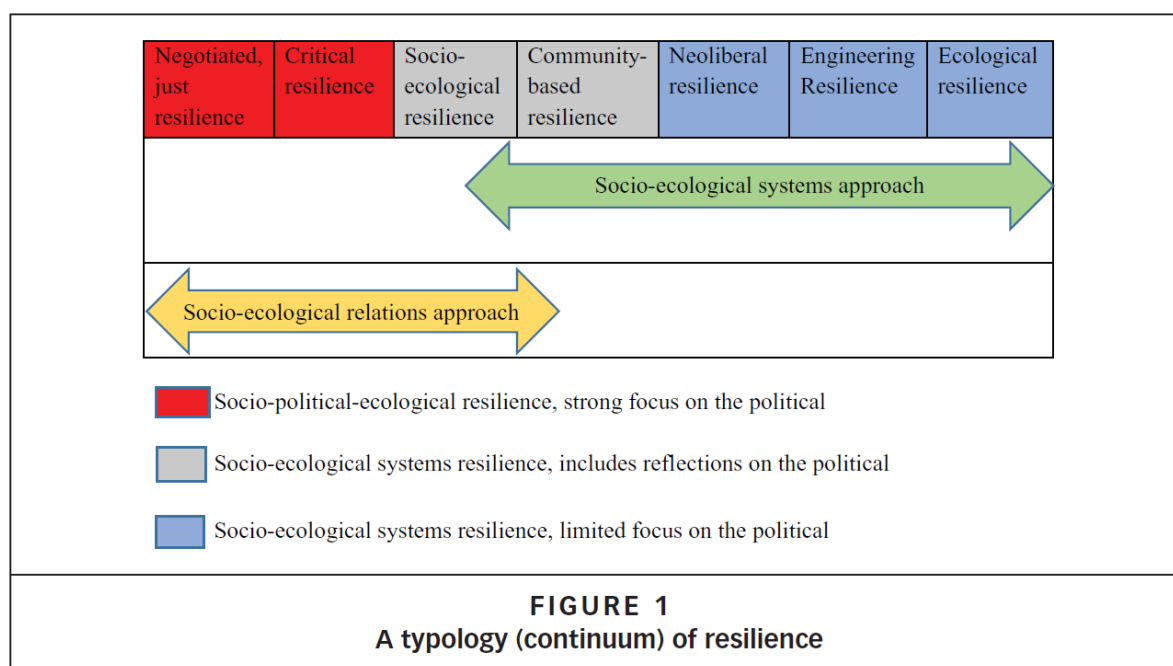
1.4.3 Resilience

Resilience as a concept has a long tradition in several disciplines, most notably in ecology, engineering and psychology. In the context of global environmental change, its most prominent origin stems from ecosystem resilience which is defined as “the magnitude of disturbance that can be absorbed before the system changes its structure” (Holling & Gunderson, 2002, p.28). Due to its very different origins in natural and social science, the term carries a variety of meanings and interpretations, possibly even more so than adaptation. An important difference between interpretations of resilience by different disciplines is the degree of normativity, i.e. whether resilience is perceived as a descriptive and directly quantifiable attribute or as a more normative and malleable concept (Brand & Jax, 2007). Figure 6 places different understandings of resilience on a continuum in relation to their focus on the normative and political. Resilience understandings from natural science and engineering pay only limited attention to politics and power which are essential variables for understanding vulnerability and change. On the left side of the continuum, interpretations of resilience cannot be objectively determined but arise out of social processes which are shaped by norms and politics (Cote & Nightingale, 2012). In fact, social science approaches to resilience emphasise that multiple competing interpretations of resilience can exist that need to be negotiated (Brown, 2016).

Resilience was only infrequently used in the international development literature until the early 2000s and experienced a strong spike in popularity from around 2008 onwards to the point that it has become a global buzz word (Béné et al., 2012). In fact, some governments changed their national climate policy discourse by replacing adaptation with resilience. In some cases, it went as far as elevating resilience into a sort of ‘master concept’ above sustainable development.⁴³ In many policy publications, project documents and in discussions at international events that I have been attending, it is apparent that participants rarely have a common understanding of the term. In some cases, the term is clearly being used as a buzz word to garner attention or acquire funding and is devoid of any concrete meaning. In essence, resilience has become the poster child of a ‘boundary object’. My observations in this regard align with the conclusion of Brown (2014).

⁴³ In one such case which I observed as part of a government collaboration, one of my messages in a review paper on resilience for government officials was: “Resilience is not a substitute or synonym for sustainable development” (see also Brown, 2016, pp.19-22).

Figure 6: A continuum of different understandings of resilience.



Source: Diagram adopted from Roberts et al. (2020), p.550.

Part of the attractiveness of the term ‘resilience’ is precisely its ambiguous meaning that different perspectives can align with (see for instance the different narratives of urban resilience analysed by Borie et al., 2016). ‘Resilience’ has a positive appeal compared to vulnerability, it can apply to a variety of stress factors (not just climate hazards), and it simply sounds more active than ‘adaptation’. In policy and practitioner spaces, critiques of the concept of resilience appear to be either not well known or to be avoided to maintain the ‘feel good’ narrative of resilience. In the scientific literature, critiques of resilience have long been voiced, but resilience in the climate change context has nevertheless experienced a boom (Bahadur et al., 2010).

Owing to its well-known definition related to ecosystems (see above), resilience is often interpreted as ‘recovering back to normal’ rather than as reinventing a new way of organising. This interpretation has also been referred to as ‘bouncing back’ vs. ‘bouncing forward’. Accordingly, a common critique of resilience is that it aims to preserve the status quo rather than addressing the root causes that led to the external shock in the first place. Such an understanding would be directly at odds with demands for adaptation to address social inequalities and injustices. Moreover, a general critique from a political ecology perspective is that resilience thinking is strongly adhering to systems thinking and ignoring “the complex webs of interest, power, and the multiplicities of social identity” (Turner, 2014, p.619; see also Brown, 2016, pp. 12-18). Furthermore, Béné et al. (2012) point out that resilience “is not a pro-poor concept” and that “the objective of poverty reduction cannot simply be substituted by resilience building” (p.3).

1.4.4 Relations between vulnerability, resilience and adaptation

Owing to the different definitions and conceptualisations that are in use by different disciplines, the relationships between vulnerability, resilience and adaptation are ‘not trivial’ (Gallopín, 2006, p.301). The phrase that vulnerability and resilience would be ‘two sides of the same coin’ does not hold (ibid.; see also Pelling, 2011, p.42). Instead, literature typically characterises resilience as an ability or capacity, making it conceptually more closely related to adaptive capacity. Table 3 illustrates the

similarities among the definitions of both terms in the Fifth and Sixth Assessment Reports of the IPCC. Accordingly, Forsyth (2015b) concludes that both resilience and adaptive capacity are entry points to reduce vulnerability. Adger (2006) likewise finds that resilience and vulnerability are different concepts and concludes that “policy interventions that promote resilience therefore need to address the multi-level nature of vulnerability” (p. 276).

Table 3: Definitions of adaptive capacity and resilience in the IPCC 5th and 6th Assessment Reports.

Adaptive capacity	Resilience	
<p>“The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences”</p> <p>[Identical in AR5 and AR6]</p>	<p>“The capacity of (AR6: interconnected) social, economic, and environmental (AR6 instead: ecological) systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure... →</p>	<p>AR5: ..., while also maintaining the capacity for adaptation, learning, and transformation”</p>
		<p>AR6: (...). Resilience is a positive attribute when it maintains capacity for adaptation, learning and/or transformation (Arctic Council, 2016).”</p>

Source: IPCC (2014b, p.1758 and 1772), and IPCC (2022a, p. 2899 and pp.2920-2921).

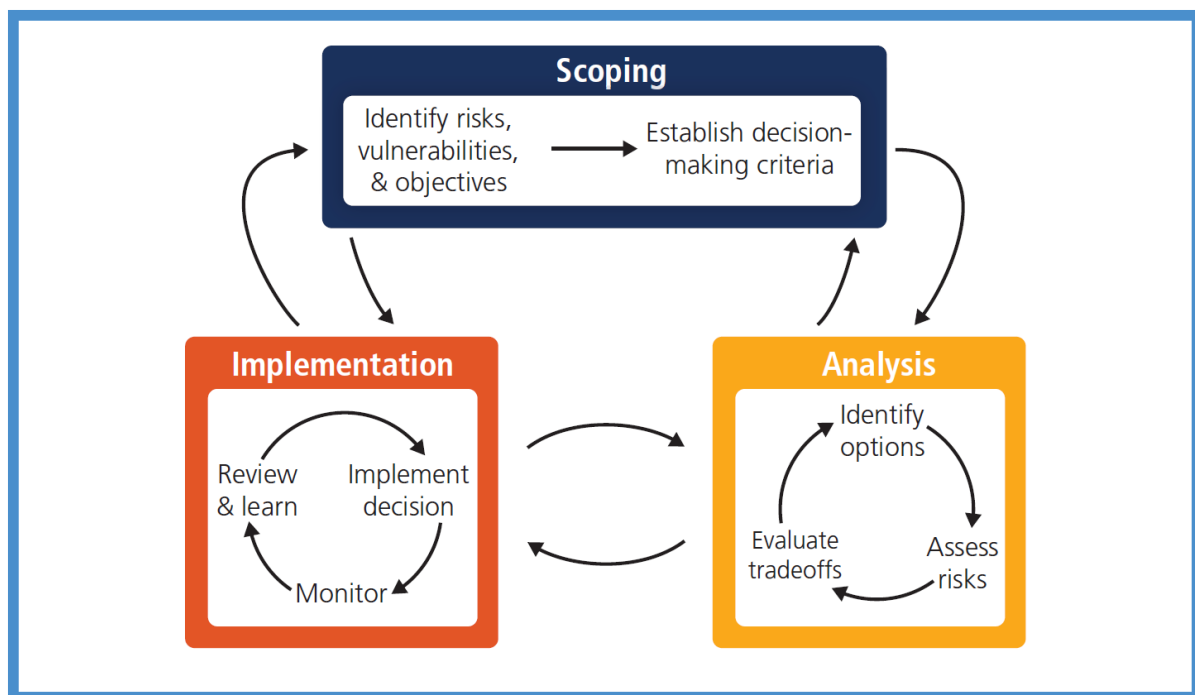
In the conceptualisation of Working Group II of AR6 around the concept of risk, each of its three dimensions (hazard, exposure and vulnerability) presents an entry point for risk reduction (see Figure 5). Improvements in resilience would be one of the sub-components of vulnerability similar to adaptive capacity. The arrangement of concepts shown in Figure 5 (also known as the ‘propeller diagram’) was first introduced in AR5, but AR6 introduced several additions that better account for the complexity of interactions including non-linear connections between the three dimensions (see IPCC, 2022a, pp.143-147).

1.5 Are we adapting? A blind spot in the adaptation literature

1.5.1 Lack of research on implementation and its effects

Despite the enormous increase in quantitative output of adaptation research (see 1.3.3), little is known about actual implementation of adaptation and its results. Indeed, the great majority of the adaptation literature has been focusing on assessments of climate impacts, vulnerability, and adaptive capacity, or on potential options and adaptation planning. While the aspect of ‘how adaptation occurs’ already featured in the ‘Anatomy of adaptation’ by Smit et al. (2000) as one of its four components and is also one of three parts of how the IPCC Fifth Assessment Report depicts the adaptation decision making process (see Figure 7), this area has clearly been neglected as a research topic, especially in regard to empirical accounts. The Fifth Assessment Report confirms: “Most assessments of adaptation have been restricted to impacts, vulnerability, and adaptation planning, with very few assessing the processes of implementation or the effects of adaptation actions (*medium evidence, high agreement*)” (IPCC, 2014a, p.8; *Italics in original*).

Figure 7: The adaptation decision making process as viewed by the IPCC Fifth Assessment Report.⁴⁴



Source: Diagram adopted from IPCC (2014a, Figure SPM.3, p.9).

I experienced this knowledge gap first-hand in 2010 during interviews with local government officials in Sydney, Australia for my Master thesis on adaptation (Leiter, 2011). The officials were interested in how to undertake adaptation and how to assess its progress. It became quickly apparent that scientific literature at the time had little to offer to answer these questions. It was striking to me that even research agendas on adaptation published around the time mentioned studying implementation only at the margins. Take, for example, the research agenda proposed by Arnell (2010) based on a reflection of adaptation research published in the journal *Climatic Change*, or Torsten Grothmann's "Adaptation research – Where do we stand and where should we go?" (Grothmann, 2014), both of which pay only scant attention to matters of implementation. The existence of this gap led to an article in *Global Environmental Change* by Berrang-Ford et al. (2011) under the title "Are we adapting to climate change?". This article prominently pointed out how little is known about implementation progress and called for more systematic reviews into adaptation practice and its effects.

Seven years later, by the time I started my PhD in October 2018, the question had still not been sufficiently answered (see 2.4.2). It has, however, been reconfirmed over and over again as an area for future research. For instance, in their article about prospective directions for a science *for* and science *of* adaptation, Swart et al. (2014) write: "We hardly know what "successful" adaptation means (Doria et al., 2009), or the conditions necessary or sufficient for evaluating successful adaptation" (p.5). Preston et al. (2015) concur, pointing out that "criteria and metrics for monitoring and evaluating adaptation and its success are lacking" (p.131). Currie-Alder et al. (2021) posit that "improv[ing] tracking of actions and progress" is one of three avenues "to transform ambition to action" (p.1). A group of members of the scientific committee of the first Adaptation Futures

⁴⁴ This diagram can of course be criticised as being overly simplistic, rational, and for treating pressures from climate change in isolation while most adaptation decisions are contingent on contextual factors or interlinked with other socioeconomic needs and drivers. The point here is to illustrate that even within the dominant IPCC logic, the implementation part of adaptation has remained largely neglected by the research community.

conference, the largest gathering of adaptation experts that meets every two years, concluded that one of “five principal challenges for adaptation today” is “Measuring climate change adaptation and evaluating success” (Palutikof et al., 2013, p.20).

The above list is just a selection of relevant sources. The knowledge gap of adaptation implementation and its effectiveness is being continuously highlighted in scientific articles, reports by think tanks, non-government organisations (NGOs), and in global environmental assessments such as UNEP’s Adaptation Gap Report (e.g., UNEP, 2014; UNEP, 2017; Leiter, 2021b). A lack of knowledge of ‘what works’ and the absence of agreement among major providers of adaptation finance about what good adaptation looks like means that resources are likely ineffectively spent (Eriksen et al., 2021). Indeed, Orlove (2022) argues that challenges around defining and measuring adaptation constitute one of three main conceptual obstacles that hinder adaptation planning and implementation. Underscored by the quality and quantity of sources confirming this knowledge gap, Berrang-Ford et al. (2019) are referring to it as a ‘**grand challenge**’ of adaptation research (p.441). I have therefore set out to contribute to this important area of work and to help answer Berrang-Ford et al.’s initial question from 2011: “Are we adapting to climate change?”.

1.5.2 Structure of the thesis

The ‘grand challenge’ of better understanding implementation of adaptation and assessing its outcomes includes a range of research questions referring to different geographical scales, actors and perspectives that can be studied from different theoretical lenses and with multiple research methods. Therefore, rather than posing a research question upfront, this chapter first presented a literature review of the research area before narrowing the focus of inquiry and formulating specific research questions in chapter 2. This thesis therefore proceeds as follows:

- Chapter 2 reviews the evolution of literature on assessing implementation progress of adaptation, outlines common research themes, clarifies terminology, presents the research framework and discusses the employed research methods and relevant aspects of research ethics.
- Chapter 3 presents a detailed synthesis of available literature on adaptation M&E as published by the IPCC AR6 Working Group II (where I wrote section 17.5.2 “Adaptation Monitoring, Evaluation & Learning”) and a novel contribution to literature on global assessments of adaptation (Garschagen et al., 2022).
- Each subsequent chapter presents a research article that addresses the research framework presented in chapter 2.

The thesis concludes with a discussion of the contributions made by the research contained herein. The Annex includes the database of policy documents (inventory of national adaptation M&E systems and related documents) that was published as supplementary material to my article in *Environmental Science & Policy* (Leiter, 2021a).

2 Assessing implementation of climate change adaptation: literature review and research framework

2.1 Overview

When I introduced my PhD topic at an adaptation workshop at Wilton Park⁴⁵ in March 2019, a natural science professor couldn't quite understand what the challenge with assessing adaptation progress was. In his view, all it would take was bringing together experts for a few months and we would have a list of global adaptation indicators – no problem! This view is not uncommon, but far from reality. In fact, it has been disproven: the United Nations Statistical Division undertook a multi-year consultative process to develop a global set of climate change indicators to which all national statistical offices could contribute. The resulting set which was adopted by the UN Statistical Commission in March 2022 includes 32 indicators that were categorised as “adaptation” (UN Economic and Social Council, 2022). However, based on the UN Statistical Division's own classification system around relevance, methodological soundness and data availability, only three of the 32 indicators meet desired standards and are globally available (UN Statistics Division, 2022). Moreover, several of the indicators clearly do not indicate climate change adaptation, e.g., “151. Air quality monitoring” and “157. Proportion of municipal waste treated”. Maybe it's not so easy after all!

In addition to an apolitical perspective on adaptation, the above-mentioned view also reflects the common belief in the separation between science and policy, referred to as the linear model of expertise (Beck, 2011; Forsyth, 2012). As sections 1.3 and 1.4 have shown, measuring adaptation through a universal, objective and context-independent set of indicators is practically an illusion. This chapter dives deeper into the literature on assessing implementation progress on adaptation. It first explains the terminology adopted in this thesis and presents an overview of the evolution of literature on adaptation monitoring and evaluation and its common themes. It then makes the case for focusing the thesis on the global assessment of adaptation progress and presents the research framework, an advancement of a framework proposed in the 2017 Adaptation Gap Report of the UN Environment Programme (Möhner et al., 2017). The chapter concludes with a review of the research methods and a discussion of research ethics.

2.2 Terminology

Providing clarity upfront on terminology is needed since it is quite common for discussions on this topic area, both in journal articles and publications from think tanks and NGOs, to use different understandings and to conflate different aspects with each other.

Assessing implementation has typically been equated with Monitoring & Evaluation (M&E). M&E is a common area of practice in international development and in other topic areas, including project management (Cracknell, 2000). In general, M&E is about assessing if and how implementation is being undertaken and what effects have resulted from it. While it is usually referred to as a pair (“M&E”), monitoring and evaluation are two distinct but related subjects. They are traditionally distinguished a) temporally, with monitoring being viewed as an ongoing process and evaluation as being undertaken only at select moments during or after implementation, and b) in regard to their degree of reflection where monitoring is seen as a narrower process of tracking progress against predetermined milestones or indicators whereas evaluation is seen as an inquiry into the how and why of effects (OECD, 2002).

⁴⁵ Wilton Park is an Executive Agency of the UK Foreign, Commonwealth & Development Office that promotes sharing of ideas in international policy. See: <https://www.wiltonpark.org.uk/about-us/>

Importantly, M&E is distinct from any assessments that take place before implementation such as feasibility assessments or appraisals of adaptation options (Leiter & Pringle, 2018). In fact, one cannot monitor something that has not begun. Nevertheless, it is not uncommon in literature on adaptation that ex-ante and ex-post assessments are being mixed up. Both have different purposes and use different methods. Furthermore, tracking of financial flows which is important in the context of support to developing countries, is also distinct from M&E since finance is just an enabler of action but financial flows do not provide information on achieved results. The relationships between M&E, ex-ante appraisals and tracking of financial flows are shown in Figure 8. I drafted this Figure based on an initial version from Thomas Bernauer as part of my contribution to chapter 1 of the AR6 WGII. The Figure builds on a diagram I had developed in 2018 for a chapter on adaptation metrics (Leiter & Pringle, 2018, p.34).

Figure 8: Relationship between monitoring and evaluation and assessments prior to implementation.

Adaptation assessment prior to implementation and M&E during and after implementation

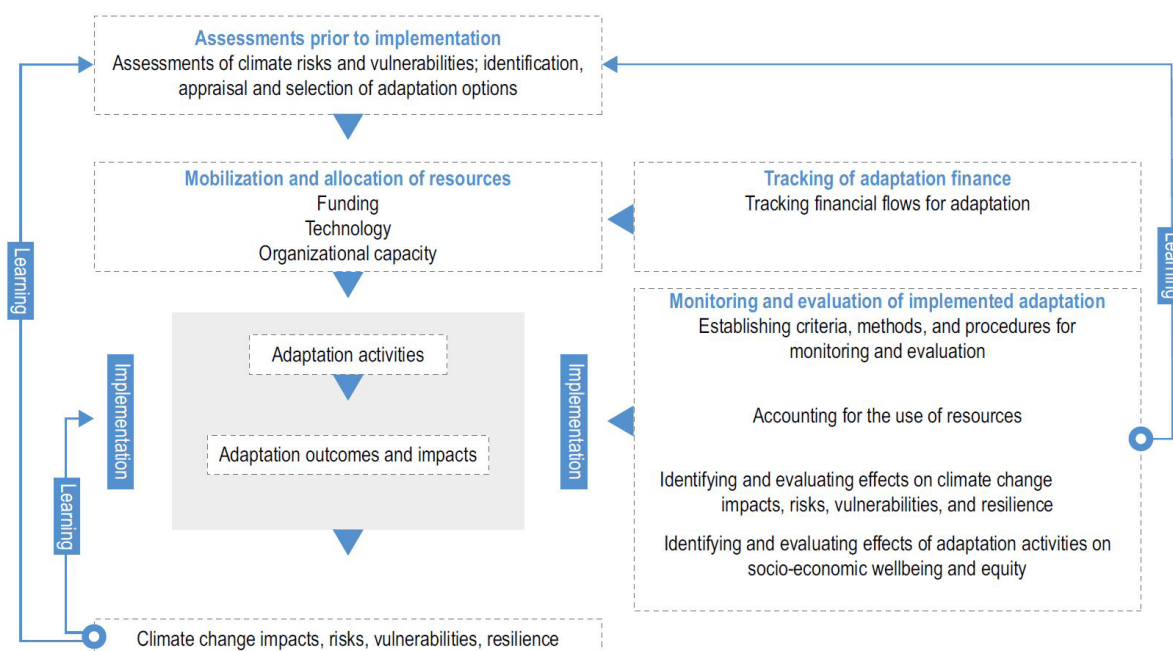


Figure 1.8 | Adaptation assessment prior to implementation and M&E during and after implementation. Both systematic assessment of adaptation needs and options and M&E of implemented adaptation are key to iterative climate risk management and to achieving effective and equitable adaptation. Most assessments to date have referred to aspects prior to implementation. There is much less systematic evidence on adaptation action, and even less evidence on adaptation outcomes and impacts and their implications for climate change impacts, risks, vulnerabilities and resilience. Figure 17.9 provides more detail on M&E.

Source: Figure adopted from IPCC (2022a, Figure 1.8 in section 1.4).

I am using the term “assessment” as an umbrella term that is neither tied to a particular theoretical position nor to any particular method. It contrasts to the term “measurement” which implies a quantitative and precise way of assessment. While Ford et al. (2015) propose “adaptation tracking” as a sub-component of M&E, a usage of this term in a way that is distinct from M&E has so far not emerged in the literature. I therefore continue to use the term ‘tracking’ as a synonym to monitoring.

Large inconsistency persists in the usage of and relation between the terms “indicator” and “metric”. For instance, some see “metric” as an overarching term, others see “metrics” as quantitative specifications of an indicator. In practice, both terms are commonly used interchangeably or with no

clear distinction. I predominantly use the term “indicator” since it relates to the traditional M&E terminology in development cooperation (e.g. OECD, 2002). In the background paper on adaptation metrics which I co-led for the Global Commission on Adaptation (Leiter et al., 2019), the use of the term ‘metric’ in the title had been preset. At the time, this term became fashionable but its sudden rise was not accompanied by a clear difference to the term “indicator”. On the related term of an “index”, there is broad agreement (albeit no complete consistency of its usage in the literature) that an index consists of several sub-variables which can be labelled as indicators or metrics depending on how the two are defined (for a critical reflection of indices, see section 17.5.2.3 in chapter 3, p.46).

Finally, on the terms “progress” and “success”. Following the findings of Adger et al. (2005) and in alignment with more recent commentaries (Dilling et al., 2019; Fisher, 2023), I have only rarely used the term “success” since it implies an absolute and final accomplishment which, in many cases, seems unattainable for adaptation given that the climate keeps changing and adaptation remains an ongoing task. Instead, I have been using the term “progress” to refer to any advancements or improvements of any relevant kind between two points in time. For example, “global adaptation progress” could refer to more widespread and higher quality of adaptation planning, more and/or more effective use of adaptation finance, and more or better implementation, avoidance of maladaptation, or a more just distribution of the benefits of adaptation. Insights from critical adaptation studies (see 1.3.5), especially regarding the distribution of benefits (‘adaptation for whom?’), are an important consideration for what “progress” means. I am not subscribing to linear notions of steady progress. Instead, I use the term in the understanding that a) progress does not necessarily mean progress for all, even less so when assessing implementation at the national and global level, b) an obtained level of progress is not guaranteed to be maintained in the future. Even though the term might come across as uncritical, I have not found another term that is as broadly applicable and equally intuitively understood.

2.3 Literature on adaptation monitoring and evaluation

2.3.1 Evolution of literature on adaptation monitoring and evaluation

The first article devoted to assessing the implementation of adaptation was Neil Adger et al.’s 2005 article “Successful adaptation to climate change across scales”. The article introduced four criteria for evaluation and highlighted that adaptation success can differ according to the perspective taken. For example, while an adaptation action may benefit some, it could come at the expense of others (a case of maladaptation, see 1.3.6). This point was reiterated by Adger & Barnett (2009): “what may be perceived as a successful adaptive response from a policy point of view may not be perceived the same way by those who have presumably benefitted from the activity” (p.2803). Hence, there are limits to an objective assessment of adaptation. Nevertheless, Doria et al. (2009) used expert elicitation to generate a definition of successful adaptation.

A main driver for developments on adaptation M&E came from implementing and funding organisations that sought to measure the adaptation-specific results of their actions. This push was influenced by the mantra of “aid effectiveness” and the associated “results agenda” (e.g. Brolin, 2017). One of the earliest publications were from UNDP and from the Institute of Development Studies (McKenzie Hedger et al., 2008). The Adaptation Policy Framework by UNDP considered M&E in its stepwise framework (Lim et al., 2005). Germany’s development cooperation agency (GIZ) also began working on adaptation M&E by the year 2009 (Leiter, 2018). Nevertheless, Preston et al. (2009, p.1) found that “Although evaluation and monitoring are often advocated within adaptation decision making frameworks, methods for undertaking such work are rarely articulated”. A key question at the time was in what way M&E of adaptation was different from traditional M&E in development cooperation and how the adaptation-specific results could be captured.

Attention to adaptation M&E picked up noticeably after the year 2010, but mainly in the practice sphere rather than in academia. The first guidebooks on developing M&E systems for adaptation projects were developed by the UK Climate Impacts Programme (UKCIP) (Pringle, 2011), by the World Resources Institute (Spearman and McGray, 2011) and by GIZ (Olivier & Leiter, 2013). Upon joining GIZ in 2011, I co-developed GIZ's guide for the development of an adaptation M&E system (ibid.). In the following years, UKCIP developed a series of guidance notes for adaptation M&E (Bours et al., 2014b, 2014c). At the same time, the Adaptation Fund, the Global Environment Facility and the Pilot Programme for Climate Resilience also developed tracking frameworks for adaptation with a view to aggregating results across their portfolio (Roehrer & Kouadio, 2015). The primary challenge that emerged around global aggregation of adaptation results was the diversity of local context and adaptation actions which is not conducive to mechanical “adding up” along generalized numerical values (Leiter & Pringle, 2018; Leiter 2015; see also Chen & Uitto, 2014). Adaptation portfolio indicators have therefore often remained at the output level and are reflecting the lowest common denominator among the diversity of adaptation projects and contexts (Leiter et al., 2019).

Even through the proceedings of the first Adaptation Futures conference in 2010 recognised “Measuring climate change adaptation and evaluating success” as one of “five principal challenges for adaptation today” (Palutikof et al., 2013, p.20), publications on this topic in academic journals remained scarce. Berrang-Ford et al. (2011) prominently highlighted this gap by asking “Are we adapting?”. Another rare example was Ford et al. (2013) who examined how adaptation at the national level could be tracked. A special issue in the journal *New Directions for Evaluation* in 2015 presented the first collection of articles on this topic including an article I wrote on linking national and sub-national adaptation M&E systems (Leiter, 2015). This special issue was initiated by the practical need to find ways of tracking progress on adaptation and most of the contributors came from think tanks, NGOs and international organisations rather than from academia.

By the year 2010, the topic also picked up in the debates under the UNFCCC. A “synthesis report on efforts undertaken to monitor and evaluate the implementation of adaptation projects, policies and programmes” was published in 2010 (UNFCCC, 2010) and the Adaptation Committee under the UNFCCC began its work on adaptation M&E with an international workshop in 2013. Since then, M&E has been a continuous topic in the work plans of the Adaptation Committee and of the LDC Expert Group (see e.g., UNFCCC, 2017a; Adaptation Committee, 2021a, 2021b).

The adoption of the Paris Agreement led to a further push in attention to adaptation M&E. The Paris Agreement explicitly recognises adaptation M&E as part of countries' adaptation planning and implementation efforts (UNFCCC 2015, Article 7.9d). It also contains provisions on reporting and established new communication instruments to inform the global community on adaptation progress (this is the subject of my article on transparency in global environmental governance, see chapter 4). The Paris Agreement also stipulates a global stocktake of progress to be undertaken every five years which stimulated a body of literature on global progress assessment on adaptation (Tompkins et al., 2018; Adaptation Committee, 2021a; see section 2.4).

In recent years, critical approaches to adaptation have challenged the notion of a “measurable, often steady progress toward a unitary goal of adaptation” (Orlove, 2022, p.567; see 1.3.5). Fisher (2023) also stresses the contingency of adaptation measurement on viewpoints, values and power. Nevertheless, political demands to assess the results of adaptation investments and of international climate finance strongly persist. Adaptation M&E will therefore remain a persistent topic in academic and policy debates, as underscored by the 8th workshop on the global goal on adaptation in September 2023⁴⁶ where one of the sessions was on potential further work to develop global adaptation indicators.

⁴⁶ I was one of the co-facilitators of the workshop. The agenda is available here: <https://unfccc.int/event/8th-workshop-glasgow-sharm-el-sheikh-work-programme-gga>

2.3.2 Common themes in the literature on adaptation monitoring and evaluation

A number of key themes have emerged in the literature on adaptation M&E (see Table 4). Most of the literature on adaptation M&E is theoretical or conceptual in nature. Ex-post evaluations of adaptation actions are still rare in scientific literature, even though hundreds of such evaluations have been carried out in varying degrees of detail and rigour for internationally funded adaptation projects (see e.g., Adaptation Fund, 2021). Reporting on adaptation results is also still rare. Less than 2% of the journal articles identified by the Global Adaptation Mapping Initiative as documenting evidence of implemented adaptation contain primary evidence of its outcomes (Berrang-Ford et al., 2021).

Table 4: Themes in the literature on adaptation monitoring and evaluation.

Themes	Description	Selected examples
Success of adaptation	What is successful adaptation? What determines success and how can it be measured?	Adger et al. (2005), Doria et al. (2009), Dilling et al. (2019)
Maladaptation	What adverse effects can be caused by adaptation actions?	Reckien et al. (2023), Schipper (2020), Magnan et al. (2016)
Challenges	What distinguishes M&E of adaptation from M&E of other areas? What makes the assessment of adaptation challenging?	Bours et al. (2014b), Fisher et al. (2015), Dinshaw et al. (2014)
Indicators / metrics	What indicators or metrics can be used to assess adaptation?	Leiter & Pringle (2018), Leiter et al. (2019), Hinkel (2011)
Indices of vulnerability	How can vulnerability be measured and compared across communities, countries or geographic locations?	Kelly & Adger (2000), Brooks et al. (2005) – see IPCC (2022a, p.2607)
Frameworks and methods	Which frameworks and methods can be used to assess implementation of adaptation?	Bours et al. (2014a), Adaptation Committee (2016), Leiter (2017)
Evaluations of implemented adaptation actions	What results have adaptation actions or plans achieved?	Owen (2020), McNamara et al. (2020)
Specific to administrative / geographic levels		
Global level	How can adaptation progress be assessed at the global level?	Garschagen et al. (2022), Adaptation Committee (2021a), Leiter (2021b), UNEP (2017), Ford et al. (2015)
National-level	Are countries tracking the implementation of their national adaptation plans? How can adaptation progress at the national level be assessed?	Leiter (2013), Leiter (2015), Klostermann et al. (2018), Berrang-Ford et al. (2019), Leiter (2021a)
Project-level	How can the results of adaptation projects and interventions be assessed?	Olivier & Leiter (2013), Bours et al. (2014a), Leiter (2018)

Community-level	How can community-based adaptation be assessed?	CARE International (2012), Faulkner et al. (2015), Leiter (2016)
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Literature on adaptation M&E has early-on specialised on applications at different geographic or administrative levels (McKenzie Hedger et al., 2008; Spearman & McGray, 2011). Owing to the strong influence from development cooperation, most of the literature is concentrated on adaptation M&E at the project or action level. Far fewer articles cover adaptation M&E at the national level, which is one of the areas where this thesis has made a novel contribution (see chapter 7). The newest and least explored area is adaptation progress at the global level which is further outlined in the section 2.4.

2.3.3 Linkage to literature on vulnerability and resilience assessments

Since the IPCC WGII reports view the reduction of climate risks and climate vulnerabilities as the outcomes of adaptation (see 1.3.4, 1.4.2 and 1.4.3), assessments of climate risks, vulnerabilities and resilience would appear to be directly contributing to efforts to assess adaptation implementation. However, the vast majority of climate vulnerability or risk assessments are one-off assessments that are carried out to inform planning or decision making (or end up informing nothing at all). To be relevant to M&E, vulnerability or risk assessments would a) need to be repeated over time so that temporal changes in vulnerability can be assessed, and b) an additional analysis linking any reductions in risks or vulnerabilities to adaptation measures would be required to establish attribution (Leiter, 2018). Furthermore, much of the literature on climate vulnerability assessments takes an uncritical approach that assumes that vulnerability is static and determined by externally defined indicators. O'Brien et al. (2007, p.83) conclude: "vulnerability reduction' as a policy objective may be rhetorically non-controversial, but what this means in practice depends on the particular interpretation of vulnerability".

A dedicated body of literature on measuring climate resilience has emerged over the recent decade (Schipper & Langston, 2015). Due to the conceptual ambiguities of the term (see 1.4.3), approaches to its measurement suffer from similar challenges and reductionist thinking than those of vulnerability assessment (Levine, 2014). One of the most profound critiques of resilience measurement frameworks is their failure to account for the dynamic nature of resilience. Furthermore, even if the resilience of a particular group of people is deemed sufficient to withstand events of a certain magnitude, multiple extreme events occurring in succession can still overwhelm the level of resilience (Jones & Ballon, 2020). Measurements of resilience based on indicators defined by outside experts can also lead to significantly different results than when people self-rate their resilience (Jones & d'Errico, 2019). High-frequency gathering of relevant data via mobile-phone applications can provide a significantly richer understanding of the dynamics of resilience and can help to understand how and why resilience fluctuates over time (Knippenberg et al., 2019).

To date, literature on measuring resilience has remained largely separate from literature on adaptation M&E. This separation is likely due to the different origins and communities around these concepts, as Janssen et al. (2006, p.240) observed: "the resilience knowledge domain is only weakly connected with the other two domains [adaptation and vulnerability] in terms of co-authorships and citations." Despite the lack of integration, literature on resilience measurement has been confronted with the same challenges that assessments of adaptation results also face, especially around attempts to quantify resilience globally on a single indicator (Hallegatte & Engle, 2019).

2.4 Global assessments of adaptation progress

2.4.1 Policy context

The Paris Agreement has established a Global Goal on Adaptation (GGA) “of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change (...) in the context of the temperature goal referred to in Article 2” (UNFCCC, 2015, Article 7.1). The Paris Agreement has further mandated the Global Stocktake that periodically takes stock of the collective progress towards the goals of the agreement to also “(d) Review the overall progress made in achieving the global goal on adaptation” (UNFCCC, 2015, Article 7.14d). This mandate has created a policy demand to assess global progress on adaptation.

Contrary to what is sometimes asserted in the literature (e.g., Magnan, 2016), neither the Paris Agreement nor its rulebook from 2018 provide any specifications as to how adaptation progress is to be assessed. A COP decision in 2015 issued a mandate to develop methodologies for “Reviewing the adequacy and effectiveness of adaptation and support” (UNFCCC 2015, paragraph 45). The Adaptation Committee under UNFCCC also produced a report that reviewed possible approaches to assessing progress. Yet, none of these processes has led to the formulation of any specific proposal how to measure adaptation progress nationally or globally (Adaptation Committee 2021a, 2021b). In fact, to this date it has remained unresolved how progress towards the GGA could be assessed (Leiter, 2022; Leiter, 2023a).

2.4.2 Global assessments of adaptation progress

The first international assessment of adaptation progress was published in 2007 (Gagnon-Lebrun & Agrawala, 2007). It examined country reports (National Communications) submitted by developed countries to UNFCCC. Lesnikowski et al. (2015) used the same data source for the period 2008-2012 and found that “progress on actual adaptation interventions (...) is limited” (p.288). In 2011, Berrang-Ford et al. (2011) conducted a systematic review of scientific literature and concluded that “the majority of studies report on vulnerability assessments and natural systems (or *intentions* to act), not adaptation actions” (p.25, emphasis in original). Such global assessments have remained rare and rather limited in their data sources.

Global assessments of adaptation implementation face a variety of challenges ranging from a lack of global data sources, a lack of consistency in definitions, ambiguity in what to count as adaptation, time-lags between action and reporting, and the limitation that many adaptation actions never make it into journal articles or into government reports to UNFCCC (Ford & Berrang-Ford, 2016; Lesnikowski et al., 2017a). Trade-offs e.g. between ease of accessing data and the ability to get detailed local information from a large number of countries, or between high data standards and data from a large variety of providers make global progress assessments of adaptation even more complicated.

A particularly daunting challenge is which standardised units to use to capture adaptation. Unlike mitigation which is about physical quantities that can be universally measured irrespective of location of the emission, adaptation is highly context specific which makes it virtually impossible to establish a single all-encompassing outcome metric for adaptation (Leiter & Pringle, 2018). The IPCC AR4 confirms that “adaptation has no common reference metrics in the same way that tonnes of GHGs or radiative forcing values are for mitigation” (IPCC, 2014a, 853). Burton et al. (2008) observe an important consequence: “Adaptation yields benefits in the form of losses prevented. Many of these benefits fall locally in the places where the adaptation measures are adopted, and cannot be readily cumulated into some aggregate global total in terms of a single metric or set of metrics” (p.27). Nevertheless, the search for a set of supposedly universal global adaptation indicators has

been ongoing, driven by demands from policy and funding bodies and based on a reductionist understanding of adaptation.

Partly due to these challenges, systematic global or intercontinental assessments of adaptation progress have remained very rare. Those that had been undertaken by 2018 used two data sources: national documents submitted to UNFCCC and information contained in journal articles. Both sources typically have a multi-year time lag and only feature a small proportion of actual adaptation actions. Berrang-Ford et al. (2019, p.441) therefore conclude that "the gap between the need for systematic adaptation tracking frameworks and the methodological tools currently available is vast, reflecting a 'grand challenge' for adaptation research". Persson (2019) finds that the global goal on adaptation under the Paris Agreement "will therefore have to rely on more complex and diverse metrics and reporting as a basis for accountability"⁴⁷ and posits as the second out of three research needs "how to ensure that the global stock-take and the global goal on adaptation under the UNFCCC become meaningful" (p.9 and p.13).

2.5 Research framework

2.5.1 Framework and research questions

As outlined in the previous section, there is a clear and compelling need for further research into the question "Are we adapting to climate change" at the global level. The **research aim** of my thesis therefore is to improve our understanding of global progress on adaptation to climate change. This aim is very timely and addresses research demands from academia and from the policy community as well. While the research need has been consistently pointed out (see 1.5.1), many recent contributions have been in the form of commentaries or viewpoints (e.g. Dilling et al., 2019; Fisher, 2023). Empirical studies of global progress on adaptation remain a crucial gap. My PhD thesis has therefore set out to address this 'grand challenge' of adaptation research.

When I began my PhD studies in October 2018, there were just two frameworks to assess global progress on adaptation. The first was a proposal to adopt a systematic review method under the Global Stocktake (Tompkins et al., 2018). While methodologically sound, the first step of this approach ("Step 1: Obtaining consensus on the objectives of adaptation") would have already been politically highly challenging to realise under UNFCCC given the different views about what adaptation entails and given that the ambiguous nature of the term helps to connect different positions (see 1.3.4). Even the "careful guidance" that the authors suggest being provided to countries would have not resolved this political challenge. Accordingly, the approach has not been taken up by the first Global Stocktake that concludes in December 2023.

Another framework concentrates on the different sources of information that can inform the review of progress towards the Global Goal on Adaptation (GGA) as mandated by Article 7.14d of the Paris Agreement. This framework, which I co-developed, was published in the framing chapter of the 2017 Adaptation Gap Report by UNEP (UNEP, 2017). As shown in Figure 9, the framework distinguishes between approaches and information sources at the national and at the global level and points out where global assessments can draw on information submitted by countries to the UNFCCC secretariat or on a synthesis of these and other sources of information. The term 'synthesis' in this context was proposed by Patrick Pringle and me as an alternative to the term 'aggregation' because

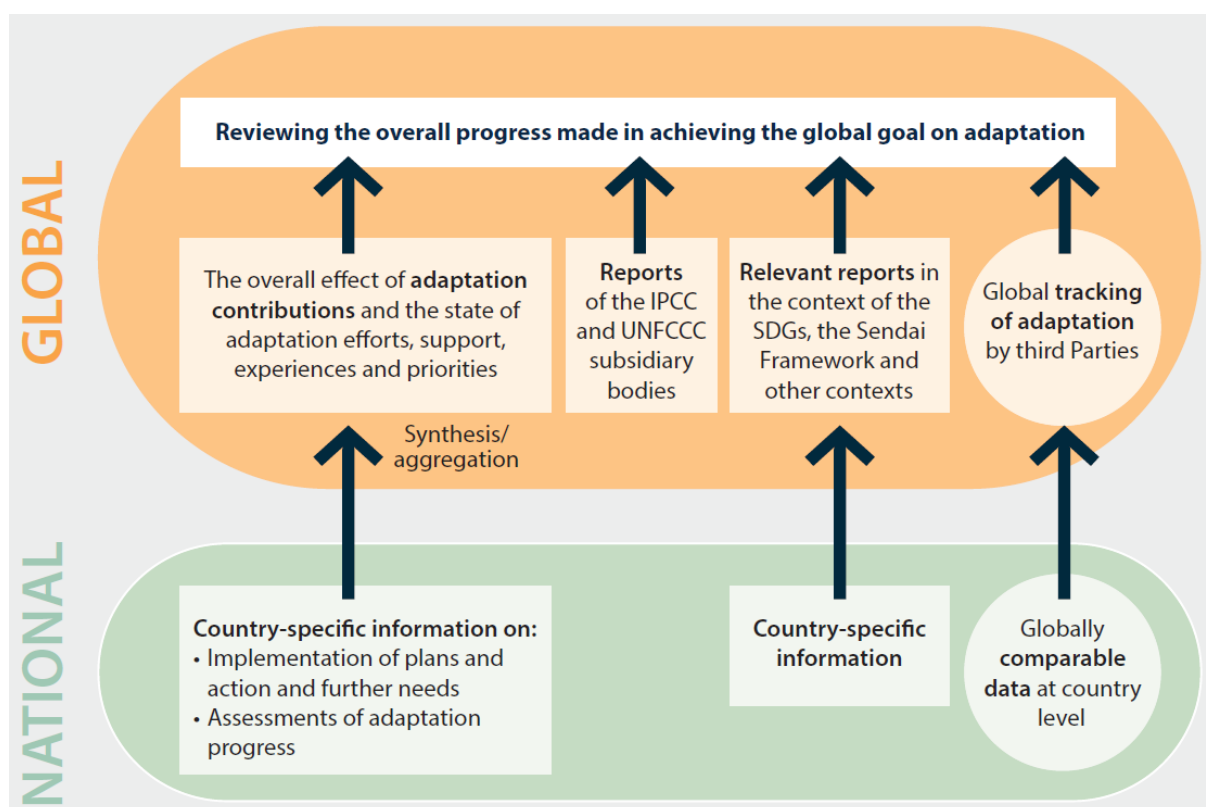
⁴⁷ It remains unclear who is supposed to be accountable and to whom, since adaptation is not recognised as a global public policy problem, as Persson notes in her article. Furthermore, countries under the Paris Agreement do not have any binding adaptation commitments to other countries except regarding the provision of support (see chapter 4).

the latter is often interpreted as mechanistic aggregation of numerical values which does not work well for the concept of adaptation (Leiter & Pringle, 2018; Leiter, 2015; Burton et al., 2008).

The framework in its 2017 version is rather descriptive and unpolitical. To open it up to a more critical analysis I have added two meta layers: First, the reporting provisions of the Paris Agreement are the result of political negotiations. Hence, the first additional layer of analysis is studying the development of transparency rules under the Paris Agreement, i.e. examining what led to the rules that underpin some of the information flows shown in Figure 9 (chapter 4). As a second layer, I am exploring in how far the global negotiations themselves have progressed since the Paris Agreement, i.e. in how far the detailed rules that were agreed three years after the adoption of the Paris Agreement and any decisions thereafter present any advancement on adaptation at the global political level (chapter 6).

In addition to these two meta layers, I am empirically examining some of the information flows shown in Figure 9, namely whether countries are tracking the implementation of their national adaptation planning instruments (chapter 7). An additional motivation not explicitly shown in Figure 9 but discussed in subsequent editions of the Adaptation Gap Report is moving from information on planning and finance to information about actual implementation of adaptation, because the former cannot reliably indicate the extent and focus of implementation (Leiter, 2021a, 2021b; chapter 8).

Figure 9: Using multiple sources of information to review progress towards the Global Goal on Adaptation.



Source: I led the drafting of this figure which was published in the Adaptation Gap Report 2017 (Möhner et al., 2017, p.13).

Adding these two political meta layers while maintaining the potential for empirical analysis from the initial framework indicates several areas for novel contributions to our understanding of global

progress on adaptation. The respective research questions that I have addressed under the broader umbrella question of “Are we adapting to climate change?” are:

1. What influences the rules for government disclosure about adaptation progress under the Paris Agreement? (Chapter 4)
2. How can progress on adaptation under the UNFCCC negotiations be understood and have any advancements on adaptation been made under the Paris Agreement since its adoption? (Chapter 6)
3. In how far do governments track the implementation of their national adaptation plans? (Chapter 7)
4. What is adaptation finance from global climate funds being spent on and how has the extent of implemented projects changed over time? (Chapter 8)

Each chapter specifies its respective research questions in further detail. Chapter 3, my contributions to the IPCC Sixth Assessment Report, acts as an extended literature review of the state-of-the-art on adaptation monitoring and evaluation. The final part of this framing chapter reviews the research methods I have used and discusses relevant aspects of research ethics. Each subsequent chapter begins with an introduction note that outlines the novelty and significance of the included publication and reviews additional literature.

2.6 Research methods and ethics

2.6.1 Overview

Multiple research methods have been applied to address the research questions outlined in the previous section. In general, a combination of multiple research methods can lead to more robust results since the disadvantages of one method can be offset by another. Different research methods and types of data being gathered can also expose the researcher to different perspectives. Most of the articles included in this thesis therefore use a combination of multiple research methods (see Table 5). While quantitative methods have been used elsewhere to study global negotiation settings, e.g. network analysis based on Actor Network Theory (Paterson, 2019), qualitative research methods are particularly well suited to understanding processes and unpacking experiences (Flick, 2006).

Participant observation enables studying dynamic settings and complex processes that need to be ‘experienced’ to understand how they function and what is occurring (see section 2.6.4). As Duffy (2014, 129) notes, event ethnography “allows us to get at the story behind international level decision-making”. Other qualitative research methods like interviews could provide insights into how people experience the negotiations, but they would likely generate only an incomplete picture of the complex multi-actor process. Furthermore, due to the high political sensitivity officials are often simply not allowed to give interviews. The negotiation periods are very intense for negotiators, and anyone closely involved would be very unlikely to have time for research interviews. The primary research methods used in this thesis therefore are participant observation, qualitative document analysis, and systematic reviews. Each of these research methods is outlined in more detail in the following sections. The final section of this chapter discusses research ethics.

Table 5: Research methods used in the articles of this thesis.

Chapter	Article	Research methods
3	Adaptation Monitoring, Evaluation & Learning	Literature review
4	Transparency rules in global environmental governance: Transparency under the Paris Agreement	Participant observation, document analysis, literature review
5	Nationally determined contributions (NDCs) as a governance instrument	Participant observation, document analysis and literature review
6	Progress on adaptation in the climate change negotiations since the adoption of the Paris Agreement	Participant observation, document analysis
7	Global stocktake of national adaptation M&E systems	Systematic review, document analysis (thematic analysis)
8	Analysis of adaptation project documents under global climate funds	Document analysis (qualitative coding)
Berrang-Ford et al., 2021	Systematic global stocktake of evidence on human adaptation	Systematic review, document analysis (qualitative coding)

2.6.2 Systematic reviews

Systematic reviews aim to systematically search through the vast amounts of published scholarship whilst simultaneously increasing transparency and reproducibility (Petticrew & Roberts, 2008). Originating from the health science, systematic reviews clearly specify every step of the review, including a clear aim, justification for the data sources, exclusion and inclusion criteria, and documentation of results (Bilotta et al., 2014). Berrang-Ford et al. (2015, p.756) write: “systematic review approaches provide a conceptually appropriate and practical opportunity for increasing methodological transparency and rigor in synthesising and tracking adaptation research”. Their article has been influential in increasing the use of systematic reviews in adaptation research, including as part of the Global Adaptation Mapping Initiative (Berrang-Ford et al., 2021). It also provides guidance for undertaking a systematic review.

While most systematic reviews in scientific literature search for evidence in academic journals, systematic reviews can also be applied to “grey literature” and policy documents. What sets systematic reviews apart from traditional literature reviews is their clear documentation of a systematic search and analysis strategy. Accordingly, I have applied a systematic review for my global stocktake of national adaptation M&E systems (Leiter, 2021a; chapter 7). During the coursework phase of the PhD programme, I also undertook a systematic review of literature on global climate change negotiations for a summative assignment in the course “MY521 Qualitative Research Methods”. Later that year, I submitted a modified version of this assignment to an open call for PhD researchers from the MARIPOLDATA project⁴⁸ which resulted in my contribution to the book “Conducting Research on Global Environmental Agreement-Making”, part of the Earth System Governance book series (Langlet et al., 2023).

⁴⁸ <https://www.maripoldata.eu/newsevents/#workshopmethods>

2.6.3 Document analysis

Document analysis can be based on numerous methods including quantitative and qualitative approaches. I have used two methods for systematic document analysis: qualitative coding and thematic analysis. For my analysis of adaptation project documents (Leiter, 2021b; chapter 8), I first selected relevant themes and then defined several categories under each theme (e.g. different degrees of involvement of most vulnerable populations). I refined the definitions based on a test run of coding and later applied the final definitions consistently across the dataset. In another application under the Global Adaptation Mapping Initiative, a detailed codebook had already been developed before I joined the initiative (see supplementary materials in Berrang-Ford et al., 2021). Every journal article that had been identified by programmed machine learning as being likely relevant to the inclusion criteria was then manually coded by at least two researchers. I coded the highest number of articles within the group that focused on the European cluster. In the subsequent synthesis stage, I identified a very low inter-rater reliability for some of the items in the codebook. For example, there appeared to be very different interpretations of what hard and soft adaptation limits are, and the coding for this item was subsequently partly unreliable. This experience underscores the importance of training coders and of detailed instructions in the codebook. With over 120 authors and coders joining the initiative at different points in time, the Global Adaptation Mapping Initiative faced particular challenges that other coding exercises with a small number of coders can address relatively easily, e.g. through a test run of coding and joint discussion of any deviations until a high degree of reliability is achieved. This was not possible at the scale of over 100 authors. In any case, it was a very valuable experience for me to have been part of such a large research initiative that made a significant contribution to systematic assessments of adaptation implementation.

Another approach employed in document analysis is **thematic analysis**. Thematic analysis aims to capture patterns across qualitative datasets. Hence, it is used to identify themes that can then be further analysed. Thematic analysis is not tied to a particular theoretical or philosophical position which makes it particularly suitable for exploratory inquiries (Braun & Clarke, 2006). As Braun et al. (2018) point out, thematic analysis is an umbrella term rather than a fixed approach and needs to be specified. I draw on what they refer to as *reflexive* approach that is “fully qualitative” and where themes are the *output* of coding (Braun et al., 2018, p. 6). Thematic analysis informed the structuring of the discussion section in my global stocktake of national adaptation M&E systems (Leiter, 2021a; chapter 7).

2.6.4 Participant observation

Participant observation aims to discover how something actually works (Flick, 2006, p. 200). Its major advantage is its directness – the researcher essentially becomes the research instrument (Robson & McCartan, 2016, p.320ff.). Participant observation intends to analyse social reality by trying to observe the “natural” cause of events (Flick, 2006, p.205). Traditional participant observation originated in the disciplines of sociology and anthropology to study the culture and structure of communities (Fine, 2015; DeWalt & DeWalt, 2011). This differs a lot from the setting of large international meetings which Campbell et al. (2014, p.3) define as “moments when diverse actors, normally dispersed in time and space, come together to produce—through decisions, interpersonal relationships, information exchange, etc.—environmental governance.” Brosius & Campbell (2010, p.247) find “there has been a surprising lack of ethnographic attention to ‘the meeting’ as a field site”. Event ethnography adapts the practices of ethnography to the settings of large events (see for example two special issues in the journal *Global Environmental Politics*, 19(2), May 2019, and 14(3), August 2014).

Participant observation is commonly differentiated according to the extent of active involvement, which Adler & Adler (1987) distinguish into three types: peripheral membership, active membership, and complete membership. Complete membership means being fully immersed into the group

without a visibly different role. Full membership helps to avoid some of the challenges usually associated with participant observation, such as being perceived as an outsider. However, recent research on qualitative methods finds that these traditional distinctions between a passive observer and an active participant seldom apply as neatly in practice (Seim, 2021). Moreover, different roles of involvement, sequentially assumed during an extended period of participant observation, can enrich insights by gaining different perspectives (ibid.).

Negotiations on international agreements are ultimately about the production of text. However, as Smith (2005) points out, the final text masquerades the politics and processes that led to it, and abstract language can disguise meanings and motives. It is therefore critical to “make visible the activities that have systematically been made invisible through the abstraction effected by the documentary reality of the UN” (Eastwood, 2006, p.184). The field of institutional ethnography has paid attention to observing what actual people actually do and thereby discovering what actually happens, rather than starting the analysis through the prism of normative concepts or theories (Smith, 2005). Applied to UN negotiations this means “unpacking the generalizing and abstracting mechanisms” and exploring “the ways in which actual people and the issues they represent get incorporated into (or disenfranchised from) the policymaking process” (Eastwood, 2006, p.182 &183).

Understanding the negotiation process from the inside demands access and involvement (Weisser, 2014). Furthermore, to effectively conduct participant observation it is essential to understand the work knowledge and customs of the targeted community (Bach & Martin, 2023). I have gained high familiarity with the UNFCCC negotiation process by participating in climate change negotiations since 2015, first as an observer for Germany’s international development agency (GIZ), then in 2018 and 2019 as member of the German delegation, and since 2021 as an observer for LSE. During my role as a technical advisor in the German delegation, I attended negotiation sessions, informal meetings and government only negotiation meetings (see Figure 10). Accreditation as a country (Party) delegate provided a level of access that researchers rarely have. The regular observer accreditation that researchers and civil society usually hold does not allow access into government-only negotiation sessions, which Campbell et al. (2014) note as limitation in their event ethnography of the UN biodiversity conference. The combination of different roles as a participant enabled me to observe the negotiations from different perspectives which provided further insights, confirming a recent finding by Seim (2021).

Regarding reflexivity, “Ethnography accepts that observers are not neutral, that observation is always contextualized” (Campbell et al., 2014, p.15). The challenge is to gain the inner perspective whilst keeping the ability of critical reflection from the outside (Flick, 2006, p. 210). Reflexivity is therefore crucial to avoid “going native” – to be so immersed that observations are uncritically adopted (ibid.). At the climate change negotiations this does present a trade-off. Due to the political sensitivity one needs to be a trusted member in order to get access to the actual negotiations rather than just access to side events, i.e. thematic meetings that take place in the surroundings of the negotiations. Furthermore, high familiarity with UNFCCC processes is required to understand and interpret practices. Hence, some degree of immersion in the UNFCCC process is required to understand it (see the experiences outlined in Langlet et al., 2023). While I am by now certainly an insider having attended thirteen negotiation sessions since 2015 including five COPs, participating in climate change negotiations is only one part of my day-to-day work. Being based in the research community (rather than in government offices as most negotiators are) provides a way to reflect on the events from a different perspective.

Figure 10: Huddle with negotiators during a late evening session on the “Koronivia Joint Work on Agriculture”, 6 December 2019 at COP25 in Madrid, Spain.



Global negotiations under the United Nations are by their very nature a highly politicised arena. Research of these negotiations can be influenced by one’s worldviews, values and positionality within the negotiations. Despite being accredited by three organizations from developed countries, due to my former job in international development cooperation at GIZ including a multi-year position in Tanzania, I have been in frequent contact with negotiators from the Global South and am very familiar with the challenging circumstances developing countries face. I have been travelling to 35 developing countries and have co-facilitated several training programmes for government officials from Least Developed Countries together with the LDC Expert Group under UNFCCC. My direct exposure from living in and travelling to developing countries and my regular contact with officials and colleagues from developing countries enable me to critically reflect on my positionality of being accredited through Northern-based organisations. Due to my understanding of the perspectives of different country groups, the UNFCCC secretariat is regularly inviting me as a co-facilitator for UNFCCC workshops. Since 2022, I have co-facilitated four in-person workshops under the work programme on the Global Goal on Adaptation (Leiter, 2023a). Furthermore, my research is also not normative in the sense that it does not try to suggest which political positions should be taken or which standpoints have higher merit than others. Overall, while observers are not neutral as Campbell et al. (2014, p.15) note, being mindful of the realities developing countries face helps me to avoid uncritical interpretations of negotiation positions. Finally, I am triangulating my data and findings with other published accounts of the negotiations, especially those representing views of the Global South (e.g. Bueno Rubial & Siegele, 2020). Triangulation is also important to increase the accuracy of observations which has been a concern in ethnographic research (Lubert, 2019).⁴⁹

⁴⁹ Qualitative research has different quality criteria than quantitative research (Dellinger & Leech, 2007). To Braun et al. (2018), reliability-driven approaches are “at odds with (fully) qualitative paradigms” (p.5).

2.6.5 Research ethics

Research that engages or involves humans (or animals, for that matter) needs to consider research ethics. The default approach is to inform individuals about the research, stress that participation is voluntary, and obtain written consent. I followed this approach in my Master thesis which used semi-structured interviews as a research method (Leiter, 2011). The qualitative research undertaken for this PhD thesis did not involve formal interviews, but many informal exchanges and observations as part of my participant observation at the UN climate change negotiations. The setting of a large conference with thousands of participants makes it practically impossible to obtain informed consent. Even if it was possible, informing people of scientific observation could influence the very processes that the research is trying to study. The UK Data Service clarifies that obtaining informed consent is not universally mandatory and “there are cases where it is not appropriate and flexibility in evaluating projects on their individual merits is essential” (UK Data Services, 2018). Literature finds that covert observation can be justified in cases where information could otherwise not be accessed and where there are no negative consequences for those involved (Robson & McCartan, 2016, p. 217). The case of observation in public spaces is commonly cited as a circumstance that makes obtaining informed consent impossible (e.g. Flick, 2006, p. 201; also mentioned as an option in LSE’s Research Ethics Checklist part I, section 8 (see Annex B in LSE, no date)).

Participant observation without obtaining informed consent can be ethically justified as follows: the UN climate negotiations have explicitly created the participant category of “observers” and there are actually more observers than negotiators at COPs. Since observers are constantly around, anyone attending the UN climate change negotiations should be mindful that they could potentially be observed, unless it is in government-only meetings or other spaces where observers are excluded. For spaces where observers are permitted, it can be assumed that people provide implicit consent by participating in the event. In fact, in the first negotiation session of every agenda item at the COP and the intersessional negotiations, the co-facilitator asks negotiators whether observers are allowed to be in the room. This serves both as a reminder to everyone that observers are present and as obtaining *de facto* consent for the possibility of being observed. Obviously, such a *de facto* consent does not include consent for any personalised recording or direct quoting unless the quote is voiced on the microphone in the room *and* the respective session is streamed live on the internet or a recording is being made available by the UNFCCC secretariat, which is the case for the opening and closing sessions of COPs and for several mandated events.

Before my first participant observation as part of the PhD, I submitted a research ethics form to LSE to seek approval. The Chair of LSE’s Research Ethics Committee decided that “Self-certification of your ethics review is fine in this case” (Email from Lyn Grove, LSE Research Governance Manager, 30.11.2018). I am also not identifying any of the negotiators and observers I spoke with and am not quoting from any statements made in negotiation sessions. Furthermore, any confidential information I learned from other participants or through my role on the German delegation remains strictly confidential. Several researchers have undertaken participant observation as a non-negotiating delegation member (e.g. Aalbu & Longva, 2022) and several current or former negotiators have published insider accounts from the climate change negotiations, for example Dimitrov (2016), Bodansky (2016), and the former lead coordinator on adaptation for developing countries, Maria Pilar Bueno Rubial (2020).

3 Adaptation Monitoring, Evaluation and Learning – contributions to the IPCC AR6 Working Group II

3.1 Authoring the M&E sections in the AR6 WGII report

During the initial phase of my PhD studies, at the recommendation of several Professors including my supervisor Declan Conway, the Coordinating Lead Authors (CLAs) of Chapter 17 of the IPCC Sixth Assessment Report (AR6), Working Group II (WGII) invited me to write the section on adaptation M&E. When I joined the Sixth Assessment cycle as a contributing author in January 2020, the first-order draft had already been sent out for expert review and I had provided extensive comments on it in December 2019. The extent and substance of my comments likely contributed to being invited to join the author team of chapter 17. In the onboarding call with the respective CLA, I insisted on rewriting the section on M&E entirely since its first-order draft was based on a narrow set of literature, and in my view did not suffice for an IPCC AR in terms of comprehensiveness, consistency of M&E terminology, and awareness of the evolution of the literature and current thinking on adaptation M&E. I therefore wrote section 17.5.2 “Adaptation Monitoring, Evaluation & Learning” from scratch and with minimal editing from the CLA.

In the first-order draft of WGII, the section on M&E of adaptation had been placed before the section that discusses what successful adaptation actually means. This order did not appear logical to me, and I proposed to shift it the other way around so that M&E can build on an understanding of what successful adaptation is. This shift was agreed to and subsequently implemented in the second-order draft of chapter 17. In 2020 and 2021, there were several rounds of revisions including in response to the expert review of the second-order draft. The comments to the M&E section required only minor changes and the main adjustments during this period were to shorten the section, to shift the order of sub-sections, and to be more “solution-oriented” rather than problem-focused. Despite the pressure to propose solutions, I retained a critical stance where published literature provided sound justification for it, especially around the limitations of global indices for understanding adaptation progress and informing decision making (see section “17.5.2.3 Adaptation Indicators and Indices” on p.46). I also rejected uncritical “buzz word” phrases such as “M&E ensures better decision-making”, instead emphasizing the importance of clearly spelling out the purpose of M&E and designing an M&E system that is capable of addressing that purpose (see e.g. Pringle, 2011; Leiter, 2013, 2016, 2017).

In 2021, when the numerous chapters of the AR6 WGII report were aligned with each other, I also became a contributing author of chapter 1 and revised the second-order draft of its respective M&E section (“1.4.3 Monitoring and Evaluation of Adaptation”). My detailed revisions were edited by the responsible lead author, Thomas Bernauer, and in the final round by the CLAs. My main contributions were ensuring that readers get clarity and orientation about M&E and its terminology at the very beginning of the AR6 WGII report and ensuring consistency between the introduction of the report and the main M&E section in chapter 17. I also revised the figure contained in that section based on a figure I had published in 2018 (see 2.2, Figure 8).

In addition to chapter 1 and chapter 17, I also supported work on the glossary of WGII and successfully suggested removing the entry for “Adaptation assessment” whose definition had been carried forward for at least three assessment cycles. At the end of the 90s, when literature on adaptation M&E practically did not exist yet, the term “adaptation assessment” was referring to the appraisal of adaptation options, i.e. it meant assessing what adaptation actions could be undertaken. Twenty years later, this definition no longer reflected how the term “assessment” was used in the context of adaptation (see 2.2). Had the old definition been carried forward yet again in the AR6, it

would have added to confusion between ex-ante evaluations (feasibility studies and appraisal of adaptation options) and M&E of implementation which are distinct in their methods and applications.

3.2 Cross-Chapter Box PROGRESS

In September 2020, I was invited to also join the author team of the Cross-Chapter Box “PROGRESS | Approaches and Challenges to Assess Adaptation Progress at the Global Level”. The content of this box changed substantially between the first-order draft that I had not been involved in and subsequent versions. The revised Cross-Chapter Box reviews multiple approaches to assessing global progress on adaptation which speaks to the policy demand for information on global progress without prescribing a particular approach. My substantial contributions to the Cross-Chapter Box were recognised by placing me second in the order of authors, just behind the CLA of the Box (Matthias Garschagen).

3.3 Significance of the contribution

The AR6 presented an opportunity for a compact and well-informed M&E section that provides orientation on this topic for years to come. Unlike the AR5 whose literature cut-off date was August 2013¹, the AR6 could draw on a far more nuanced and larger literature base on adaptation M&E and on empirical experiences from practical application. In the AR5, the M&E section was strangely placed in the chapter on “needs and options” rather than in the implementation chapter (IPCC, 2014). This placement might be explained by the common conflation with ex-ante assessments (see 2.2). AR6 presented an opportunity to accurately place M&E into the adaptation cycle outlined in chapter 1 of the AR6 while avoiding uncritical and mechanistic notions that present M&E as a solution that somehow automatically delivers the right information to the right places.

The Cross-Chapter Box “PROGRESS” presents a novel contribution to the global debate on assessing adaptation progress by providing an overview of the different approaches and data sources that have so far been used. I co-led the development of its main table (“Key approaches and data sources used for global adaptation assessments”) which built on a strategy I had already introduced in the Adaptation Gap Report two years earlier: combining multiple approaches and data sources to better understand adaptation progress (see chapter 8 of this thesis). The Cross-Chapter Box confirmed the efficacy of this strategy by concluding: “One overarching conclusion of this Cross-Chapter Box therefore is that the combination of different approaches will provide a more comprehensive picture of global adaptation progress than is currently available from individual approaches (limited evidence, high agreement)” (Garschagen et al., 2022, p.2613).

In addition to the M&E section of chapter 1, I also contributed to the development of Figure 1.7 “Assessing adaptation solutions and success”. My main contribution was to clearly separate the assessment of *intentions* from that of implemented *actions* to avoid a false sense of progress and to ensure clarity and consistency in methods and terminology, thereby contributing to one of the aims of IPCC Assessment Reports.

¹ See: https://www.ipcc.ch/site/assets/uploads/2018/03/IPCC_WG2AR5_Questions.pdf

17

Decision-Making Options for Managing Risk

Coordinating Lead Authors: Mark New (South Africa), Diana Reckien (the Netherlands/Germany), David Viner (UK)

Lead Authors: Carolina Adler (Switzerland/Chile/Australia), So-Min Cheong (Republic of Korea), Cecilia Conde (Mexico), Andrew Constable (Australia), Erin Coughlan de Perez (USA), Annamaria Lammel (France), Reinhard Mechler (Austria/Germany), Ben Orlove (USA), William Solecki (USA)

Contributing Authors: Rawshan Ara Begum (Malaysia/Australia/Bangladesh), Lea Berrang-Ford (UK/Canada), Rachel Bezner Kerr (Canada), Sukaina Bharwani (UK), Robbert Biesbroek (the Netherlands), Laurens Bouwer (the Netherlands), Emily Boyd (Sweden), Lily Burge (UK), Massimo Cattino (Italy), Isabelle Cojocaru-Durand (Canada), Riyanti Djalante (Japan), Mauricio Domínguez Aguilar (Mexico), Kristie Ebi (USA), Hannah Farkas (USA), Simon French (UK), Katja Frieler (Germany), Matthias Garschagen (Germany), Aduugna Gameda (Ethiopia), Francois Gemenne (Belgium), Michael Gerrard (USA), Elisabeth Anne Gilmore (USA), Nicoletta Giulivi (Italy/Guatemala), Maron Greenleaf (USA), Marjolijn Haasnoot (the Netherlands), Ralph Hamman (Germany), Kirstin Holsman (USA), Christian Huggel (Switzerland), Margot Hurlbert (Canada), Kripa Jagannathan (India/USA), Catalina Jaime (UK/Colombia), Richard Jones (UK), Sirkku Juhola (Finland), Rachel E. Keeton (the Netherlands/USA), Zoe Klobus (USA), Carola Kloeck (Germany/France), Bettina Koelle (South Africa/Germany), Robert Kopp (USA), Carolien Kraan (the Netherlands), Judy Lawrence (New Zealand), **Timo Leiter** (Germany/UK), Robert Lempert (USA), Debora Ley (Mexico), Tabea Lissner (Germany), Megan Lukas-Sithole (South Africa), Katharine Mach (USA), Alexandre Magnan (France), Kathleen Miller (USA), Lionel Mok (Canada), Veruska Muccione (Italy), Rupa Mukerji (India), Johanna Nalau (Australia/Finland), Baysa Naran (Mongolia), Camille Parmesan (USA), Lei Pei (China), Mark Pelling (UK), Rosa Perez (Philippines), Lavinia Perumal (South Africa), Patricia Pinho (Brazil), Madeleine Rawlins (UK), Neha Rai (UK), Britta Rennkamp (South Africa/Germany), Alexandra Rinaldi (USA), Olivia Rumble (South Africa), Liane Schalatek (USA), Emma Lisa Freia Schipper (Sweden/USA), Pasang Yangjee Sherpa (USA/Nepal), Sabrina Shih (USA), Roopam Shukla (India/Germany), Rachael Shwom (USA), Nick Simpson (Zimbabwe/South Africa), Chandni Singh (India), Doreen Stabinsky (USA), Adelle Thomas (Bahamas), M. Cristina Tirado-von der Pahlen (USA/Spain), Cathy Vaughn (USA), Maria Alejandra Velez (Colombia), Ivo Wallimann-Helmer (Switzerland), Charlene Watson (UK), Romain Weikmans (Belgium), Andrew Jordan Wilson (USA), Katy Wilson (UK), Mark Workman (UK), Anita Wreford (New Zealand)

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(10%), the elderly (8%), youths (5%), racial and ethnic minorities (4%), and migrants (4%) were the most frequently considered groups in adaptation responses. Individuals with disabilities are the least considered, with only 1% of articles including this group. There is a category of 'other' capturing characteristics of social disadvantage that are distinct from the categories above. This includes, for example, spatially marginalised populations (e.g., groups relegated to flood-prone or cyclone-prone areas) and groups marginalised due to marital status or assets (education, farm size and land tenure) (Araos et al., 2021).

Procedural equity and justice: Participation is employed to enable procedures that aim to redress power imbalances, which are assumed to be the root causes of vulnerability (i.e., the reasons that lead certain people and places to be differentially vulnerable to climate risks) (Tschakert and Machado, 2012; Shackleton et al., 2015; Schlosberg et al., 2017; Ziervogel et al., 2017). However, participation is often constrained by gender (Cross-Chapter Box GENDER in Chapter 18), social status, unequal citizenship (as concerns education, access to information, finance and media) (Wallimann-Helmer et al., 2019), entrenched political interests (Shackleton et al., 2015; Chu et al., 2017), power dynamics (Rusca et al., 2015; Taylor and Bhasme, 2018; Kita, 2019; Omukuti, 2020; Taylor and Bhasme, 2020) or institutional shortcomings (Nightingale, 2017, in Nepal), which allow the most powerful access to funding and reinforce marginalisation of the powerless (Schipper et al., 2014; Khatri, 2018; McNamara et al., 2020). Vulnerability is also sometimes used as a pretext to exclude groups from participation, often because vulnerable groups do not own land and lack legal status, time or the ability to commit labour or material inputs for adaptation, all drivers of vulnerability in the first place (Nyantakyi-Frimpong and Bezner Kerr, 2015; Camargo and Ojeda, 2017; Nagoda and Nightingale, 2017; Nightingale, 2017; Thomas and Warner, 2019; Mikulewicz, 2020).

Reporting from the global assessment of equity considerations in adaptation, procedural equity and justice was slightly more often mentioned (~52%) than not (~48%) (*medium agreement*). However, the robustness of the evidence on inclusion of vulnerable and marginalised groups in the planning of adaptation responses is low (63%) (*high agreement*). Only for ~6% of the articles that provide evidence for inclusion of vulnerable groups was the robustness of evidence high (*low agreement*). Globally, the categories of low income (~25%) and women (~13%) are most often included, although the robustness remains low. Most of the *robust evidence* comes from Africa and Asia, where adaptation responses mostly focus on low-income and women groups in the food (28%) and poverty (32%) sectors (*medium agreement*). With regard to other vulnerability categories, such as disabled populations, almost negligible evidence was found for the inclusion of this group, globally. There is also little reporting of procedural equity in community-based or ecosystem-based responses (Araos et al., 2021).

Distributive equity and justice: Attention to distributional equity and justice aims to ensure that adaptation interventions do not exacerbate inequities (Atteridge and Remling, 2018) and that the benefits and burdens of interventions are distributed fairly (Tschakert et al., 2013; Reckien et al., 2017; Reckien et al., 2018b; Pelling and Garschagen, 2019).

A global assessment of 1682 papers on adaptation (Araos et al., 2021) finds that about 60% of articles mentioned at least one vulnerable group being involved in the implementation of adaptation or targeted by it (*medium confidence*). Low-income groups (*high agreement*, 37% of 1682 articles) and women (*medium agreement*, 20% articles) are the most frequently mentioned. Particularly in sectors and regions that incorporated coping measures in their adaptation response (poverty, food, Africa, Asia, Central and South America), these groups are prevalent. In sectors where responses were more strategic or planned, such as in cities, terrestrial and water, in a larger proportion of articles (51%, 47% and 47% of articles, respectively) vulnerable groups were not frequently included in the response (*medium agreement*). There was also a stark difference in inclusion of marginalised and vulnerable groups between high-income and low-income countries or regions, with the majority of the responses from Australia, Europe and North America, not including marginalised groups (*high agreement* with 70%, 69% and 55% of articles, respectively), showing the need for increasing attention in particular on a cross-sectoral and cross-regional relation (Araos et al., 2021).

Flexible and strong institutions: There is *medium confidence* that flexible institutions can enable adoption of new adaptation measures or course-correct established ones based on ongoing monitoring and evaluation, which is key to avoiding potential maladaptation (e.g., Granberg and Glover, 2014, in Australia; Magnan et al., 2016; Torabi et al., 2018; Gajjar et al., 2019a, in India). Cross-sectoral, cross-jurisdictional and cross-spatial institutional frameworks enable successful adaptation by improving the ability of societies to respond to changes in their environment in a timely manner. The latter points to the vital role of monitoring and evaluation, as the tool to detect change in risk and vulnerability, together with environmental or societal conditions determining risk and the effectiveness, efficiency, adequacy or success of adaptation responses.

Beginning of my contribution

17.5.2 Adaptation Monitoring, Evaluation & Learning

17.5.2.1 Purpose of Monitoring and Evaluation

Adaptation responses have been observed in every region and across a wide variety of sectors (Section 16.3), but little evidence exists of their outcomes in terms of climate risk reduction (*high confidence*) (Section 1.4.3; Ford and Berrang-Ford, 2016; Tompkins et al., 2018; Berrang-Ford et al., 2021; Eriksen et al., 2021; UNEP, 2021a). To advance on that, the Paris Agreement is encouraging countries to engage in 'Monitoring and evaluating and learning from adaptation plans, policies, programmes and actions' (UN, 2015, Article 7.9d). Monitoring and evaluation (M&E) is the systematic process of collecting, analysing and using information to assess the progress of adaptation and evaluate its effects—for example, risk reduction outcomes, co-benefits and trade-offs—mostly during and after implementation (AR6 Glossary, Annex II). Distinctions between monitoring and evaluation typically view monitoring as a continuous process of tracking implementation and informing management to allow for corrective action including in situations of deep uncertainty (see Cross-Chapter Box DEEP in this Chapter), while evaluation is described as a more comprehensive assessment of achievements, unintended effects and lessons learned

carried out at certain point in time (OECD, 2002). M&E is an important part of the adaptation process (Figure 1.9). It can help to generate information on adaptation success or maladaptive outcomes.

M&E of adaptation is undertaken for different purposes, including: (1) understanding whether responses have achieved their intended objectives and contributed to a reduction in climate risks and vulnerability or to an increase of adaptive capacity and resilience, (2) informing ongoing implementation and future responses, and (3) providing upward and downward accountability (Preston et al., 2009; UNFCCC, 2010a; Pringle, 2011; Spearman and McGray, 2011). M&E is also commonly linked to learning (Section 17.5.2.7). By continuously monitoring implementation, for example, to assess whether adaptation is on track or needs to be accelerated, M&E can aid decision-making under uncertainty. Adaptation M&E is distinct from tracking financial flows related to adaptation since financial accounting does not provide information on implementation and outcomes (Section 17.5.2.5; Adaptation Partnership, 2012; World Bank Independent Evaluation Group, 2012).

17.5.2.2 Adaptation M&E Approaches

Adaptation M&E can be conducted for various purposes and in a wide variety of different contexts ranging from the local to the global level (McKenzie Hedger et al., 2008; UNFCCC, 2010a; Spearman and McGray, 2011). The context and specific purpose of M&E determine what information needs to be generated, and together with the available resources also determine the suitability of particular approaches and methods (Leiter, 2016; Leiter, 2017). Several frameworks and approaches have been proposed for M&E of adaptation and climate resilience (Bours et al., 2014d; Schipper and Langston, 2015; Adaptation Committee, 2016; ODI, 2016; Cai et al., 2018; Gregorowski et al., 2018), including sector-specific ones for agriculture (FAO, 2017; FAO, 2019a; FAO, 2019b), health (Ebi et al., 2018), ecosystem-based adaptation (Donatti et al., 2018; Donatti et al., 2020; GIZ, 2020) and cities (Section 6.4.6).

Adaptation M&E generally seeks to answer whether implementation is taking place and what effects it has (Figure 17.12). Accordingly, M&E can focus on the processes, activities and outputs or on their outcomes and ultimate impacts (Harley et al., 2008; Pringle, 2011; Ford et al., 2013). Most of the available guidance for the development of adaptation M&E systems is aimed at the household, local or project level (Pringle, 2011; Villanueva, 2012; Olivier et al., 2013; CARE, 2014; BRACED, 2015; Leiter, 2016; Jones, 2019b) with only limited guidance for national or cross-sectoral M&E systems (Price-Kelly et al., 2015) or frameworks that are applicable at different scales (Brooks et al., 2014). The available guidebooks take users through a series of steps which are synthesised in Figure 17.12.

The majority of adaptation M&E efforts have so far focused on processes and outputs rather than on achieved outcomes such as climate risks, vulnerability, well-being or development (Droesch et al., 2008; GIZ and Adelphi, 2017; UNDP Cambodia, 2014; Fawcett et al., 2017) (*high confidence*) or use a combination thereof (Brooks et al., 2011; Brooks et al., 2014). Newly emerging approaches include perception-based measurements and the use of data collected via mobile phones (Jones et al., 2018; Jones, 2019a), which can be collected frequently (Clare et al., 2017a; Knippenberg et al., 2019; Jones and

Ballon, 2020). Such advances call into question the common reliance on 'objective' indicators defined from an external perspective. Instead, they suggest that multiple complementary approaches combined with higher-frequency data collection produce a more elaborate picture of the effects of adaptation and resilience responses (Jones and d'Errico, 2019; Knippenberg et al., 2019; Singh et al., 2019; Jones, 2019a; see Cross-Chapter Box PROGRESS in this Chapter) (*medium confidence*).

Central to designing, monitoring and evaluating adaptation responses is outlining how activities are expected to lead to intended objectives, for example, via a theory of change (Bours et al., 2014c; Oberlack and al., 2019). Theories of change or similar change models provide a basis to decide what to measure, but more attention needs to be paid to how theories of change are constructed and who is involved (Mason and Barnes, 2007; Forsyth, 2018). Participatory approaches can support understanding how climate risks affect the respective population, how these risks interact with social and cultural processes, and how responses could most effectively address climate risks (Conway et al., 2019). Inclusive M&E systems can facilitate ownership and enhance the meaningfulness and usability of the generated information (CARE, 2014; Faulkner et al., 2015). Meaningfulness is not associated with a particular approach or method but depends on whether the chosen M&E design fits the M&E purpose and the information needs of the intended audience (Fisher et al., 2015; Leiter, 2017). Effective communication of M&E findings and feedback into decision-making processes is essential to achieve the respective M&E purpose and facilitate learning (Section 17.5.2.7).

17.5.2.3 Adaptation Indicators and Indices

A set of all-purpose and globally applicable standard indicators that could comprehensively measure adaptation does not exist (*high confidence*) (IPCC, 2014; Leiter and Pringle, 2018). A wide variety of indicators have been used to assess adaptation and its results (CARE, 2010; Harvey et al., 2011; Lamhauge et al., 2013; Brooks et al., 2014; Hammill et al., 2014b; Mäkinen et al., 2018; HM Government, 2019). Literature has also noted unrealistic expectations of what indicators can accomplish. For instance, decisions involving competing political interests would not be adequately informed through simple indicators; and learning requires knowledge of how and why change has happened, something that indicators often do not capture (Hinkel, 2011; Bours et al., 2014b). Indicators can also become misguided incentives and might steer attention away from what matters (Leiter and Pringle, 2018; Hallegatte and Engle, 2019; Klonschinski, 2021). Surveys, scorecards, interviews and focus groups are alternative methods of gaining insights on adaptation progress (Brooks et al., 2014; Porter et al., 2015; Das, 2019; McNamara et al., 2020).

The difficulties of assessing adaptation and an emphasis on short-term results have contributed to the common practice of relying on easily quantifiable indicators rather than assessing actual changes, that is, outcomes and impacts (World Bank Independent Evaluation Group, 2012; Fisher et al., 2015). In fact, indicators used by international climate funds largely measure outputs which provide little evidence of the actual effectiveness of adaptation, that is, its outcomes and impacts (GCF Independent Evaluation Unit, 2018; Leiter et al., 2019; Pauw et al., 2020).

Adaptation monitoring, evaluation (M&E) and learning as part of the adaptation process

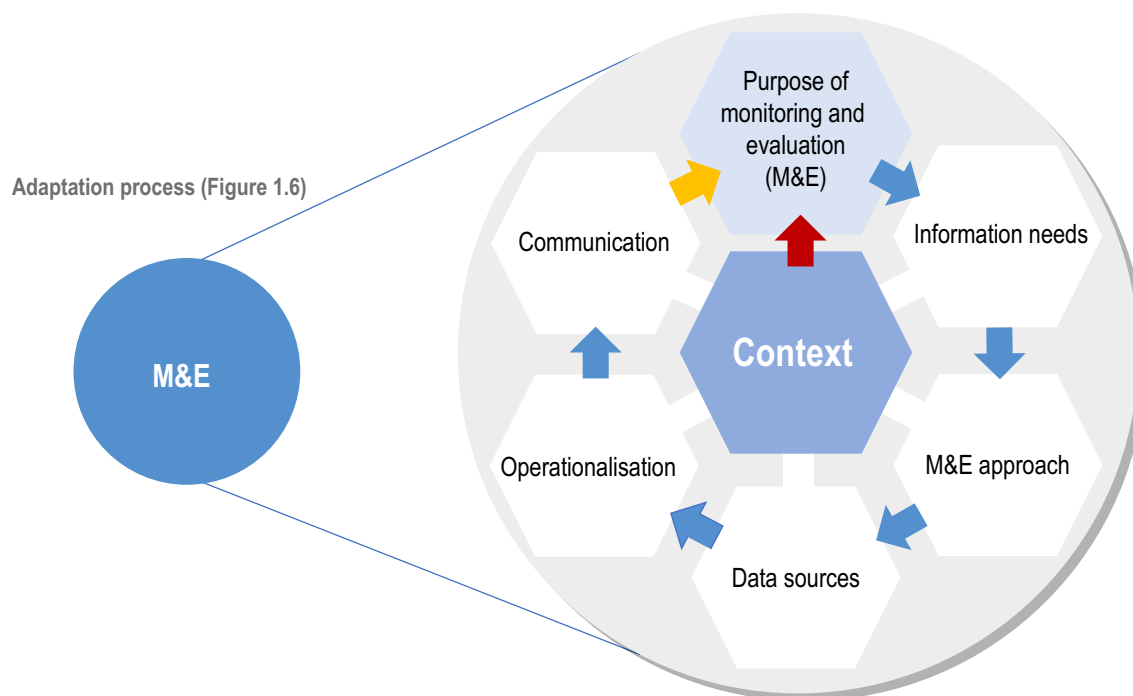


Figure 17.12 | Adaptation M&E and learning as part of the adaptation process (based on Hammill et al., 2014a; Price-Kelly et al., 2015; Leiter, 2016). This figure shows the main steps involved in developing an adaptation M&E system where the context informs the purpose of M&E, which in turn determines the information needs. To achieve the M&E purposes, the chosen approach and data sources need to be able to generate the needed information, which needs to be communicated in a suitable way to the target audiences.

Indices, the combination of multiple indicators into a single score, are common products of risk and vulnerability assessments to compare countries or other entities, often in the form of rankings or maps (Preston et al., 2011; Reckien, 2018; de Sherbinin and et al., 2019). They can indicate changes in vulnerability over time within their respective conceptualisation of vulnerability or risk. The construction of indices, including indicator selection, their weighting, normalisation and data sources, has a profound impact on their scores (Reckien, 2018). Research has consistently found large discrepancies between country vulnerability rankings (Brooks et al., 2005; Eriksen and Kelly, 2007; Leiter et al., 2017b; Visser et al., 2020). Reviews of vulnerability and resilience indices identified ‘substantial conceptual, methodological and empirical weaknesses’ (Füssel, 2010: 8) and a widespread lack of validation (Cai et al., 2018). Using countries as a unit of analysis also masks significant sub-national variation (Otto et al., 2015; Mohammadpour et al., 2019). Individual indices therefore ‘fail to convene a robust guidance for policy makers’ (Muccione et al., 2017: 4) and should not present the sole basis for policy decisions (Brooks et al., 2005; Leiter and Pringle, 2018). Due to their limitations (Singh et al., 2017), the OECD suggests that indices are primarily used for ‘initiating discussion and stimulating public interest’ (OECD, 2008: 13).

17.5.2.4 Empirical Evidence of National Adaptation M&E Systems

Tracking the implementation of national adaptation plans is essential for understanding their effectiveness, that is, the progress made in addressing climate risks, and can support assessing the success of adaptation and the risk of maladaptation. Over 60 countries have developed or started

developing national adaptation M&E systems, although less than half are yet reporting on implementation (Leiter, 2021b; Table 17.8). Country-specific adaptation M&E systems vary considerably regarding their legal mandate, purpose, content, involved actors and types of reporting (Hammill et al., 2014a; EEA, 2015; Leiter, 2015; Leiter et al., 2017a; EEA, 2020). In most cases, they focus primarily on monitoring implementation rather than assessing outcomes, although some are linked to national climate risk or vulnerability assessments (e.g., in Germany and the UK) (EEA, 2018). At least 15 countries have published evaluations of national adaptation plans which help inform the development of successive adaptation plans or strategies (Table 17.8). Nevertheless, there is only limited empirical evidence of the ability of M&E systems to facilitate action or increase the level of ambition of revised policies. More research is needed to determine the quality of national adaptation M&E systems and how well they support the policy cycle.

Under the Paris Agreement, countries are encouraged to provide information on adaptation, including its adequacy and effectiveness (Möhner et al., 2017; Adaptation Committee, 2021). National adaptation M&E systems can inform both national as well as international reporting and contribute to the Global Stocktake (see Cross-Chapter Box PROGRESS in this Chapter; Craft and Fisher, 2015; Leiter et al., 2017a). Guidance for and examples of national adaptation progress assessments are provided by Price-Kelly et al. (2015), Brooks et al. (2014), Brooks et al. (2019), EEA (2015), GIZ (2017), Karani (2018) and van Rùth and Schönthaler (2018). Global assessments of adaptation progress have so far often focused on adaptation planning and, to a lesser extent, implementation, while evidence of the collective effect

of adaptation globally remains limited (*high confidence*) (UNEP, 2021a; Cross-Chapter Box PROGRESS in this Chapter).

17.5.2.5 Challenges of Assessing Adaptation

To date, literature has largely focused on aspects prior to implementation such as assessments of climate vulnerability and risks or appraisals of adaptation options (Sietsma et al., 2021; Cross-Chapter Box Adaptation). To understand adaptation progress, the assessment of implemented adaptation actions and their outcomes requires more attention (*very high confidence*) (Cross-Chapter Box PROGRESS in this Chapter).

Outcomes on risk reduction are typically expressed in ways that are specific to the respective sector or context (e.g., as agricultural yields, health benefits or reduced water stress) highlighting that ‘adaptation has no common reference metrics in the same way that tonnes of GHGs or radiative forcing values are for mitigation’ (IPCC, 2014: 856). Assessments of adaptation progress therefore need to specify what they are measuring and how they are measuring it. The way adaptation is conceptualised, for example as a continuum between successful adaptation and maladaptation (Section 17.1.1), and the way adaptation is framed, for example as a technical challenge or a political process (Juhola et al., 2011; Bassett and Fogelman, 2013; Eriksen et al., 2015), shape the understanding of progress and its subsequent measurement (Singh et al., 2021).

Furthermore, people can be differently affected even in the same location owing to, among others, differential vulnerability among the population (Reckien and Petkova, 2019; Thomas et al., 2019). Different views and values can also affect what it means to adapt (Few et al., 2021). Assessments of adaptation progress therefore need to be transparent and reflective about how they define and measure adaptation and account for culturally and geographic contingent concepts of what it means to adapt in light of the global diversity of livelihoods and concepts.

The lack of knowledge on adaptation progress is associated with further measurement challenges, including that avoided impacts are difficult to measure and that risk levels change over time, meaning what is effective today may not be effective in the future (Brooks et al., 2011; Pringle, 2011; Spearman and McGray, 2011; Villanueva, 2012; Bours et al., 2014a). Moreover, adaptation is embedded in complex political and social realities where power and politics shape outcomes and where simplistic views of how adaptation would take place may be ill-conceived (Nightingale, 2017; Mikulewicz, 2018; Mikulewicz, 2020). In practice, this means that theories of change of adaptation projects may miss important causes of risks and could subsequently lead to inaccurate assessments (Forsyth, 2018). Measuring adaptation is therefore a matter of understanding drivers of vulnerability and risk and of designing responses and M&E systems accordingly (UNFCCC, 2019a, section V).

The importance of context and the dependence on viewpoints make comparative assessments of adaptation across nations, regions or responses challenging. Comparison requires a consistent conceptualisation of adaptation, comparable units of analysis and access to relevant data sets (Ford et al., 2015; Ford and Berrang-Ford, 2016). Comparative adaptation policy assessments to date often lack

clarity in concepts and explanatory variables (Dupuis and Biesbroek, 2013; Biesbroek R, 2018a). The trade-off between standardisation and context specificity also complicates attempts to aggregate adaptation progress across scales to the national or global level (Leiter and Pringle, 2018; Cross-Chapter Box PROGRESS in this Chapter).

17.5.2.6 Tracking Adaptation Finance

Adaptation finance tracking is capturing the financial flows associated with adaptation. It can indicate how much is being spent on adaptation, where funds are going to and whether spending matches allocated budgets. Thus, adaptation finance tracking can provide useful information for decision-making, but it does not provide information on the achievements resulting from the invested funds. Accordingly, it can complement, but not substitute, M&E of actions and outcomes. Adaptation finance tracking can be applied domestically (Guzmán et al., 2017; Guzmán et al., 2018) as well as internationally, for instance by developed countries to report on the goal to mobilise USD 100 billion yr⁻¹ by 2020 in climate finance (UNFCCC SCF, 2018). Data on adaptation finance can be used alongside information on planning and implementation to assess adaptation progress (UNEP, 2021a).

Tracking adaptation finance requires defining what counts as adaptation. Different definitions can lead to large variations in the estimated amount of adaptation finance (Donner et al., 2016; Hall, 2017). A further challenge is how to account for adaptation that is mainstreamed, that is, where adaptation-specific investments form only part of a larger programme or budget line, or where actions contribute to adaptation without being labelled as adaptation. These challenges limit the direct comparability between adaptation and mitigation finance (UNFCCC, 2019a). In fact, tracking adaptation finance differs from tracking mitigation finance since activities cannot be *a priori* assumed to constitute adaptation but instead have to be assessed for their linkage to climate risks in a particular context (MDBs & IDFC, 2018). Methods for adaptation finance tracking continue to be further developed aiming at better comparability and completeness (Richmond and Hallmeyer, 2019; Richmond et al., 2021).

Various methods are used to track adaptation finance, which makes comparisons between adaptation finance figures challenging (UNFCCC SCF, 2018; Weikmans and Roberts, 2019). For example, multi-lateral development banks use a different methodology than countries do under the OECD Development Assistance Committee (DAC) (Box 17.4; MDBs, 2019). One of the differences concerns the treatment of partially adaptation-relevant projects, namely whether only parts or the full amount of a given project volume are counted as adaptation finance (see, e.g., MDBs, 2019). Under the OECD DAC methodology, countries often use a fixed percentage (e.g., 50% of the total project value), whereas the MDB methodology attempts for a project-specific estimation of the adaptation-relevant proportion (MDBs & IDFC, 2018). Another aspect is whether tracking distinguishes between financial instruments, such as grants or loans. Different accounting rules can lead to large differences in reported amounts of adaptation finance and to a lack of comparability between providers (Weikmans and Roberts, 2019). Studies identified an over-reporting (i.e., counting non-adaptation-related finance) by a factor of two to three, which suggests the need for a more consistent and transparent accounting system (Weikmans et al., 2017; CARE, 2021).

Table 17.8 | Countries in different stages of developing or operating a national adaptation M&E system as of 1 August 2021 (Source: Leiter, 2021b). Countries can appear twice if they have published both a progress report and an evaluation.

	National adaptation M&E system		
	Stage	Definition	Country
Under development	Early stage	Tangible steps have been undertaken to develop a national adaptation M&E system, for example a stocktake of relevant existing data sources and engagement with stakeholders on the objectives of the M&E system	Benin, Cook Islands, Jordan, Paraguay, Sri Lanka, Uganda
	Advanced stage	Details of the adaptation M&E system have been developed, including, for instance, institutional arrangements, indicators and data sources, but it has not yet been applied	Albania, Bulgaria, Cameroon, Canada, Colombia, Ethiopia, Fiji, Grenada, Indonesia, Moldova, Morocco, Mozambique, Nauru, Peru, Rwanda, Senegal, St. Lucia, St. Vincent and the Grenadines, Suriname, Thailand, Togo, Tonga, Turkey, Vietnam
In operation	Adaptation progress report published	A progress report on the implementation of the national adaptation plan or strategy has been published	Austria, Belgium (Flanders), Brazil, Burkina Faso, Cambodia, Chile, Cyprus, France, Germany, Japan, Kenya, Kiribati, Lithuania, Mexico, the Netherlands (Delta Programme), Norway, Portugal, Slovakia, Spain, South Africa, South Korea, Switzerland, UK
	Evaluation published	An evaluation of the implementation of the national adaptation plan or strategy has been undertaken and published	Belgium, Cambodia, Chile, Czech Republic, Finland, France, Germany, Ireland, Mexico, the Netherlands, Philippines, South Korea, Spain, Switzerland, UK

Cross-Chapter Box PROGRESS | Approaches and Challenges to Assess Adaptation Progress at the Global Level

Authors: Matthias Garschagen (Germany), Timo Leiter (Germany/UK), Robbert Biesbroek (the Netherlands), Alexandre K. Magnan (France), Diana Reckien (the Netherlands/Germany), Mark New (South Africa), Lea Berrang-Ford (UK/Canada), So Min Cheong (Republic of Korea), Lisa Schipper (Sweden/USA), Robert Lempert (USA).

This Cross-Chapter Box responds to a growing demand for assessing global climate change adaptation progress, which currently faces the challenge of lacking consensus on how adaptation progress at this level can be tracked (*high confidence*). The box therefore assesses the rationale and methodological approaches for understanding adaptation progress globally across sectors and regions. It discusses strengths and weaknesses of existing approaches and sources of information, with a view towards informing the first Global Stocktake of the Paris Agreement in 2023.

Rationale for assessing adaptation progress at the global level

Global assessments of adaptation are expected to help answer key questions of climate policy (Ford et al., 2015; UNEP, 2017; Adaptation Committee, 2021) (*limited evidence, high agreement*), including: Do the observed, collective investments in adaptation lead humanity to being better able to avoid or reduce the negative consequences from climate change? Where is progress being made, and what gaps remain in the global adaptation response to climate risks?

While more than 170 countries have policies that address adaptation (Nachmany et al., 2019b; Section 17.4.2), very few have operational frameworks to track and evaluate implementation and results (Leiter, 2021a; Section 17.5.2.4). In Europe, for example, most countries have adopted a national adaptation plan or strategy, but only few are tracking whether ambitions are realised (EEA, 2020; Section 13.11.2). Moreover, climate risks are interconnected across scales, regions and sectors (Eakin et al., 2009; Challinor et al., 2017; Cross-Chapter Box INTERREG in Chapter 16; Hedlund et al., 2018) (*high confidence*), complicating causal attribution. National assessments of progress usually do not assess private sector and non-governmental adaptation and barely account for climate risks that transcend across borders, for example through supply chains or shared ecosystems (EEA, 2018; Benzie and Persson, 2019). In addition, adaptation action in one place or time can potentially lead to negative effects elsewhere (externalities) (Magnan and Ribera, 2016; Atteridge and Remling, 2018; 17.5.1). Hence, determining the collective adequacy and effectiveness (see Figure 1.7 in Chapter 1) of adaptation responses is different from simple aggregates of national and sub-national information (UNEP, 2017).

Assessing global progress on adaptation is therefore of high relevance to the scientific community, policymakers and other actors. Global assessments serve different information needs than local assessments, and their meaningfulness depends on the chosen approaches and their limitations. Aggregated global assessments of adaptation progress are therefore not meant to substitute place-specific ones but to complement them to enhance the knowledge base on adaptation beyond actions by or within individual countries. The Paris Agreement stipulates a Global Stocktake to be undertaken every 5 years to assess the collective progress towards its long-term goals, including

Cross-Chapter Box PROGRESS (continued)

on adaptation (UNFCCC, 2015, Article 14). Yet very few scientific studies have addressed the adaptation-specific aspects of the Global Stocktake (Craft and Fisher, 2018; Tompkins et al., 2018), and there are different views and options on how assessing global progress could take place (*high confidence*).

Considerations in designing global adaptation assessments

A number of key considerations for the design of global adaptation assessment approaches are discussed in the literature (Ford and Berrang-Ford, 2016; Berrang-Ford et al., 2017). Some of these involve trade-offs, such as global applicability versus context specificity, for which there is no simple solution. Design considerations directly depend on the objectives of global adaptation assessments, which can differ between actors and can include, for example, providing transparency, enabling accountability, understanding effectiveness or guiding policy development (Section 17.5.2.1). The underlying objectives determine the suitability of approaches and the data requirements.

Comparability

Global assessments may have the objective to compare adaptation over time and across sectors and regions (Ford et al., 2015). Such comparison requires a consistent definition of concepts (Hall, 2017; Berrang-Ford et al., 2019) and the identification of variables that are both generic enough to be applicable from one context to another and specific enough to illustrate national circumstances. To date, finding such balance has proven to be challenging (Dupuis and Biesbroek, 2013). The context dependence of adaptation outcomes poses limits for meaningful comparisons. Even people exposed to the same climate hazard may be differentially affected due to varying levels of vulnerability and resilience (Jones et al., 2018; Thomas et al., 2019), meaning that perceptions on adaptation outcomes can also differ (Jones and d'Errico, 2019).

Aggregation

The aggregation of data from local or regional to global scales can take different forms ranging from qualitative synthesis to quantitative aggregation, which may involve condensing a diverse set of variables into a single score (Leiter, 2015; Section 17.5.2.3). In contrast to climate change mitigation, adaptation does not have a global reference metric against which adaptation levels could be assessed to identify progress or gaps. Experience from the Global Environment Facility, for example, has shown that mechanical aggregation based on standardised indicators fails to capture what makes the greatest difference on the ground (Chen and Uitto, 2014).

Results: Input, process, output or outcome

Adaptation progress at any spatial scale can in principle be assessed in terms of input (e.g., resources spent), process (i.e., the way adaptation is organised), output (i.e., adaptation capacities and actions) and outcomes (i.e., actual changes induced) (Section 17.5.2.2). Due to the challenges inherent in measuring adaptation outcomes (Sections 16.3, 17.5.1 and 17.5.2.5), most global assessments to date have focused on outputs, such as whether countries have adopted adaptation plans (Berrang-Ford et al., 2021; UNEP, 2021a) (*high confidence*). Understanding the effectiveness of adaptation responses globally requires a way to conceptualise and capture outcomes, for example in terms of effective climate risk reduction, while avoiding simplifications that mask maladaptation at the global level, such as where climate risks are shifted to other countries, sectors or population groups (Cross-Chapter Box INTERREG in Chapter 16, Section 17.5.1).

Data

Global assessments typically require global availability of consistent data, be they quantitative or qualitative, which has proven to be a constraining factor for attempts to assess global adaptation (*high confidence*). For example, many countries face difficulties in reporting adequately on progress in implementing the Sendai Framework and risk-related SDGs (UNDRR, 2019: vi). The availability of data also influences which variables can be eventually selected in an assessment. This limitation can affect the ability to meet the initial objectives and lead to biases in the framing and interpretation of assessment outcomes. For some variables, an alternative to relying on nationally provided data can be to develop new global data sets (Magnan and Chalastani, 2019) or utilise data from Earth Observation (Andries et al., 2018). Adaptation is hence faced with a dilemma between globally available yet generic data and regionally or locally more detailed yet patchy data (*high confidence*).

Assessment of existing approaches to assess adaptation progress at the global level

Only few global assessments of adaptation progress across sectors have been undertaken to date (*high confidence*). They focus, for example, on whether countries have progressed their adaptation policies and actions over time (Lesnikowski et al., 2015; Nachmany et al., 2019b), the extent of implemented adaptation globally (Leiter, 2021a; Leiter, 2021b), and the type and actors of responses (Berrang-Ford et al., 2021), evidence for reduced vulnerability to climate-related hazards (Formetta and Feyen, 2019; UNDRR, 2019) or adaptation planning in cities across the globe (Araos et al., 2016a; Reckien et al., 2018a; Olazabal et al., 2019a). Each of these assessments draws

Cross-Chapter Box PROGRESS (continued)

on different approaches and data, and all have particular potential but also limitations (Table Cross-Chapter Box PROGRESS.1) (*high confidence*). The application of differing approaches shows that there is no single ‘best’ approach or data source to assess global progress on adaptation (*high confidence*). Existing global assessments have provided valuable insights into the extent and types of responses and their level of planning and implementation (Section 16.3.2.4). However, they do not provide comprehensive and robust answers so far on whether climate risk and vulnerability have been reduced (Berrang-Ford et al., 2021) (*high confidence*). As a result, combining different approaches and integrating data on climate risk levels, policy measures, implemented actions and their effects on climate risk reduction is currently regarded as the most robust approach (Berrang-Ford et al., 2019) (*medium evidence, high agreement*).

Table Cross-Chapter Box PROGRESS.1 | Key approaches and data sources used for global adaptation assessments.

Approach/data source	Potential added value	Limitations
Systematic assessment of adaptation responses reported in academic literature (e.g., systematic reviews, evidence synthesis, meta-analysis, large- <i>n</i> comparative studies) Examples: Berrang-Ford, 2011, Global Adaptation Mapping Initiative, Berrang-Ford et al. (2021)	Provides an indication of the status, trends and gaps in adaptation responses	Not a representative sample; biased towards responses published in scientific literature; excludes grey literature; some topics and regions not well covered; challenges in terms of comparability and aggregation; inconsistency in definitions and use of concepts; English language bias
Self-reported progress documents by countries (e.g., National Communications, Biennial Transparency Reports or domestic progress and evaluation) Examples: Gagnon-Lebrun and Agrawala (2007); Lesnikowski et al. (2015); Lesnikowski et al. (2016); Leiter (2021a)	Context-specific information; official government documents enable assessments of national progress	May only be available every few years; content is sensitive to political and policy changes; possible bias towards positive examples; challenges in terms of comparability and aggregation; inconsistency in definitions and use of concepts
Self-reported information from the private sector (e.g., information on actions taken in response to climate risks within the context of climate-related financial disclosure or in company reports). Examples: Committee on Climate Change (2017); Street and Jude (2019); UNFCCC (2021), responses reported under Climate-related Financial Disclosure	Provides an indication of the status, trends and gaps in adaptation responses by the private sector; complements information published in the scientific literature; could enable better understanding of supply chain risks	Sample biased towards larger companies; challenges in terms of comparability and aggregation; potential inconsistencies in definitions and use of concepts
Project documents and evaluations (e.g., from climate funds or implementing organisations) Examples: Leiter (2021b); Eriksen et al. (2021)	Detailed information on context, intended or achieved results and activities	Actual implementation can differ from what was proposed; fragmented picture of local/regional actions; results may be challenging to aggregate; challenges in terms of comparability and aggregation; inconsistency in definitions and use of concepts
Existing global data sets of mostly quantitative indicators Examples: United Nations (UN, 2016a; UN, 2016b; UN, 2019; UNDRR, 2019)	Comparable information based on globally defined indicators	Global data availability constrains indicator choice; reporting burden for new indicators; trade-off between global applicability and national circumstances; usefulness and meaningfulness of global indicators is contested (Leiter and Pringle, 2018; Lyytimäki et al., 2020; Pauw et al., 2020).
Tracking financial flows Examples: CPI (2019), OECD (2018a), MDBs (2019)	Comparable data on financial flows directed at adaptation; standardised methodologies (e.g., OECD RIO markers; climate finance tracking method of multi-lateral development banks; Section 17.5.2.6; Cross-Chapter Box FINANCE in this Chapter)	No information about implementation of measures and their adaptation effect (Eriksen et al, 2021), i.e., it tracks inputs, not outputs or outcomes; inconsistency in what gets counted as adaptation finance (Donner et al., 2016; Doshi and Garschagen, 2020); evidence of over-reporting (Michaelowa and Michaelowa, 2011; Weikmans et al., 2017)

Conclusion—Combining approaches for assessing adaptation progress at the global level

Understanding to what extent the world is on track to adapt to climate change impacts and risks globally is a pressing question in scientific and policy communities, especially in light of the Global Stocktake under the Paris Agreement. Important considerations for a robust assessment framework (e.g., consistency), as well as the associated scientific challenges (e.g., aggregation, externalities, breadth versus depth of data) and the role of underlying objectives (e.g., on the contested issue of comparability) are increasingly understood (*high confidence*). There is also a growing and diverse body of information on adaptation progress, although most assessments of global progress undertaken to date focus on processes and outputs (e.g., policies and plans) rather than outcomes (i.e., risk reduction). A variety of approaches and data sources are employed, such as systematic reviews of observed adaptation, formal communications by Parties to the UNFCCC, and

Cross-Chapter Box PROGRESS (continued)

project documents to international funding agencies. Novel approaches, including big data tools (Ford et al., 2016; Biesbroek et al., 2020), are also being explored but still have to prove their practical value. Each approach and source of information can contribute additional knowledge, but also demonstrates limitations, so that there is no single ‘best’ approach (*high confidence*). Yet, to date, the international community has not sufficiently explored the relative strengths and weaknesses of different approaches and their applicability and, therefore, their potential synergies in complementing each other. Triangulated assessments have only rarely been applied (*high confidence*) due to multiple conceptual and methodological challenges, despite their potential for increasing the robustness of knowledge. One overarching conclusion of this Cross-Chapter Box therefore is that the combination of different approaches will provide a more comprehensive picture of global adaptation progress than is currently available from individual approaches (*limited evidence, high agreement*).

Box 17.4 | The Rio Markers Methodology to Track Climate Finance

The OECD Development Assistance Committee (DAC) introduced a methodology to track the amount of bilateral official development assistance (ODA) that is targeting climate change mitigation and/or adaptation. It distinguishes whether activities have adaptation as a ‘principal’ objective (score ‘2’), as a ‘significant’ objective (score ‘1’) or as not targeting it (score ‘0’) (OECD, 2016). The associated project value is counted in full, in part, or not counted as adaptation finance, respectively. Countries count the volume of partial adaptation projects (score ‘1’) to a different extent, which limits comparability and can lead to over-reporting (OECD, 2019). The first data on this ‘adaptation marker’ became available in 2012 for the financial flows of 2010. It forms the basis for developed countries’ reporting to the UNFCCC Secretariat on their financial commitments towards developing countries (Weikmans and Roberts, 2019).

While a guidebook with requirements for adaptation as a principle or significant objective has been developed (OECD, 2016), several studies have shown that OECD DAC donors tend to overestimate the number of activities in their portfolio that genuinely have adaptation objectives (Michaelowa and Michaelowa, 2011; Weikmans et al., 2017; CARE, 2021). Hence, the amount of adaptation finance from public sources may be lower than reported. The use of just three categories leads to a broad range of the extent of adaptation being concentrated in the middle category (‘significant objective’). Accordingly, the category ‘principle objective adaptation’ provides a more robust predictor of the relevance of an activity to adaptation (Donner et al., 2016).

Good coverage of adaptation finance data exists around international public finance flows, predominantly official development assistance flows from OECD DAC members and from multi-lateral development banks. Less data exist around domestic public finance and private finance flows to adaptation activities, but data sources continue to be further expanded, for example through climate change expenditure tagging and city-level data (Weikmans et al., 2017; UNFCCC SCF, 2018; Richmond et al., 2021). Recent estimates of adaptation finance are provided in UNFCCC SCF (2018), Macquarie et al. (2020) and Cross-Chapter Box FAR in this Chapter.

17.5.2.7 Evaluation and Learning

Most adaptation M&E frameworks and tools proposed to date refer to monitoring rather than evaluation (*high confidence*) (Adaptation Committee, 2016). Evaluations are envisioned to go beyond monitoring by examining how and why results have been achieved and what could be improved (Brousselle and Buregeya, 2018; Vähämäki and Verger, 2019). Evaluations of adaptation outcomes are still rare, particularly quantitative impact evaluations (Weldegebriel and Prowse, 2013; Das, 2019; Béné et al., 2020). Impact evaluations of adaptation need to address several methodological as well as practical challenges (Dinshaw et al., 2014; Fisher et al., 2015; Béné et al., 2017; Puri et al., 2020).

Different types of evaluations are appropriate for different evaluation questions (Silvestrini et al., 2015). Evaluations of the available evidence of effective adaptation, in particular topics or sectors, have emerged more recently, for instance on mainstreaming (Runhaar et al., 2018) and agricultural climate services (Vaughan et al., 2019a). Impact evaluations of capacity building measures are important because capacity building is assumed to lead to adaptation, but its actual effects are seldom examined (Mortreux and Barnett, 2017; Alpizar F and Meiselman, 2019). If well designed and utilised for learning, evaluations can play an important role in improving adaptation responses (Hildén, 2011).

Learning requires information about how and why change occurred and what experiences have been made (Feinstein, 2012). M&E is frequently associated with learning, but it is rarely made explicit how learning is supposed to take place (Armitage et al., 2008; Baird et al., 2015; Borrás and Hølund, 2015). The design of adaptation M&E systems can support learning by gathering relevant information and disseminating it in a way that is accessible and effectively linked to decision-making processes (Spearman and McGray, 2011; Villanueva, 2012; Fisher et al., 2015). Options include institutionalised feedback mechanisms, peer learning and knowledge sharing events, a learning culture and ways to gather in-depth insights beyond indicators (ibid; Oswald and Taylor, 2010). Since AR5, adaptation programmes and funds such as

the BRACED programme, the Adaptation Fund, the Climate Investment Funds and the Green Climate Fund have created knowledge-sharing units and provide resources to support learning activities (BRACED, 2015; Roehrer and Kouadio, 2015; Adaptation Fund, 2016; Leavy et al., 2018; CIF, 2020; Puri et al., 2020), but there is little information about their longer-term effectiveness.

End of my contribution

17.6 Managing and Adapting to Climate Risks for Climate Resilient Development

Actions to ameliorate a climate risk have consequences beyond the immediate effects on exposure or vulnerability to a hazard. They may aim to combat many risks, could adversely interact with other risks and actions, or may be nested within a suite of actions across many risks. Some actions may have negative consequences for climate resilient development. In this broader context, the effectiveness of adaptations for supporting climate resilient development is now better articulated (Box 17.1). Importantly, adaptations need to be designed to not only combat current and future climate risks but also ensure that they do not lock in undesirable pathways in the future as risks develop and change (*very high confidence*) (Sections 17.2, 17.3.1, 17.5). Effective management of climate risks will therefore be dependent on satisfactorily managing current climate risks (Boxes 17.1, 17.2, 17.5), coupled with assessing prognoses for future climate risks, and developing responses in advance for reducing those risks to tolerable residual levels (*very high confidence*) (Sections 1.4, 1.6, 16.6, 17.2, Box 16.1; e.g., water risks, Section 4.7.1). The dynamic nature of risk (Viner et al., 2019; Simpson et al., 2021; Sections 16.3, 16.6) also means that the contribution of current adaptations to ameliorating future risks needs to be regularly reviewed (*high confidence*) (Section 17.5.2). Across the Working Group II report are examples of how managing adaptations to ameliorate climate risks can negatively or positively affect sustainable development, thereby impacting the potential for climate resilient development discussed in Chapter 18. Drawing on the assessment of sectoral and regional chapters in this report, this section examines three broad components for orienting decision-making for climate adaptation towards climate resilient development.

17.6.1 Need for Integrated Risk Management

The complex, interacting and compounding nature of climate risks means that single risks cannot be managed in isolation (*very high confidence*) (Section 16.5, Figure 16.11; Section 17.3.2; Nhamo et al., 2018), including accounting for potential risks arising from adaptations (Simpson et al., 2021). Regional examples of needs for cross-sectoral integrated management include the water–energy–food nexus in Africa (Section 10.5.1), Asia (Section 10.6.3), Australasia (Section 11.6), Europe (Section 13.2.2) and North America (Table 14.8), and ecosystem-oriented adaptations and/or nature-based solutions, in Africa (Section 9.6.5), Asia (Section 10.4.2), Australasia (Box 11.4, Section 11.3.5), Central and South America (Section 12.5.1), Europe (Section 13.3.2), North America (Section 14.6.1, Box 14.3) and Small Islands (Section 15.5.4). The cross-sectoral interactions within human systems, including impacts on cities, settlements and infrastructure, are reflected in those subjects as well as for health in Africa (Section 9.10.2), Asia (Section 10.4.5), Australasia

(Section 11.3.6), Central and South America (Section 12.5.6), Europe (Section 13.7.2), North America (Section 14.6.1) and Small Islands (Section 15.6.2), and poverty and livelihoods in Africa (Section 9.11.3), Asia (Sections 10.4.5, 10.5), Australasia (Section 11.4), Central and South America (Section 12.5.7), Europe (Section 13.8.2), North America (Section 14.6.1) and Small Islands (Section 15.3.4).

These examples demonstrate that the emergence of climate risks can be at different rates and different time horizons, and the interactions between risks vary from region to region (*very high confidence*). The need to manage these risks in an integrated manner is readily identified in the water–energy–food nexus (Box 9.5). However, in terms of climate resilient development, the need for integration is demonstrated by the diverse and interacting impacts of climate risks on ecosystems (Sections 2.7, 3.6), cities (Sections 6.2.3, 6.2.4, Boxes 6.2, 6.3), health (Section 7.4), and poverty and livelihoods (Section 8.6).

17.6.2 Strategies for Managing a Portfolio of Climate Risks

Since WGII AR5, new methods for simultaneously considering multiple societal and sectoral objectives, climate risks and adaptation options have emerged (Section 17.3.2; Adam et al., 2014; Hadka et al., 2015; Garner et al., 2016; Rosenzweig et al., 2017; Giupponi and Gain, 2017a; Stelzenmuller et al., 2018; Marchau et al., 2019), including methods for accounting for different sources of uncertainty and types of risk (Section 17.3.1; Giupponi and Gain, 2017a). Different decision-making approaches can be complementary (*high confidence*) (Section 17.3.1; Kwakkel et al., 2016), and multiple approaches will likely be necessary in managing the risks across sectors, over different spatial scales, and over short to long time scales (*medium confidence*) (Cross-Chapter Box PROGRESS in this Chapter; Girard et al., 2015; Rouillard and Spray, 2016).

Deciding on which adaptations to adopt when managing climate risks inevitably needs examination of trade-offs in outcomes (*very high confidence*) (Sections 17.3.1, 17.5.1; Cross-Chapter Box FEASIB in Chapter 18). A current difficulty with integrated assessments is to develop a set of metrics that are appropriately scaled for the different sectors or outcomes to be compared (e.g., Sections 12.5.2.6, 17.3.1, 17.5.2; Cross-Chapter Box PROGRESS in this Chapter). For climate resilient development, dimensions of poverty, equity, justice and health need to be factored into analyses (Boxes 17.1, 17.5), many of which are difficult to quantify (*high confidence*) (Section 18.2.4). Moreover, uncertainties on the interactions within and between sectors can make trade-off analyses uneven in their precision across sectors and uncertain as to the outcome of an implemented adaptation (*medium confidence*) (Sections 4.7.2, 17.4, 17.5).

Expertise and resources for using tools and approaches for integrated risk management vary between the developed and developing countries (*high confidence*) (e.g., Section 4.7.2). Exploration of adaptation scenarios can be derived from Earth System Models (*high confidence*) (e.g., Sections 4.7.1.2, 11.7.3.1). However, the feasibility of possible adaptations and the degree to which they are likely to be effective (Box 17.1) will require further exploration as success will

4 Transparency in global environmental governance – the case of the Paris Agreement

4.1 A novel case to “Transparency in global environmental governance”

Transparency is a fundamental element of the architecture of the Paris Agreement (Falkner, 2016; Bodansky, 2016; Bodle et al., 2016). A systematic review of success factors of the Paris Agreement found that transparency is simultaneously the most commonly cited driver *and* a commonly cited barrier to its effectiveness (Raiser et al., 2020) – an intriguing finding! While a dedicated body of literature has emerged around transparency under the Paris Agreement, it is almost exclusively focusing on transparency of mitigation and on climate finance. Winkler et al. (2017) find the inclusion of adaptation in the transparency framework to constitute a “step change” for the way adaptation is treated under the UNFCCC. But what this means in theory and practice has been largely unexplored.

The importance of transparency in the Paris Agreement confirms the ongoing “transparency turn” in global environmental governance (Gupta & Mason, 2014). It also provides an opportunity to explore a new case of state-led transparency and to reexamine almost ten years after its publication some of the findings of the 2014 book “Transparency in Global Environmental Governance” edited by Aarti Gupta and Michael Mason. As the article shows, the transparency rules under the Paris Agreement challenge common assumptions in the literature on state-led transparency. The article also proposes several advancements to the analysis of state-led transparency that can inform future case studies and that point to exciting further areas for exploration. For example, whether other cases of global environmental agreements with different topics areas show similar differences in their transparency rules, and if this can similarly be traced back to a strong influence of the subject matter. Overall, the article makes significant contributions to our understanding of transparency as a governance mechanism in global environmental agreements.

The idea for the paper was first presented in September 2021 at the Earth System Governance conference and also at the European Consortium for Political Research (ECPR) General Conference in 2021.

What influences transparency rules in global environmental governance? Insights from transparency under the Paris Agreement

First presented at the Earth System Governance conference 2021 and at the European Consortium for Political Research (ECPR) General Conference 2021

Timo Leiter

Grantham Research Institute on Climate Change and the Environment, and
Department of Geography and Environment, London School of Economics and
Political Science, London, UK

T.L.Leiter@lse.ac.uk

ORCID ID: <https://orcid.org/0000-0003-4982-8063>

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Abstract

Global environmental agreements increasingly rely on transparency as a governance mechanism to achieve their objectives. In public policy, transparency relates to the targeted disclosure of information by governments to influence behaviour. This “governance by disclosure” is institutionalised through rules that define its scope and modalities. To date, literature views the development of these transparency rules as being primarily shaped by political factors rather than by aspects of the subject matter that is being governed. The Paris Agreement offers an opportunity to study the relative importance of political and subject-related factors since its transparency framework includes two distinct topics, mitigation of greenhouse gas emissions and adaptation to the impacts of climate change. Both topics are found to have profoundly different, even entirely opposite transparency rules: disclosure of information on mitigation is mandatory and subject to technical review while it is voluntary for adaptation and partly excluded from review. The reasons for these differences are analysed based on multi-year participant observation at the United Nations climate change negotiations. Subject-related factors are found to affect the rationale for disclosure and the comparability and measurability which are substantially more challenging for adaptation than for mitigation. The case of the Paris Agreement therefore demonstrates that transparency can simultaneously be a site of political conflict *and* significantly influenced by aspects of the subject matter. The coexistence of contrasting transparency rules under one environmental agreement challenges common assumptions of state-led transparency frameworks and calls for a more granular analysis of how transparency operates.

Introduction

Global environmental agreements increasingly rely on transparency as a governance mechanism to monitor and enforce Parties' commitments (Gupta 2010; Gupta and Mason 2014). State-led transparency involves the targeted disclosure of information by governments to influence behaviour through "governance by disclosure" (Gupta 2008). It is institutionalised through rules that define its scope and modalities. These transparency rules are influenced by power and government capacities since transparency is a site of political conflict over what is to be made transparent and by whom (Gupta and Mason 2014). Transparency rules can also be shaped by the subject matter of an environmental agreement since its properties affect the degree to which transparency is feasible. To date, studies suggest that political and economic factors are more important for shaping transparency rules than factors that relate to the subject that is being governed (Mason and Gupta 2014, 331). The Paris Agreement on climate change presents an opportunity to study their relationship more closely since transparency is fundamental to its governance architecture and since its transparency framework covers two distinct topic areas, mitigation of greenhouse gas (GHG) emissions and adaptation to the impacts of climate change. Accordingly, any differences in transparency rules can be explored within the same contextual conditions rather than having to rely on comparisons across separate environmental agreements of varying contexts.

If factors related to the subject matter(s) covered by an environmental agreement would be of minor relevance to the design of its transparency rules, one would expect the same or similar transparency rules to be in place for mitigation and adaptation under the Paris Agreement. However, as this article shows, both have profoundly different, even entirely opposite transparency rules: provision of information on mitigation is mandatory and subject to compulsory review while transparency of adaptation is completely voluntary and review of its content was excluded, even though it has most recently been enabled on a voluntary basis. This article examines the reasons for these differences and analyses their implications for transparency as a governance mechanism.

This research is based on multi-year participant observation at the United Nations climate change negotiations since 2015 including the period when the transparency rules were elaborated. Empirical accounts of the actual negotiation of transparency rules are rare; most studies examine transparency rules only after their adoption. This article begins with a review of the concept of transparency in environmental governance and of literature on transparency under the Paris Agreement and subsequently proposes three advancements to frameworks for the study of state-led transparency. It then outlines the transparency rules for mitigation and adaptation under the Paris Agreement and its rulebook and examines the relative influence of political and subject-related factors in three ways: First, by assessing how the subject matter influences the rationale, comparability and measurability as central attributes of transparency; second, by exploring a hypothetical scenario of equally strong transparency rules for mitigation and adaptation and what it would have taken politically for it to be adopted; and third, by reviewing the contentious debates of the actual negotiations around transparency to see whether Parties tried to instal equally strong transparency rules regardless of subject-related differences. The article concludes by discussing the implications for our understanding of transparency in global environmental governance.

Transparency in global environmental governance

Conceptualisations of transparency

Transparency or "governance by disclosure" has become a common governance mechanism of international environmental agreements (Gupta 2010; Gupta and Mason 2014). A definition of transparency in this context is the "targeted disclosure of information as a way to evaluate and/or steer the behaviour of selected actors" (Gupta and Mason 2014, 6). The

belief in the potential of transparency rests on the assumption that disclosed information matters and empowers, both of which is not necessarily the case (Gupta 2008; Michener and Bersch 2013; Mason 2020). Indeed, a review of the concept of transparency in international relations finds the conditions for transparency to be often underspecified or the concept left ill-defined altogether (McCarthy and Fluck 2017).

Transparency has been conceptualised in multiple ways “including as a norm, a procedural principle, and/or as a mechanism of governance” (Gupta and Mason 2014, 18). Critical perspectives on transparency highlight its normative representation, i.e., that it is not a value-free concept, but is promoted by, and further promotes particular norms such as those of liberal environmentalism (Langley 2001; Mason 2008). Critical transparency studies also view transparency as a site of political conflict where power and capacities shape the rules of transparency and influence who benefits. Accordingly, transparency may reinforce rather than disrupt existing power structures, raising questions about the transformative capability of transparency (Ciplet et al. 2018; Mason 2020).

Transparency as a governance mechanism is institutionalised through a set of rules and procedures that specify what is to be disclosed, when, how and by whom, and that regulate aspects such as reporting standards and matters of compliance. Hence, while employed as a mechanism to govern, transparency is itself being governed. The politics around transparency and the conditions for effective transparency have therefore become an evolving research field in global environmental governance (Gupta 2010; Burch et al. 2019; Gupta et al. 2020).

Transparency under the Paris Agreement

The Paris Agreement is part of a trend of relying on transparency as a governance mechanism. Its architecture is based on national pledges of climate action which makes transparency about implementation “critically important” (Falkner 2016, 1121). In fact, transparency “is a means to counterbalance the lack of specific and individual mitigation obligations, to improve the credibility of the global effort, and to create mutual trust” (Bodle et al. 2016, 12). To achieve that, the Paris Agreement established an “enhanced transparency framework” (ETF) that covers both mitigation and adaptation (UNFCCC 2015, Article 13). The notion of “enhanced” refers to the preceding transparency arrangements under the 1992 United Nations Framework Convention on Climate Change (UNFCCC) which differentiated between developed and developing countries while the common rules of the ETF are applicable to all countries, albeit with flexibility “to those developing country Parties that need it” (UNFCCC 2015, Article 13.2).

A growing body of literature examines transparency under the Paris Agreement, but so far with an almost exclusive focus on either transparency of mitigation (e.g., Weikmans et al. 2020; Sælen 2020; Weikmans and Gupta 2021) or transparency of climate finance (e.g., Ciplet et al. 2018; Bodle and Noens 2018). This leaves the second of the three objectives of the Paris Agreement unaccounted for, namely “Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience” (UNFCCC 2015, Article 2.1b). Yet, as part of the expanded scope and role of transparency under the Paris Agreement, adaptation was added as a new topic under the ETF. Winkler et al. (2017) identify transparency of adaptation as having received insufficient attention and note that it differs from transparency of mitigation, but in how far it differs and what this means has so far been largely unexplored. Only very few articles have addressed reporting of adaptation by countries but without examining transparency as a governance mechanism (Berrang-Ford et al. 2019; Leiter 2021). A systematic review by Raiser et al. (2020) confirms a general lack of research on the adaptation provisions of the Paris Agreement.

Analytical framework: Three advancements

Existing frameworks of state-led transparency in global environmental governance

Several frameworks have been put forth to examine state-led transparency in global environmental governance. A framework by Gupta and Mason (2014) distinguishes three aspects: uptake (the drivers of transparency), institutionalization (its scope and modalities), and its effects. Another framework by Cipler et al. (2018) consists of four components: norm recognition, accountability mechanisms, degree of compliance, and effects of transparency. The current article seeks to examine the relative influence of political and subject-related factors on the formation of transparency rules, an aspect that is not directly considered in the framework by Cipler et al. (2018). Within Gupta and Mason's (2014) framework, it falls into the institutionalization aspect. In the following, I propose three advancements to better understand the formation of state-led transparency rules.

A critical understanding of the subject matter

The first advancement refers to the way the subject matter is conceptualised. Gupta and Mason (2014, 16) describe its influence on transparency as follows:

"Impediments to full disclosure (...) may also relate to the *materiality* of the environmental resource in question, whereby the physical properties of, for example, carbon, genetic resources, oil, or forests (...) shape the scope of disclosure obtainable in a given context." (Italics in original)

This description suggests that physical properties are fixed which according to Bakker and Bridge (2006, 8) is not uncommon: "The material (...) has often been treated unproblematically as a category external to society". Human–environment relations including how nature is conceptualised have been the subject of much debate in human geography (Harden 2012). Political ecology argues that science and politics co-evolve, and that politics determine which claims over environmental 'facts' gain dominance (Forsyth 2003; Forsyth 2015). What appears to be 'physical facts' may therefore be the product of human construction, and consequently not something that is fixed. Furthermore, environmental agreements do not only govern physical resources such as water or minerals, but also concepts such as sustainability or adaptation which can be conceptualised in various ways and whose properties are often contested. Yet, the term "materiality" implies the opposite: something that is fixed and uncontested. Moreover, "materiality" is associated with a range of very different meanings, for example in Marxian theory or in finance and accounting (Miller 2005). It is therefore proposed to replace it with the term 'subject matter' and to adopt a more critical analysis of its meaning.

Accounting for the diversity in scope and modalities of transparency

Analysis of state-led transparency under global environment agreements is often based on a standard pollution model where the costs and benefits of transparency follow a simple rational logic: polluters would want to obscure their actions while others would seek transparency to hold polluters to account. In cases where the resources being governed are global and accessible to all (what economists refer to as "global public goods"), it further follows that disclosure of information is relevant to all since all are affected by the actions of every polluter. While this model applies to climate change mitigation, it does not necessarily apply to all topics that are subjected to transparency under global environmental agreements. For example, information on highly localised actions that do not affect global or transnational commons might be irrelevant for actors that are located elsewhere. Disclosure of such information under a global agreement would therefore not benefit all Parties, which has direct implications for transparency's rationale and likely affects the stringency of its rules. By the same token, where disclosure has no disadvantage to any one Party, potential motives for obscuring information – one of the components in the framework by Cipler et al. (2018) – lose their relevance. Frameworks of state-led transparency therefore need to

scrutinize whether their inherent assumptions are applicable to various topics and types of information that environmental agreements may govern.

More than one set of transparency rules under an environmental agreement

Many studies of state-led transparency in global environmental governance seem to assume that any given agreement has just one set of transparency rules that uniformly applies across the subject matter(s) it governs. The Paris Agreement is an example of an environmental agreement where this is not the case as will be shown below. Frameworks of state-led transparency therefore need to account for the potential coexistence of differential transparency rules under one agreement. Furthermore, a distinction may be needed between an analysis of the norms and drivers that precipitate transparency's *general* role under an agreement, and an analysis of the *specifics* of how transparency is operationalised for different topic areas covered by an agreement. Details of the latter cannot be explained through general drivers like marketization or democratization which makes it necessary to examine the influence of political and subject-related factors on the formation of transparency rules.

These three advancements enable frameworks of state-led transparency to more accurately account for the diversity of transparency modalities in global environmental agreements. Specifically, they offer refinements for the component of "institutionalization" in Gupta and Mason's (2014) framework and for the component of "accountability mechanisms" in Cipler et al.'s (2018) framework. These advancements are especially relevant for understanding the formation of transparency rules which in turn are a critical input to any analysis of the potential effects of transparency as a governance mechanism.

Methods

Research on global environmental governance has recognised the importance of being on-site to explain the outcomes of global negotiations (O'Neill and Haas 2019; Hughes et al. 2021). Accordingly, participant observation has become a common research method to study environmental negotiations (Langlet et al. 2023). Recent research on qualitative methods finds that traditional distinctions between a passive observer and an active participant rarely apply (Seim 2021). Moreover, different roles of involvement, sequentially assumed, can enrich insights by gaining different perspectives (ibid.).

This research draws on participant observation at the UN climate change negotiations since 2015. Negotiation sessions typically take place twice a year for two weeks each: in May/June in Bonn, Germany and in November/December as the Conference of the Parties (COP). From 2015-2017, I was accredited as an observer for Germany's agency for international development cooperation (GIZ) and since 2021 for the London School of Economics. In 2018 and 2019, I was a member of the German delegation as an expert advisor which provided access to negotiation sessions that are only open to country delegates. This unique access was especially valuable during the final year of the rulebook's negotiations in 2018.

As my positionality changed from observer to delegate and back to observer, I gained different perspectives and could reflect on the process by which environmental agreements are produced. Despite being accredited through three organizations from developed countries, due to my job in international development cooperation including a multi-year stay in a Least Developed Country I have been frequently in contact with negotiators from the Global South and am very familiar with the challenging circumstances developing countries face. I did not conduct formal recorded interviews since the negotiations are politically highly sensitive and the time pressure at COPs is not conducive to this research method. Instead, I held many informal exchanges with negotiators and observers alike. To keep anonymity, I am not identifying specific individuals or any information from government-internal meetings.

I triangulated my observations with published accounts of the negotiations including from negotiators (e.g. Bueno Rubial 2020).

Transparency provisions in the Paris Agreement and its rulebook

Transparency in the architecture of the Paris Agreement

The Paris Agreement departed from the top-down regulatory framework of the Kyoto Protocol from 1997 and instead established a “pledge and review” system where countries pledge their climate actions whose details and implementation are subject to transparency. One of the central features of the Paris Agreement therefore is an “enhanced transparency framework” (ETF) “to build mutual trust and confidence and to promote effective implementation” (UNFCCC 2015, Article 13.1). Several details about the operation of the ETF were left open in the Paris Agreement and subsequently negotiated during the period 2016-2018 which led to a set of decisions known as the “Paris rulebook” (UNFCCC 2018a, 2018b). The following sections outline the transparency rules for mitigation and adaptation as contained in the Paris Agreement, its rulebook and any subsequent decisions. Table 1 summarises the transparency rules.

Purpose of transparency and obligations for disclosure

The Paris Agreement defines the purpose of transparency as providing “a clear understanding of climate change action” (Article 13.5). Each Party “shall regularly provide” a GHG inventory and “information necessary to track progress made in implementing and achieving its nationally determined contribution under Article 4” (that is, regarding mitigation), which makes the disclosure of such information mandatory (Article 13.7). In contrast, providing information related to adaptation is qualified by “should, as appropriate”, i.e., is voluntary (Article 13.8). Thus, although the stated purpose of transparency of action applies to mitigation and adaptation alike, disclosure of information on adaptation is treated differently.

In addition to the ETF, the Paris Agreement newly created another communication instrument called “Adaptation Communication” which is also qualified by “should, as appropriate” which makes its submission voluntary (Article 7.10). The rulebook defines the purpose of Adaptation Communications as: “(a) Increase the visibility and profile of adaptation and its balance with mitigation; (b) Strengthen adaptation action and support for developing countries; (c) Provide input to the global stocktake; (d) Enhance learning and understanding of adaptation needs and actions” (UNFCCC 2018a, Decision 9/CMA.1, paragraph 1). The Paris Agreement also stipulates a Global Stocktake (GST) to be undertaken every five years “to assess the collective progress towards achieving the purpose of this Agreement and its long-term goals” (Article 14.1). Information disclosed by countries through the ETF and Adaptation Communications is among the agreed inputs to the GST (UNFCCC 2018b, Decision 19/CMA.1, 37a).

Communication instruments and types of information

Under the ETF, each Party is obliged to submit a Biennial Transparency Report (BTR) starting in 2024. Least Developed Countries (LDCs) and Small Island Developing States (SIDS) are exempt from this requirement. The rulebook specifies which GHGs have to be covered and what information is required to account for national climate pledges (UNFCCC 2018b, Decision 18/CMA.1, Annex chapters II-III). With regard to adaptation, the Paris Agreement states that Adaptation Communications “may include [Parties’] priorities, implementation and support needs, plans and actions” (Article 7.10). The rulebook contains a list of topics for Adaptation Communications and a similar list for adaptation under BTRs. These topics can be categorised into four pillars: (a) Climate change vulnerabilities, risks, impacts, and associated adaptation needs; (b) adaptation policies, plans and goals; (c)

adaptation actions; (d) results of adaptation actions (Berrang-Ford et al. 2019). However, since any reporting on adaptation is voluntary, it is at the discretion of each Party what to communicate, how and in what level of detail.

Comparability and review of disclosed information

The Paris Agreement states: “In accounting for anthropogenic emissions and removals (...), Parties shall promote (...) transparency, accuracy, completeness, comparability and consistency” (Article 4.13). These attributes are also enshrined in the rulebook as guiding principles for the ETF. To facilitate comparability of information about mitigation, the rulebook prescribes “common tabular formats” (UNFCCC 2018b, Decision 18/CMA.1). No equivalent format for adaptation was established. Information submitted in BTRs must undergo a mandatory technical expert review, but information on adaptation is exempt from this requirement. On the contrary, it was stipulated that an Adaptation Communication is “not a basis for comparison between Parties and is not subject to review” (UNFCCC 2018a, Decision 9/CMA.1, paragraph 2). In November 2022, it was agreed “that a Party may, on a voluntary basis, request the secretariat to organize a review of the [adaptation] information” submitted in its BTR (UNFCCC 2022, Decision 9/CMA.4).

Table 1. Differences between the transparency rules for mitigation and adaptation in the Paris Agreement and its rulebook.

Aspect	Transparency arrangements for:	
	Mitigation	Adaptation
Purpose	Providing “a clear understanding of climate change action”	
Types of information	Anthropogenic emissions and removals; mitigation policies, targets and measures and their achieved and projected effects	Climate impacts, vulnerabilities and risks; adaptation needs; adaptation policies and plans; implemented adaptation actions and their results
Obligation of disclosure	Mandatory (“shall regularly provide”)	Voluntary (“should, as appropriate”)
Review of submitted information	Mandatory	Voluntary; explicitly ruled out for Adaptation Communications
Comparability	Explicitly required for mitigation in NDCs	Adaptation Communications are explicitly ruled out as the basis for comparison
Metrics to measure progress	Predefined. “100-year time-horizon global warming potential” in order “to report aggregate emissions and removals”	Not mentioned. Neither the Paris Agreement nor its rulebook foresee the development of metrics or indicators for adaptation
Flexibility	Applies equally to mitigation and adaptation	

Sources: Paris Agreement (UNFCCC 2015), its rulebook (UNFCCC 2018a, Decision 9/CMA.1; UNFCCC, 2018b, Decision 18/CMA.1), and UNFCCC 2022, Decision 9/CMA.4.

Measurement of progress

The rulebook clearly defines the metric to measure mitigation: “Each Party shall use the 100-year time-horizon global warming potential (GWP) values” (UNFCCC 2018b, Decision 18/CMA.1, Annex paragraph 37). The rulebook further stipulates that countries must provide information on methods used for emission calculations in accordance with guidelines for national GHG inventories from the Intergovernmental Panel on Climate Change (IPCC). In contrast, neither the Paris Agreement nor its rulebook provide any specifications as to how adaptation progress is to be assessed. Instead, a mandate was issued in 2015 to develop methodologies for “Reviewing the adequacy and effectiveness of adaptation and support” (UNFCCC 2015, paragraph 45). Since 2022, negotiations have discussed the option of global targets for adaptation which, if adopted, might lead to a mandate for further work on tracking progress towards them (Leiter, 2022).

Influence of the subject matter on transparency rules

Differences between adaptation and mitigation

Adaptation to climate change is defined as “the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities” (IPCC 2022, 2898). While this definition by the IPCC has remained almost constant in over twenty years, the exact scope and interpretation of adaptation has been strongly debated. The main points of contention are how adaptation relates to development (Ayers and Dodman 2010), whether climate risks are primarily determined by biophysical changes or by existing vulnerabilities (O’Brien et al. 2007), and whether the aim of adaptation is reducing climate impacts or also aiming for reductions in inequalities (Pelling 2011).

Adaptation is neither defined in the UNFCCC from 1992 nor in the Paris Agreement, and Parties have held different views over its exact meaning (Schipper 2006). A review of adaptation definitions found the lack of consensus among states to be due to epistemic ambiguity, i.e., the difficulty of drawing clear boundaries around adaptation, rather than strategic ambiguity caused by political differences (Hall 2017). Even though the exact meaning of adaptation is contested, there is consensus that adaptation differs fundamentally from mitigation of GHG emissions. As a policy issue, the latter is widely accepted to present a collective action problem over a common pool resource (the global atmosphere). Adaptation, in contrast, is typically framed as a more location-specific governance issue and the importance of context for adaptation is undisputed. Table 2 summarises these differences and their implications for transparency. The following sections elaborate the implications for transparency’s rationale and for the aspects of comparability and measurability which are among the attributes Dingwerth and Eichinger (2010, 82) refer to as “preconditions of effective transparency”.

Rationales for transparency

GHG emissions by any one country affect all others irrespective of the physical distance to the source. Countries thus depend on each other’s enforcement to mitigate the threats from climate change which creates a very strong rationale for transparency of mitigation. In contrast, inaction on domestic adaptation by any one country does not affect another except in case of transboundary climate risks, i.e., where risks spread across borders through movements of goods or people (Challinor et al. 2017). However, transboundary climate risks do not affect each country equally and they only account for a proportion of total climate risks (Hedlund et al. 2018). Accordingly, for the most part, countries do not depend on information about other countries’ domestic adaptation actions. Adaptation therefore does not have an equivalent rationale for disclosure than reassuring compliance in a global commons problem.

Table 2: Differences between mitigation and adaptation and their implications for transparency.

	Mitigation	Adaptation	Implications for transparency
Governance problem	Global problem: Total amount of global GHG emissions determines if temperature goals can be met; pollution of any one country affects all.	Mainly local and sub-national; international only regarding transboundary climate risks and regarding support to developing countries	Transparency of GHG mitigation is indispensable to all Parties. The same does not apply to transparency of adaptation, but transboundary climate risks make information about adaptation action internationally relevant.
Main political debates under UNFCCC	Fair share of mitigation efforts; phase out of fossil fuels; support for developing countries	Support for developing countries; in 2023: negotiation of a framework for the global goal on adaptation	Information on mitigation actions and on support for developing countries is essential. A framework for the global goal on adaptation may trigger further demand for information on adaptation.
Relevance of comparability	Essential to calculate the combined global effect of mitigation pledges and actions to determine if the temperature goals can be met.	No direct rationale for global comparability of adaptation actions. Comparability of vulnerability information sometimes suggested as a basis for allocation of funds.	Comparability of mitigation information is indispensable to determine if the temperature goals can be met. Context-specificity limits comparability of adaptation actions.
Measurability	Measurable as physical quantities via objective and context-independent metrics (e.g. temperature in degree centigrade).	No common global reference metrics exist. Assessment is sensitive to framing and context including differential vulnerability among the population.	Information about adaptation outcomes cannot be globally aggregated on a single metric. Assessments need to consider who benefits and what the risks of maladaptation are.

Another rationale for transparency of mitigation is determining whether countries make a fair or equitable contribution to global emission reductions. This rationale does not in the same way apply to domestic adaptation actions because its benefits typically accrue nationally or sub-nationally rather than at the global level. Internationally, it would only apply to those domestic actions that reduce transboundary climate risks. Debates on fairness regarding adaptation have instead focused on international support to developing countries (Paavola and Adger 2006). The subject of transparency then refers to financial support rather than to domestic adaptation actions, and transparency of support is a separate category under the ETF (see e.g. Bodle and Noens 2018). A distinct rationale for disclosure related to adaptation

refers to information about climate vulnerabilities, risks and impacts which have been proposed as possible criteria for the allocation of adaptation finance to developing countries (Muccione et al. 2017; but see a critique by Robinson et al. 2023).

Comparability

Any given quantity of a particular GHG has the same effect on climate change irrespective of its emission location. This “uniformity of effect” is one of the properties that enables comparability of mitigation metrics (Leiter and Pringle 2018, 31). A methodological challenge concerns the conversion between different GHGs since they differ regarding their atmospheric lifetime and their warming potential (IPCC 2021, Chapter 7.6). However, for a given conversion method, emissions from countries are directly comparable. In contrast, numerically similar adaptation outcomes, e.g., regarding availability of water, can have a very different meaning in different contexts and even within the same context due to differential levels of vulnerability (Thomas et al. 2019). Furthermore, the benefits of adaptation are typically not equally shared, and adaptation can lead to redistributing rather than reducing vulnerability (Atteridge and Remling 2018; Eriksen et al. 2021). Adaptation in one place can therefore not be equated with adaptation somewhere else. In fact, Dupuis and Biesbroek (2013, 1476-1484) warn against “rather simplistic and descriptive comparisons between countries in order to determine adaptation leaders or laggards”.

Measurability

Mitigation of climate change is defined as “A human intervention to reduce emissions or enhance the sinks of greenhouse gases” (IPCC 2022, 2915). Mitigation can therefore be measured through metrics of emission quantities, i.e., through physical units that have universal applicability irrespective of context. Adaptation, in contrast, is a social change process that takes a myriad of different forms and includes a broad range of outcomes, e.g., increased water efficiency in situations of drought, reduced health impacts from extreme heat, or minimized damages in the advent of intense storms. As a result, “adaptation has no common reference metrics in the same way that tonnes of GHGs or radiative forcing values are for mitigation” (IPCC 2014, 853). Furthermore, the definition of what constitutes effective or successful adaptation can vary according to the framing and conceptualisation of adaptation (Dewulf 2013; Eriksen et al. 2015; Singh et al. 2022). There is, therefore, no objective way of measuring adaptation outcomes (Dilling et al. 2019). Adaptation by one group of people can also worsen the situation of others. These cases of maladaptation can lead to false conclusions about adaptation’s success (Reckien et al 2023).

The relative influence of subject-related and political factors on transparency rules

Had more stringent transparency rules on adaptation been politically feasible?

The transparency rules for mitigation and adaptation under the Paris Agreement are almost the complete opposite of each other (see Table 1). A comparison to the subject-related differences outlined in Table 2 suggests a strong causal relationship. To further test this causality, and to determine its relation to political factors, this section explores a hypothetical alternative scenario where transparency rules for mitigation and adaptation are identical. Table 3 shows the actual transparency rules on the left and an alternative scenario for more stringent transparency rules for adaptation on the right. The following paragraphs explore the feasibility of this scenario, i.e., what it would have taken politically to agree to those more stringent transparency rules.

Table 3: Actual transparency rules and a hypothetical scenario of alternative rules for adaptation.

	Actual transparency rules		Hypothetical alternative scenario for adaptation	
Aspect	Mitigation	Adaptation	Alternative rules for adaptation	What it would have taken
Obligation of disclosure	Mandatory	Voluntary	Mandatory	Agreeing on rationale and scope
Review of submitted information	Mandatory	Voluntary	Mandatory	Agreeing on scope and purpose
Comparability	Explicitly required	Explicitly ruled out for Adaptation Communications	Explicitly required	Agreeing on purpose and methods
Metrics to measure progress	Predefined	Not mentioned	Global indicators or metrics	Agreeing on purpose and indicators or metrics

Mandatory obligation of disclosure and a review of submitted information by experts or by officials from other countries are typically perceived as infringements on national sovereignty. An agreement on mandatory disclosure of information on adaptation would have therefore required a very strong case that such disclosure was necessary and that it was worth the efforts and costs of producing the relevant information. Yet, contrary to technical arguments for more disclosure on adaptation by countries (Ford et al. 2015), the political debate in 2015 did not reflect a necessity of knowing about other countries' domestic adaptation actions. Instead, the political argument for transparency of adaptation was part of a general push by developing countries to anchor adaptation as an equal pillar in the new agreement. Achieving this political objective did not require making disclosure mandatory since the inclusion as such was already an advancement over the mitigation-focused transparency arrangements of the 1992 UNFCCC (Winkler et al. 2017). Keeping it voluntary also helped securing buy-in from countries that were concerned about the capacity burden of meeting respective requirements.

Stipulating mandatory disclosure of adaptation information would have also required specifying what types of information had to be disclosed. The Paris Agreement did not specify what adaptation under the ETF would include and only provided general directions for Adaptation Communications. During the negotiations of the Paris rulebook between 2016-2018 there were generally two positions: developing countries emphasised information on vulnerabilities and funding needs while developed countries stressed the importance of information on adaptation policies and actions taken. The eventual settlement saw both types of topics included while the latter were qualified by "as appropriate" (UNFCCC 2018a, Decision 9/CMA.1, paragraph 7). Since developing countries were generally opposed to including information on adaptation implementation, monitoring and evaluation in Adaptation Communications, let alone as mandatory topics, and developed countries were opposed to mandatory information on vulnerabilities and needs, any agreement on mandatory disclosure of adaptation information was infeasible in 2018.

Comparability is one of the agreed guiding principles of the ETF. At the same time, comparisons across countries are politically sensitive which is one of the reasons why the

rulebook stipulates that an Adaptation Communication is “not a basis for comparison between Parties and is not subject to review” (UNFCCC 2018a, Decision 9/CMA.1, paragraph 2). Making comparability of adaptation information mandatory would have required a strong political case for such comparability including what exactly was to be compared and for what purpose. While comparable information on mitigation actions is indispensable to calculate whether the combined commitments are sufficient to reach the temperature goals, there is no equivalent rationale for comparing adaptation outcomes across countries. Moreover, since 1994 countries have not been able to agree on a methodology to determine which countries are “particularly vulnerable” to the effects of climate change and therefore to be prioritised for financial support. Negotiators report that this debate caused frictions in the group of developing countries because any methodology could favour some country groups over others (Arciniegas Rojas and Cordano Sagredo 2020, 56-57; see also Klein 2009). It was therefore politically infeasible to agree to any methodologies for comparative vulnerability information in the ETF or in Adaptation Communications and no political case for comparisons of adaptation outcomes was made.

Specifying global indicators or metrics for adaptation within the Paris Agreement or its rulebook would have required an agreement about their purpose and their wording. In 2015, this would have been no small task since just a year earlier the IPCC had concluded that “adaptation has no common reference metrics” (IPCC 2014, 853). It would have required finding indicator formulations that fit to the very different circumstances of countries and overcoming reservations against cross-country comparisons. Instead, the Paris Agreement recognised the importance of “Monitoring and evaluating and learning from adaptation plans, policies, programmes and actions” as part of countries national adaptation planning and implementation (Article 7, paragraph 9d; see Leiter 2021). The Adaptation Committee and the LDC Expert Group, which had been given a mandate in 2015 to develop methodologies for reviewing the adequacy and effectiveness of adaptation concluded two years later “that the current state of knowledge is not sufficient to address the mandate and requires time and effort to advance” (UNFCCC 2017, paragraph 15c). Accordingly, there was little basis for any decision to include global adaptation indicators or metrics in the rulebook in 2018, and there was no strong political support for it across negotiations groups.

Were more stringent transparency rules on adaptation a politically contested issue?

To further test the relative role of political and subject-related factors on transparency rules, this section examines whether countries tried to instal more stringent transparency rules on adaptation regardless of the challenges presented by the subject matter. A negotiator interviewed by Hall and Persson (2018, 556) expressed: “No one has really pushed for binding commitments on planning and implementation of adaptation”. According to the lead coordinator on adaptation for developing countries, the main politically contested issues between 2016-2018 were: a) the role of the principle of common but differentiated responsibilities; b) whether Adaptation Communications should focus on support needs or on policies and implemented actions; and c) whether guidance on Adaptation Communications should be different for different reporting instruments (Bueno Rubial 2020). The first issue confirms an observation by Gupta and van Asselt (2019, 30) that transparency negotiations often “reflect ongoing disputes around responsibility, differentiation, and burden sharing for climate action” rather than focusing on substantive aspects related to transparency. The third issue was an attempt by major oil and gas producing countries to avoid more stringent reporting requirements on mitigation by classifying them as mitigation co-benefits of adaptation. Only the second issue was about substance on transparency of adaptation, namely about the scope and role of Adaptation Communications, as discussed in the previous section. Overall, based on these first-hand accounts and on my own observations, none of the negotiations about the transparency rules of the Paris rulebook seriously considered making adaptation reporting mandatory or subject to review, nor was any advanced proposal on how to assess adaptation progress globally put forth that would have had the support from multiple negotiation blocks.

Implications for transparency in global environmental governance

Influence of the subject-matter on transparency rules

In a synthesis of ten studies of transparency arrangements in global environmental agreements and initiatives, Mason and Gupta (2014, 331) conclude “that the partial transparency evident from the institutionalization of governance by disclosure (...) is delimited more by political-economic rather than by technical markers.” In contrast, the analysis presented in this article suggests that subject-related aspects had a profound influence on transparency rules under the Paris Agreement. In fact, the transparency rules for mitigation and adaptation are practically the opposite of each other (see Table 1). Importantly, the analysis finds that subject-related and political factors often interact with each other. For example, where subject-related factors make stringent transparency rules more challenging, it adds to the political hurdles that would need to be overcome to increase transparency, especially regarding infringements on national sovereignty. The case of the Paris Agreement therefore demonstrates that transparency can be simultaneously a site of political conflict *and* significantly influenced by aspects of the subject matter.

As significant as subject-related factors have been for the formation of transparency rules under the Paris Agreement, it is important to stress that there is no determinism. For instance, while there was a clear case for mandatory disclosure and comparability of information on mitigation, transparency was nevertheless a “crunch issue” during the negotiations of the Paris Agreement and there was strong resistance against any mandatory disclosure and review (Bodansky 2016, 311). To take another example, countries could have chosen to adopt global adaptation indicators as part of the rulebook in 2018 despite the subject-related challenges. For example, they could have decided to adopt the indicators of the Sustainable Development Goal 13 “Climate Action” which were already in place by then, or the indicators under the Sendai Framework for Disaster Risk Reduction (Leiter and Olivier 2017). Hence, the influence of subject-related aspects is not deterministic, but it affects the feasibility and effort needed to operationalise particular transparency rules and can in turn be utilised in political arguments for or against transparency.

Transparency rules can change over time. While information about adaptation was excluded from any technical expert review under the ETF in 2015 (Article 13.11), a decision in November 2022 enabled a voluntary review of such information (UNFCCC 2022, Decision 9/CMA.4). However, this change does not represent a fundamental departure from the transparency rules of 2015 since the review is voluntary and does not refer to Adaptation Communications. Furthermore, it is important to carefully account for the details of the new decision and its evolution. The initiative for a voluntary review of adaptation information in BTRs was spearheaded by a few developing countries whose aim was primarily around information on adaptation needs rather than reviewing the full scope of information on adaptation including reporting on implementation. Developed countries questioned the purpose of a review with such a limited scope. The compromise reached was to include the full scope of adaptation information in a technical review while countries “may select specific sections (...) for particular attention” (ibid.). Hence, this case shows how Parties are seeking to utilize transparency to advance their interests which confirms the underlying thesis of critical transparency studies that transparency is a site of political contest (Gupta and Mason 2014).

Towards a more granular analysis of transparency as a governance mechanism

The above analysis leads to important takeaways for our understanding of transparency as a governance mechanism including challenges to assumptions commonly made in studies of state-led transparency. First, multiple contrasting transparency arrangements can coexist under a single treaty. Such coexistence has multiple implications. For one, it reinforces the need to study the specifics of how transparency is operationalised since an analysis of the

norms and drivers underpinning the general uptake of transparency will not explain these differences. Furthermore, diverse sets of rules likely mean that transparency operates differently for different topics. For example, Weikmans et al. (2020) propose pathways through which transparency could lead to greater ambition under the Paris Agreement, but several of these pathways are not applicable to adaptation. A partial analysis of transparency under an agreement therefore cannot be taken to represent transparency's potential regarding other topic areas.

Second, the effect of transparency does not only depend on transparency's normative underpinnings, but also on the subject matter and the (normative) concepts used to describe it. A hypothesis for future investigation is: the more diverse multiple topics covered by an environmental agreement are, the more likely it is that each will have distinct transparency rules and that transparency will subsequently function differently for each subject area. Subject matter influence has also been confirmed for private-led transparency in voluntary sustainability standards (Wijen and Flowers 2023). Instead of assuming a fixed external "materiality", transparency studies should adopt understandings "that admit the significance of the physical" while simultaneously accounting for political and cultural dimensions (Bakker and Bridge, 2006, 8).

Third, literature on transparency in global environment governance should not presuppose that transparency only refers to the traditional category of environmental harm. It can, for instance, also cover information on support, vulnerabilities, or adopted policies. Rational assumptions derived from a standard pollution case cannot be taken to determine the costs and benefits of disclosure of all types of information. Moreover, analysis of the politics of state-led transparency should be informed by the actual content of negotiations to avoid simplistic or inaccurate conclusions (Leiter 2023). Finally, the case of the Paris Agreement shows that the notion of "full disclosure" (Gupta and Mason 2014) or "true transparency" (Wijen and Flowers 2023) is not always suitable. In fact, it is difficult to image what "full disclosure" regarding adaptation would entail. Instead of imagining a hypothetical maximum extent of disclosure, it should be examined what influences transparency rules and how these rules in turn affect the mechanisms through which transparency aims to steer behaviour.

Conclusion

This study presents a rare empirical account of the development of transparency rules under a global environmental agreement. Transparency rules for mitigation and adaptation under the Paris Agreement show marked differences regarding obligations for disclosure, review, comparability, and measurability (see Tables 1 and 2). Contrary to conclusions from previous studies, subject-related factors appear to be a vital explanatory reason for these differences. At the same time, there is no determinism. Political factors including power and interests ultimately set transparency rules, but the influence of the subject matter makes some transparency modalities easier or more challenging to agree to politically than others. The case of the Paris Agreement therefore demonstrates that transparency can simultaneously be a site of political conflict *and* be significantly influenced by the underlying subject matter. The findings further challenge common assumptions about transparency in global environmental governance, that the subject matter would be a fixed and externally defined, that information to be disclosed would primarily concern pollution problems, that there would essentially be just two types of players (those seeking to render something visible and those seeking to obfuscate), and that costs and benefits would be distributed accordingly. The coexistence of contrasting transparency rules and the diversity of information included under transparency arrangements instead call for an analysis of the specific rules and types of information in order to assess more accurately how transparency as a governance mechanism works and what potential it has to steer states' behaviour.

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5 Transparency's role in the pledge-and-review system of the Paris Agreement

5.1 NDCs as a document and a site of political conflict

One of my former bosses at GIZ used to say: “Researchers love NDCs because they are neat documents that can be easily studied”. What he alluded to was that the messy realities of how NDCs get produced (from being written by individual consultants to being the product of wide-ranging consultative processes) and the very different political currency they carry in different countries are much harder to study. Yet, these aspects are what actually matters when one seeks to understand the influence these documents have. In my job as a climate policy advisor in Tanzania, I had the privilege to first-hand witness the update process of Tanzania's NDC in 2018. Such a reality check of an NDC development process in an LDC context quickly dispels any rational notions of a process grounded in evidence (“truth speaks to power”). The development of NDCs is simultaneously a site of political conflict, especially regarding the mitigation requirements and its impacts on the national political economy, and part of a political positioning within the UN climate change negotiations.

Due to all the attention that NDCs receive under the Paris Agreement, there is a tendency to overstate NDC's role and to lose sight of the fact that NDCs present just the “pledge-side” of the “pledge-and-review” system. The governance architecture of the Paris Agreement cannot function without the inherent connection to the “review-side”. The latter is largely (but not exclusively) represented by the enhanced transparency framework. It is only the stringency of the transparency side (for mitigation at least) that made the bottom-up structure of self-determined national pledges agreeable to all (Bodle et al., 2016).

The article contained in this chapter responds to another article that was published in April 2023 in *Environmental Politics*. My response underwent the regular double-blind peer review process. One reviewer wrote: “Academic debate of this nature is extremely valuable, and I wish that journals would publish more such exchanges. This is how our knowledge and understanding develops, as a community”.

Partly in response to the reviewers' comments, I reframed the article to also provide guidance to future research on NDCs. As a results, the article outlines five aspects to strengthen the robustness and accuracy of research into the governance functions of NDCs.

Nationally determined contributions (NDCs) as a governance instrument – accounting for politics, negotiation progress, and related mechanisms under the Paris Agreement

Timo Leiter 

Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science (LSE), London, UK

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The article “Governing through the nationally determined contribution (NDC): five functions to steer states’ climate conduct” by Jernnäs (2023) is part of an important research effort to understand how climate governance under the Paris Agreement operates. The article succeeds in demonstrating that the adoption of the Paris Agreement did not resolve many of the long-standing differences between states, but further clarity is needed to accurately interpret its results. In this response, I outline five aspects to guide future research on NDCs as a governance instrument including the crucial distinction between exploring *potential* NDC functions based on submissions during the negotiation process and examining the *actual* NDC functions based on the adopted Paris rulebook and empirical observations. My response draws on participant observation at the United Nations climate change negotiations since 2015 (Leiter 2022, Langlet *et al.* 2023) and is further substantiated through literature on global climate change negotiations.

In December 2015, Parties to the United Nations Framework Convention on Climate Change (UNFCCC) adopted the Paris Agreement (UNFCCC 2015). Many details on how to operationalise its provisions were left open and designated for further elaboration during the three-year period 2016–2018. A common procedure during negotiations is for countries to state their views in the form of ‘submissions’, basically written negotiation positions. The negotiation process then seeks to find compromises so that countries’ positions gradually narrow down to a version that is agreeable to all. In December 2018, this process concluded in a set of decisions collectively

CONTACT Timo Leiter  T.L.Leiter@lse.ac.uk

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known as the Paris rulebook (UNFCCC 2018). It is against this backdrop that I outline the following five aspects for research on NDCs.

First, research can examine countries' positions expressed during the negotiations, or the adopted decisions, or a combination of both. By using submissions as the only data source, Jernnäs chose the former. Such an approach can yield useful insights into the politics and 'terrains of contention' (Calliari *et al.* 2020) and is indeed suitable to 'examine how states articulate ideas on governing through the NDC' (Jernnäs 2023, p. 6). However, the breath of views expressed in submissions, including the most extreme positions, are not representative of the much narrower set of NDC rules countries had agreed to in December 2018 (Decision 4/CMA.1 in UNFCCC 2018). Jernnäs' analysis does not account for this decision and readers are left unaware of its existence. At times, the article therefore appears to conflate an inquiry into the variety of country positions expressed *during* the negotiations with examining how NDCs actually govern based on the agreed *outcome* of negotiations. As a consequence, the reader is left with the impression that the conflicting issues around NDCs are still left largely unresolved, an impression reinforced by Jernnäs' argument that 'these diverging views on the function of the NDC will become increasingly prominent as we move toward the first round of the global stocktake in 2023' (p.1). On the contrary, countries' positions had already considerably narrowed to a set of rules that were adopted in December 2018. For example, on two of the most prominent issues of contestation, namely the extent of standardisation of NDCs and requirements for comparability of emission reduction pledges, countries agreed to mandatory information on 'clarity, transparency and understanding' (CTU) that all countries must provide (Decision 4/CMA.1, paragraph 7). The compliance rate of CTU information in NDCs across all Parties is 95% as of September 2022 (UNFCCC, 2022)." Failing to mention that countries had already converged their positions and to discuss what this means for NDC's functions can cause readers to misinterpret findings of the article, for example by taking the five functions shown in Figure 1 of Jernnäs (2023) as representing the actual ways in which NDCs have come to govern states' behaviour. The robustness of future research into the governance functions of the NDC can be increased by analysing submissions in conjunction with adopted decision text.

Second, submissions are instruments through which states seek to influence negotiations in accordance with their interests. When analysing submissions, it is therefore important not to take the ideas expressed in submissions at face value. For example, the proposal by China to use NDCs merely for sharing good practices was made precisely to avoid stringent requirements that enable comparing and aggregating countries' commitments (Dimitrov 2016). Indeed, literature has recognised that NDCs can be interpreted not only as pledges, but also as negotiation positions (Leinaweaver and Thomson 2021) which applies even more to submissions.

Instead of accounting for the underlying politics, Jernnäs engages with some of states' submitted ideas at face value, especially on the 'Influencer' function (section 5.3), thereby justifying rather than analysing certain positions. As a consequence, readers might take away that NDCs would commonly function as a tool for showcasing good practices which is rarely done in practice and not at all mentioned in the respective decision of the Paris rulebook.

A third and equally important aspect is that NDCs' governance effects cannot be properly understood without considering the interlinkages to other parts of the Paris architecture. The Paris Agreement established a 'pledge and review system' whereby states pledge their commitments that are subsequently reviewed through multiple mechanisms. Accordingly, Winkler (2017, p. 163) emphasises that NDC's 'mitigation provisions [in Article 4] need to be read together with links to transparency'¹ and the global stocktake', i.e. with Articles 13 and 14. In contrast, Jernnäs presents the NDC 'as the central instrument for achieving the stipulated targets' and, while mentioning the transparency framework briefly, portrays the Paris Agreement design largely as 'a pledge-based system' (p.3–4). However, the element of national pledges became only agreeable *in combination* with the review component that serves to 'counterbalance the lack of specific and individual mitigation obligations, to improve the credibility of the global effort, and to create mutual trust' (Bodle *et al.* 2016, p. 12). Indeed, information on implementation that is crucial for trust-building and for tracking progress must be provided every two years through transparency reports rather than just every five years via NDCs (Winkler *et al.* 2017). Since the NDC is inextricably linked to the review system, presenting NDCs as fulfilling the functions of 'Trust-builder' and 'Progress Tracker' *in isolation* from other mechanisms is an inaccurate representation of the architecture of the Paris Agreement.

Fourth, NDCs primarily refer to the temperature goals and less to the other two objectives of the Paris Agreement, namely adaptation to climate change and making financial flows consistent with low greenhouse gas emissions and climate-resilient development (Article 2.1). While most NDCs mention adaptation, the far more consequential governance instruments for adaptation are National Adaptation Plans (mandated in Article 7.9), Adaptation Communications (Article 7.10–11), and the Global Goal on Adaptation (Article 7.1) (Leiter 2022). Therefore, solely focusing on NDCs does not sufficiently capture the governance of two of the three objectives of the Paris Agreement.

The fifth aspect concerns the challenge of making sense of complex negotiation dynamics and associated governance effects without oversimplification. Drawing on Foucauldian governmentality studies, Jernnäs 'seek[s] to bring analytical clarity to the rationalities that inform governing under the Paris Agreement' (p.3). Her analysis identifies five NDC functions which, as explained above, do not necessarily represent the actual ways through which NDCs influence states' behaviour. Jernnäs then denotes three of them

(‘Progress Tracker’, ‘Trust-Builder’, and ‘Influencer’) as ‘center[ing] around a techno-managerial rationality’. The other two functions (‘Differentiator’ and ‘Gatekeeper’) would ‘exhibit an antagonistic rationality’ that ‘highlight[s] the long-standing, structural political struggles that surround climate governance’ (p.16–17). Yet, accounts of the negotiations clearly attest that *all* major agenda items were strongly influenced by long-standing political struggles (e.g. Dimitrov 2016). In fact, the transparency mechanism was a ‘crunch issue’ in Paris (Bodansky 2016, p. 311). Gupta and van Asselt (2019) likewise find transparency just to mirror the disputes around differentiation and burden sharing. Thus, reducing the central issues of progress tracking and trust building to merely following a ‘techno-managerial rationality’ is an oversimplification that, paradoxically, itself risks hiding the political struggles that play out in their implementation.

Jernnäs describes the main risk of a techno-managerial rationality as ‘presenting problems of insufficient climate action as a lack of expert knowledge, quantification, and reporting cycles’ which in turn ‘risks displacing political contention’ (p.17). While rationalist assumptions such as more information leading to better action are indeed common in climate governance (e.g. Gupta and Mason 2016), a lack of information has not recently been advanced by states to justify low ambition. Instead, political conflicts around the phase out of fossil fuels have been on full display at recent climate change conferences (Lo and Farand 2022). These conflicts do no longer just unfold along the traditional lines of developed vs. developing countries, but between countries determined to continue producing oil, gas and coal and those that foster a faster transition away from fossil fuels. Against this backdrop, it remains unclear how climate action could be enhanced by utilizing NDCs for ‘fending off seemingly predatory attempts at increased international assimilation’, as Jernnäs suggests (p. 17).

Overall, out of the five functions that Jernnäs ascribes to the NDC based on countries’ submissions, two (‘Progress Tracker’ and ‘Trust-Builder’) cannot be performed in isolation from review mechanisms, one (‘Influencer’, i.e. showcasing good practices) is rarely done via NDCs, and another one (‘Gatekeeper’) outlines more a debate rather than a governance function. Furthermore, the way the functions are arranged in Figure 1 of Jernnäs (2023) suggests each would be of equal importance which does not correspond to the dynamics of the ambition cycle (see e.g. Sælen 2020). While it is perfectly legitimate to ‘explore how governing climate change through the NDC is envisioned by states’ (in this case, how it *was* envisioned in 2016–2018) (p.3), understanding how NDCs actually “steer states’ climate conduct” (the title of the article) would have required integrating the adopted decisions of the Paris rulebook into the analysis. Additionally, any inquiry into the governance effects of the NDC must account for the inherent interlinkages with other mechanisms of the Paris architecture (Winkler

2017). Finally, it remains a challenge for the scholarly community to explain complex and multi-faceted negotiations without oversimplification, especially regarding the causes of particular negotiation outcomes. I hope that the five aspects outlined above will help guide future research on this important matter.

Note

1. Importantly, the term transparency in context of the Paris Agreement does not just refer to transparency of information contained in NDCs but to a review mechanism including the Enhanced Transparency Framework under Article 13. The UNFCCC website provides a useful introduction: <https://unfccc.int/Transparency>

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ORCID

Timo Leiter  <http://orcid.org/0000-0003-4982-8063>

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6 Adaptation in the UN climate change negotiations

6.1 Adaptation negotiations and global governance of adaptation – two understudied areas

Adaptation to climate change has been a top priority of recent United Nations climate change conferences. However, to date no systematic assessment of the negotiation outcomes on adaptation during the implementation phase of the Paris Agreement has been undertaken. In fact, most of the literature on global climate governance and climate law focuses on mitigation of greenhouse gas emissions. Indeed, it is common for research articles on the climate change negotiations to exclude adaptation (e.g. Rajamani & Bodansky, 2019; Weikmans et al., 2020). It seems that the elusive nature of adaptation makes it harder to analyse, certainly for rational institutionalist approaches. To address this gap, the article in this chapter examines whether progress has been made in advancing adaptation at the UN climate change negotiations since the adoption of the Paris Agreement. It builds on and advances the work of a pioneering article on adaptation in UNFCCC negotiations by Lisa Schipper (2006).

An important finding of the article is the stark contrast between expectations or imaginations about what the negotiations on adaptation would discuss, and what they actually do talk about (often largely procedural matters). From a governance perspective, it is an intriguing question to what extent a mainly (but not exclusively) local and context-specific subject matter can be governed at the global level by international law. This question has so far rarely been examined (exceptions are Hall & Persson, 2018; and Persson, 2019). My article therefore makes a novel and significant contribution to literature on global adaptation governance and to scholarship on international environmental negotiations.

Too Little, Too Slow? Climate Adaptation at the United Nations Climate Change Negotiations Since the Adoption of the Paris Agreement

Timo Leiter*

Adaptation to climate change has become a top priority of negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement. However, most of the literature on global climate governance focuses on mitigation of greenhouse gas emissions. This article therefore proposes a framework for tracking negotiation outcomes on adaptation based on the four dimensions of the Adaptation Gap Report of the United Nations Environment Programme (planning, finance, implementation, and effectiveness) and on key governance functions outlined in the climate policy literature. By comparing the adaptation outcomes of the three most recent Conferences of the Parties (COP25 – COP27) with the baseline of adaptation provisions in the Paris Agreement and its rulebook, the extent and type of decisions on adaptation are assessed and the evolution of relevant agenda items is analysed. Decisions adopted since 2019 have concentrated on support and transparency while the Paris Agreement made greater use of signalling and rule-setting. The extent to which adaptation gaps identified by the Intergovernmental Panel on Climate Change can be reduced through decisions at UN climate change negotiations is influenced by the potential and limits of governing a context-specific subject matter at the global level. Reflecting about how adaptation can be facilitated through multiple governance functions will be vital for the development of an effective framework for the global goal on adaptation.

I. Introduction

The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) emphasises the importance of adapting to current and expected climate change in parallel to strong and near-term emission reductions if the goals of the Paris Agreement are to be achieved.¹ Record-breaking extreme weather events in 2022 including unprecedented flooding in Pakistan and the longest and most extensive heat wave

in China underscore the urgency to act.² While global climate governance was initially concentrated on mitigation of greenhouse gas (GHG) emissions, adaptation to climate change has become an important subject of intergovernmental negotiations. Indeed, the Presidencies of the 26th and 27th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) that took place in November 2021 in Glasgow, United Kingdom and in November 2022 in Sharm El-Sheikh, Egypt named

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- 1 IPCC, *Climate Change 2022. Mitigation of Climate Change. Working Group III contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2022, Cambridge University).
- 2 WMO, *WMO Provisional State of the Global Climate 2022* (2022, World Meteorological Organisation).

adaptation as one of their top priorities.³ Yet, literature on the UN climate change negotiations has so far paid only scant attention to adaptation. Very few empirical studies of the actual negotiations exist and even fewer for the period after the adoption of the Paris Agreement in December 2015. This gap is surprising given that adaptation achieved a higher profile through the Paris Agreement and given that the Sixth Assessment Report of the IPCC finds that significant adaptation gaps persist.⁴ Literature available to date cannot comprehensively answer whether the UN climate change negotiations contributed to addressing these adaptation gaps during the implementation phase of the Paris Agreement. It is therefore pertinent to analyse what has been negotiated on adaptation, what decisions were taken and what can and cannot be expected from international law on adaptation.

Answering whether progress on adaptation has been made is not straightforward. Unlike mitigation of GHG emissions, climate adaptation does not have a universal metric⁵ and its ambition or implementation level cannot simply be aggregated based on countries' national pledges.⁶ This article therefore proposes a framework to track and assess negotiation outcomes on adaptation along the four dimensions of the Adaptation Gap Report of the United Nations Environment Programme (UNEP)⁷ and along key governance functions used in the climate policy literature. Based on this framework, negotiation outcomes on adaptation are reviewed and findings discussed in relation to expectations from negotiation groups and literature on global adaptation governance. The arti-

cle concludes by identifying future research needs and with an outlook towards COP28 that will take place in Dubai, United Arab Emirates in December 2023.

This research is informed by participant observation at the three most recent UN climate change conferences (COP25-COP27 in November/December 2019, 2021 and 2022, respectively) and the intersessional negotiations in June 2019 and June 2022.⁸ Literature on global environmental politics increasingly recognises that understanding negotiation outcomes requires observing the negotiation process first-hand rather than interpreting final decision texts in the absence of knowing how they evolved.⁹ The author also participated in workshops mandated by COP26¹⁰ under the work programme on the Global Goal on Adaptation (GGA)¹¹ and in related events of the Organisation for Economic Co-Operation and Development (OECD)¹². Findings of the article are highly relevant for upcoming negotiation sessions and workshops towards COP28, especially regarding the work programme on the GGA.

II. Global Adaptation Governance and Adaptation in UN Climate Change Negotiations

Literature on the governance of climate adaptation has predominantly concentrated on the local, urban and sub-national level, with fewer studies on national adaptation governance.¹³ Global adaptation governance has received rather limited attention. Persson (2019)

3 The UK COP Presidency Glasgow Imperative: Closing the Adaptation Gap and Responding to Climate Impacts <<https://uk-cop26.org/the-uk-cop26-presidency-glasgow-imperative-closing-the-adaptation-gap-and-responding-to-climate-impacts/>> accessed 10 December 2022; I Gerretsen, 'Egypt to host next climate summit, putting a spotlight on resilience' (Climate Change News, 12 November 2021) <<https://www.climatechangenews.com/2021/11/12/egypt-host-next-climate-summit-putting-spotlight-resilience>> accessed 1 December 2022.

4 IPCC, *Climate Change 2022. Impacts, Adaptation and Vulnerability. Working Group II contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2022, Cambridge University).

5 IPCC (n 4): Chapter 17.5.2, 'Adaptation monitoring, evaluation & learning' 17-91 – 17-101.

6 Ambition on mitigation is measured based on countries' proposed emission reductions and the corresponding expected future temperature. See: UNFCCC, 'Nationally determined contributions under the Paris Agreement. Synthesis report by the secretariat' (2022) Document FCCC/PA/CMA/2022/4.

7 UNEP, 'Adaptation Gap Report' 2022.

8 Due to the COVID pandemic, COP26 was postponed by a year to November 2021. The intersessional negotiations in June 2020 were cancelled and those in June 2021 took place in a limited virtual format.

9 See for instance R Dimitrov, 'The politics of persuasion: UN climate change negotiations' in P Dauvergne (Ed.). *Handbook of Global Environmental Politics* (2012, Edward Elgar); H Hughes et al, 'Global environmental agreement-making: Upping the methodological and ethical stakes of studying negotiations' (2021) *Earth System Governance*, 21, 100121.

10 Decision 7/CMA.3, paragraph 12.

11 Glasgow-Sharm el-Sheikh work programme on the global goal on adaptation <<https://unfccc.int/topics/adaptation-and-resilience/workstreams/glasgow-sharm-el-sheikh-WP-GGA#eq-5>> accessed 10 December 2022.

12 For instance, the Climate Change Expert Group Global Forum on 13-14 September 2022, sessions on 'Adaptation in the Global Stocktake'. <<https://www.oecd.org/environment/cc/ccxg/globalforumontheenvironmentandclimatechange-september2022.htm>> accessed 9 December 2022.

13 IPCC (n 4).

conceptualises it along three dimensions: the scale of the adaptation problem, the level of governance, and the level actors operate at, and depicts each dimension on a continuum from local to global.¹⁴ The present article focuses on the primary source of global adaptation governance and law, the UN climate change negotiations under the UNFCCC and the Paris Agreement. Specifically, it concentrates on the actual negotiations by Parties to these treaties, i.e., the decisions taken by states as actors at the COP and its subsidiary bodies. These decisions are referred to here as 'negotiation outcomes'.¹⁵ Other initiatives or events that take place on the side-lines of UN climate change conferences but that are not negotiated are not considered.¹⁶

Most of the literature on global climate governance and climate law has been dealing with ways to reduce the causes of climate change rather than how to govern responses to the already experienced and projected climate impacts. A systematic review found that 'the lack of research explicitly studying the adaptation provisions within the Paris Agreement is a gap'.¹⁷ Among the small body of literature examining adaptation in the UN climate change negotiations, the majority of articles are limited in scope to matters of adap-

tation finance.¹⁸ While several articles have reviewed the history of adaptation in the UN climate change negotiations¹⁹, only one in-depth account of how adaptation negotiations evolved in the first three years after the adoption of the Paris Agreement has been published.²⁰ No systematic analysis of the adaptation negotiations since COP24 in December 2018 is available to date, leaving a crucial gap in our understanding of how this subject has advanced in international law.

Hall & Persson (2018) examined the legalisation of adaptation under the UNFCCC and the Paris Agreement and find that adaptation provisions are characterized by low obligation and low precision.²¹ Persson (2019) suggests this status is caused by a) a contested rationale for global-level governance on adaptation, and b) the ambiguity of definitions of adaptation, especially in regard to sustainable development and the associated challenges of assessing adaptation progress.²² As a result, adaptation provisions are more procedural rather than substantive, are mainly voluntary and leave considerable discretion to countries. The 'soft law' characteristic of the Paris Agreement is therefore even more pronounced for adaptation than for mitigation.²³ The first-hand account of the coordinator on adaptation for the negotiation group 'G77 and China' over the period 2016-2018 confirms that most agenda items were of a procedural nature.²⁴

Considering this state of the literature, this article makes three original contributions. First, it proposes how negotiation outcomes on adaptation can be systematically tracked based on a framework derived from UNEP's Adaptation Gap Report and governance functions discussed in the climate policy literature. Second, it provides the first empirical account how negotiations on adaptation evolved since the adoption of the Paris rulebook in 2018. Third, based on the findings and the reviewed literature, it discusses to what extent adaptation gaps can be addressed at the global level and whether expectations put on the adaptation negotiations have been met.

III. Assessing Negotiation Outcomes on Adaptation

1. Importance of Adaptation and Persistence of Adaptation Gaps

Adaptation seeks to reduce climate risks by limiting exposure and reducing vulnerability to climate haz-

14 Å Persson, 'Global adaptation governance: An emerging but contested domain' (2019) 10 Wiley Interdisciplinary Reviews Climate Change 6, e618.

15 While this term is commonly used on the literature on UN negotiations, its equivalent under the OECD results terminology would be an 'output' whereas an 'outcome' would be the implementation or enactment of decisions taken at the negotiations. See OECD, Glossary of Key Terms in Evaluation and Results Based Management (2022).

16 The UK COP Presidency compiled a list of relevant adaptation initiatives that happened outside of the negotiations at COP26 in November 2021, see (n 3).

17 K Raiser et al, 'Is the Paris Agreement effective? A systematic map of the evidence' (2020) Environmental Research Letters 15, 083006.

18 See articles listed in Persson (n 14) 5.

19 See for instance L Schipper, 'Conceptual History of Adaptation in the UNFCCC Process' (2016) 15 Review of European Community and International Environmental Law 1, 82-92; M R Kahn and J T Roberts, 'Adaptation and international climate policy' (2013) 4 Wiley Interdisciplinary Reviews Climate Change 3, 171-189.

20 M P Bueno Rubial, 'The implementation phase of the Paris Agreement: The Adaptation Provisions' In M P Bueno Rubial and L Siegle (eds.) *Negotiating Climate Change Adaptation* (2020, Springer Climate) 110-128.

21 N Hall and Å Persson, 'Global climate adaptation governance: Why is it not legally binding?' (2018) 24 European Journal of International Relations 3, 540-566.

22 Persson (n 14).

23 R Bodle et al, 'The Paris Agreement: Analysis, Assessment and Outlook' (2016) 10 Carbon & Climate Law Review 1, 5-22.

24 M P Bueno Rubial (n 20).

ards that result from, or are exacerbated by, human-induced climate change.²⁵ Adaptation can cushion the adverse effects of climate impacts but is constrained by various barriers and physical limits.²⁶ Adaptation becomes harder and costlier the higher global temperature rises.²⁷ While a high proportion of countries have adopted national adaptation plans and policies²⁸, the Sixth Assessment Report of the IPCC identifies significant adaptation gaps, asserting: 'Despite progress, adaptation gaps exist between current levels of adaptation and levels needed to respond to impacts and reduce climate risks (high confidence). Most observed adaptation is fragmented, small in scale, incremental, sector-specific, designed to respond to current impacts or near-term risks, and focused more on planning rather than implementation (high confidence). (...). At current rates of adaptation planning and implementation the adaptation gap will continue to grow (high confidence).'²⁹

A recent report of the UN Office of Disaster Risk Reduction similarly concludes that 'Despite progress, risk creation is outstripping risk reduction.'³⁰ Developing countries are therefore demanding more support and faster progress on adaptation, a call supported by the UN Secretary-General.³¹

2. A Framework for Assessing Negotiation Outcomes on Adaptation

Global progress on mitigation can be measured in physical quantities (GHG emissions and concentra-

tions in the atmosphere) and associated temperature projections. Global aggregation requires universal applicability of the underlying metrics irrespective of context and a uniform effect of mitigation outcomes, i.e., that benefits are equally distributed globally irrespective of where mitigation takes place. The latter applies since GHG emissions mix evenly in the atmosphere. For adaptation, however, these two conditions are not met.³² First, adaptation outcomes are very diverse. Fewer economic damages, lower death tolls from extreme events, sustained livelihoods despite changing climatic conditions and effective protection from sea-level rise are just four examples. No single metric can express these diverse outcomes across practically all sectors and contexts.³³ Second, climate hazards affect people differently due to different levels of vulnerability, i.e., the poorest and most disadvantaged are typically hit the hardest.³⁴ Assessments of adaptation success therefore need to consider who benefits and whether an adaptation intervention may leave others worse off by shifting rather than reducing vulnerability.³⁵ Furthermore, despite the presence of transboundary climate risks³⁶, adaptation benefits are usually more geographically concentrated and do not equate to equally shared global benefits as in the case of avoided GHG emissions. Accordingly, progress on adaptation, including negotiation outcomes, cannot be measured in the same way as mitigation.³⁷

The Global Stocktake under the Paris Agreement includes adaptation and requires a review of progress made in achieving the GGA.³⁸ The Adaptation Committee reviewed potential methodologies and associated challenges of their operationalisa-

25 IPCC (n 4)

26 IPCC (n 4), Chapter 16.4.

27 This relationship is captured in Article 7.4 of the Paris Agreement.

28 M Nachmany and R Byrnes and S Surminski, 'National laws and policies on climate change adaptation: a global review' (2019) Grantham Research Institute on Climate Change and the Environment.

29 IPCC (n 4), Summary for policy makers, SPM-11.

30 UNDRR, 'Global Assessment Report on Disaster Risk Reduction' (2022).

31 Secretary-General's message on the Launch of the United Nations Environment Programme Adaptation Gap Report, 3 November 2022. <<https://www.un.org/sg/en/content/sg/statement/2022-11-03/secretary-generals-message-the-launch-of-the-united-nations-environment-programme-adaptation-gap-report>> accessed 10 December 2022.

32 T Leiter and P Pringle, 'Pitfalls and potential of measuring adaptation through adaptation metrics' in L Christiansen, G Martinez and P Naswa (Eds.) *Adaptation metrics: Perspectives on measuring, aggregating and comparing adaptation results* (29–48) (2018 UNEP DTU Partnership).

33 IPCC (n 5).

34 K Thomas et al, 'Explaining differential vulnerability to climate change: A social science review' (2018) 10 *Wiley Interdisciplinary Reviews Climate Change* 2, 1–18.

35 A Atteridge and E Remling, 'Is adaptation reducing vulnerability or redistributing it?' (2018) 9 *Wiley Interdisciplinary Reviews Climate Change* 1, 1–16.

36 T R Carter et al, 'A conceptual framework for cross-border impacts of climate change' (2021) *Global Environmental Change*, 69, 102307.

37 UNEP, 'The Adaptation Gap Report. Towards Global Assessment' (2017).

38 Article 7.14d.

tion.³⁹ The Sixth Assessment Report of the IPCC confirms there is ‘no single ‘best’ approach or data source to assess global progress on adaptation (high confidence)’ and concludes that a comprehensive picture requires a combination of multiple methods and data sources.⁴⁰ No decision has yet been taken on an approach to assess adaptation progress under the Global Stocktake. Tasked with a similar demand for policy-relevant information, UNEP’s Adaptation Gap Report has assessed global adaptation progress under a systematic structure since 2020.⁴¹ Instead of attempting to define a list of global indicators, it has defined key dimensions of the adaptation process and presents globally available information on each dimension. This structure is aligned with the policy cycle and is sufficiently flexible to integrate new data sources annually as they become available.⁴²

While the evolution of the concept of adaptation and its role in the UN climate change negotiations have been reviewed by several scholars⁴³, no attempt at systematically assessing whether UNFCCC negotiations have advanced the prospects for adaptation since the adoption of the Paris rulebook has yet been undertaken in the scientific literature. This gap is striking given the high priority placed on adaptation in the Paris Agreement⁴⁴ and subsequent negotiation rounds. No framework for this purpose has yet been proposed.⁴⁵ A coherent structure is required against which negotiation outcomes can be tracked over time. It is proposed that the four dimensions employed by the Adaptation Gap Report (planning, finance, implementation, and effectiveness) provide a suitable structure for this task since they capture dis-

tinct stages of the policy cycle, are applicable to any national circumstances (e.g., different levels of economic development, different political systems and geophysical contexts) and have proven their feasibility in three editions of the Adaptation Gap Report. The report has also been frequently referred to during the negotiations in 2022⁴⁶ and is mentioned in the cover decision of COP27.⁴⁷

The Adaptation Gap Report seeks to assess adaptation progress globally including implementation by governments, international organisations and other actors. However, the COP to the UNFCCC and the meeting of the Parties to the Paris Agreement do not have authority over national implementation and non-state actors. Kinley et al. (2021) observe: ‘In an international system based on the sovereignty of nation states, multilateral processes can ‘deliver’ commitments but not their implementation.’⁴⁸ It therefore needs to be considered what these global multilateral processes ‘can be reasonably expected to deliver’⁴⁹. Literature on climate governance has used the concept of ‘governance functions’ to specify *how* governance can steer behaviour and exert authority. Different variations of these functions have been used to assess the mitigation potential of global climate governance⁵⁰, to review the outcomes of COP27⁵¹, and to take stock of 30 years of international climate change negotiations.⁵²

To generate a suitable framework, the four dimensions of the Adaptation Gap Report and the governance functions proposed by Oberthür et al. (2021) and Kinley et al. (2021) were tested against the adaptation provisions in the Paris Agreement and its rulebook (see Table 2 - Appendix). It turned out that trans-

39 Adaptation Committee, ‘Approaches to reviewing the overall progress made in achieving the global goal on adaptation’ (2021) Technical paper by the Adaptation Committee.

40 IPCC (n 4), see Cross-Chapter Box PROGRESS: Approaches and Challenges to Assess Adaptation Progress at the Global Level, 17-96 – 17-99.

41 A new structure for the report was introduced in 2020. Earlier editions conceptualised the adaptation gap (Adaptation Gap Report 2014), estimated adaptation finance needs (2016), explored global assessments of progress (2017), and provided a sectoral focus on health (2018). All reports are accessible here: <<https://www.unep.org/resources/adaptation-gap-report>> accessed 10 December 2022.

42 See for instance the evolution of the implementation chapter as described in the Annex of the 2022 Adaptation Gap Report (n 7).

43 Most recently by B Orlove, ‘The concept of adaptation’ (2022) Annual Review of Environment and Resources 47, 535–581.

44 A Lesnikowski, J Ford, R Biesbroek and S Austin, ‘What does the Paris Agreement mean for adaptation?’ (2017) 17 Climate Policy 7, 825–831.

45 Berrang-Ford et al, propose a framework for countries to track their national adaptation progress over time. See L Berrang-Ford et al, ‘Tracking global climate change adaptation among governments’ (2019) 9 Nature Climate Change 6, 440–449.

46 Own observation, especially during the negotiation sessions of the work programme on the GGA.

47 Decision 1/CP.27, paragraph 3.

48 R Kinley et al, ‘Beyond good intentions, to urgent action: Former UNFCCC leaders take stock of thirty years of international climate change negotiations’ (2021) 21 Climate Policy 5, 593–630, 594.

49 Ibid.

50 S Oberthür, L Hermwille and T Rayner, ‘A sectoral perspective on global climate governance: Analytical foundation’ (2021) Earth System Governance 8, 100104.

51 W Obergassel et al, this issue.

52 Kinley et al (n 48).

parency, one of the main governance mechanisms of the Paris Agreement⁵³, requires its own dimension. This decision is supported by research on the link between transparency and accountability which finds that the former does not necessarily enforce the latter.⁵⁴ Transparency can therefore not be equated with effectiveness.⁵⁵ Moreover, it became apparent that a cross-cutting dimension is required to account for provisions that apply to multiple dimensions.

In terms of governance functions, those proposed by Oberthür et al. (2021) provided a better fit than those suggested by Kinley et al. (2021).⁵⁶ The five governance functions adopted for the purpose of this article therefore are:

1. **Guidance and signalling:** Influencing actors' behaviour through common goals and objectives and signalling of desired courses of action.
2. **Rules and standards:** Agreeing to obligations, norms and standards of behaviour
3. **Transparency and accountability:** Agreeing on rules and procedures that facilitate transparency about actors' behaviour, especially the implementation of commitments, and that enable accountability
4. **Means of implementation:** Provision of financial, technological and capacity-building support
5. **Knowledge and learning:** Generation and sharing of relevant knowledge including scientific evidence, practical experiences and traditional knowledge, and promotion of learning

The resulting framework is described in Table 1 (Appendix).

3. The Paris Agreement and its Rulebook as a Baseline for Assessing Negotiation Outcomes on Adaptation

The UNFCCC of 1992 and its Kyoto Protocol from 1997 focused predominantly on mitigation. Adaptation is mentioned but not defined in the Convention. A key demand from developing countries for a new treaty has therefore been an explicit inclusion of adaptation and an equal treatment to mitigation.⁵⁷ The Paris Agreement includes adaptation among its long-term goals, contains a dedicated Article on adaptation and covers adaptation under the trans-

parency framework and the Global Stocktake.⁵⁸ Outstanding details of the Paris Agreement were negotiated in the following three years which culminated in the adoption of a rulebook at COP24 in December 2018.⁵⁹ Some scholars argue that its adoption marks a shift from regime-building to implementation.⁶⁰ Irrespective of this perspective, decisions adopted until the conclusion of the Paris Agreement's rulebook serve as an appropriate baseline for assessing negotiation progress on adaptation. Table 2 outlines this baseline along the framework introduced above.

IV. Adaptation Negotiations 2019 – 2022

1. Agenda Items on Adaptation

The UN climate change negotiations are organised along the agenda of the COP to the Convention, the agendas of its subsidiary bodies (the Subsidiary Body for Scientific and Technological Advice — SBSTA, and the Subsidiary Body for Implementation — SBI)⁶¹, and the meeting of the Parties to the Paris Agreement, abbreviated as CMA⁶². Table 3 (Appendix) shows the agenda items on adaptation during

53 Raiser et al (n 17).

54 A Gupta and H van Asselt, 'Transparency in multilateral climate politics: Furthering (or distracting from) accountability?' (2019) *Regulation & Governance* 13, 18-34.

55 In fact, a systematic review by Raiser et al (n 17) found that transparency is simultaneously viewed as an enabling factor and a barrier to success of the Paris Agreement.

56 Kinley et al (n 48) do not provide definitions of their proposed seven governance functions. Moreover, two of them, creating international law and increasing ambition, describe overarching functions that overlap with, or result from, other governance functions.

57 M P Bueno Rubial & L Siegle, 'Coordination of the G77 and China on Adaptation. Looking for the Appropriate Space for Adaptation under the UNFCCC' in M P Bueno Rubial & L Siegle (Eds.) *Negotiating Climate Change Adaptation* (2020, Springer Climate) 95-109.

58 Lesnikowski et al (n 44).

59 While details on the market mechanisms under Article 6 were only finalised at COP26 in Glasgow, all adaptation agenda items under the Ad Hoc Working Group on the Paris Agreement were completed at COP24.

60 W Obergassel et al, 'From regime-building to implementation: Harnessing the UN climate conferences to drive climate action' (2022) 13 *Wiley Interdisciplinary Reviews Climate Change* 6, e797.

61 UNFCCC Articles 9 and 10.

62 Conference of the Parties serving as the meeting of the Parties to the Paris Agreement.

the period 2019-2022.⁶³ It provides an overview of the content being discussed on adaptation as well as on the closure and opening of items. The following sections describe adaptation negotiations at COP25-27.

2. Adaptation Outcomes at COP25 in Madrid, 2-15 December 2019

COP25 was themed by the Chilean Presidency under the banner 'Time for action'. No consensus on an overarching agenda item on adaptation as requested by the African Group could be reached. In its place, a 'Ministerial Dialogue on Adaptation Ambition' was mandated and attended by numerous Ministers and the Prime Minister of Fiji. The only material decision with high adaptation relevance at COP27 was the adoption of revised guidelines for national communications by Annex I Parties. The guidelines contain a new structure for adaptation information including monitoring and evaluation. The adoption was significant since it replaced the far outdated guidelines from 1999 and contributes to enhanced transparency on adaptation by developed countries. No agreement could be reached on the report of the Adaptation Committee and on the composition of the Board of the Adaptation Fund. Overall, little material progress on adaptation was made at COP25.

3. Adaptation Outcomes at COP26 in Glasgow, 31 October – 12 November 2021

The UK Presidency had early on proclaimed adaptation at the top of the priority list of COP26.⁶⁴ Indeed,

the CMA agenda featured for the first time a general agenda item on adaptation. A two-year work programme on the Global Goal on Adaptation was launched, fulfilling a major demand from the African Group and other developing countries. Its eight objectives include enhancing a common understanding of the existing goal⁶⁵, contributing to reviewing overall adaptation progress, enhancing national planning and implementation, and facilitating national adaptation monitoring and evaluation systems⁶⁶. COP26 also made significant progress on adaptation finance by deciding that a 5% levy on market mechanism activities under Article 6.4 will go to the Adaptation Fund, more than twice the previous 2% on Clean Development Mechanism activities under Article 12 of the Kyoto Protocol. In the final hours of the conference, a doubling of overall adaptation finance by developed countries from 2019 levels by 2025 was also 'urged'. Additionally, the agenda item on the registry of Adaptation Communications could be settled for good. Overall, COP26 substantially advanced adaptation negotiations.

4. Adaptation Outcomes at COP27 in Sharm el-Sheikh, 6-20 November 2022

The general adaptation item on the CMA agenda that had been introduced at COP26 was maintained but a newly proposed item on doubling of adaptation finance was not met with consensus.⁶⁷ The most notable negotiation stream was about the work programme on the GGA. Debate centred on whether a framework or any other arrangement should be established under the GGA, and if so, what it might entail. Negotiation sessions were tense and multiple competing proposals could not be reconciled. The African Group proposed a list of five new global targets and the development of associated indicators, but most negotiation groups agreed that it was premature to adopt text with potentially far-reaching consequences without time for thorough deliberation. Eventually, a compromise was reached to initiate the development of a framework for the existing GGA through a structured approach including four workshops in 2023.

A new agenda item that was opened in June 2022 debated the voluntary review of information on adaptation communicated in biennial transparency reports. Parties must submit these reports at the latest

63 Only the main adaptation items are considered. Other items have partial relevance for adaptation, e.g., the Koronivia Joint Work on Agriculture, or can otherwise affect adaptation, especially the finance items.

64 COP26 Presidency (n 3)

65 It is sometimes falsely reported that the work programme would develop a new global adaptation goal seemingly replacing the existing one contained in Article 7.1. The decision does not contain such a mandate.

66 For an overview of countries' M&E systems see T Leiter, 'Do governments track the implementation of national climate change adaptation plans? An evidence-based global stocktake of monitoring and evaluation systems' (2021) *Environmental Science & Policy* 125, 179-188.

67 Likewise, a dedicated agenda item on achieving 1.5°C was not taken up.

by the end of 2024⁶⁸ but inclusion of information on adaptation is voluntary and was initially not foreseen to be reviewed. The main debates under this item related to the scope, objectives, and modalities of any review and to a possible training course for reviewers and its timeline. While this item was left unresolved at the intersessional meeting in June 2022, an agreement was reached rather quickly at COP27 (see Table 4 for details - Appendix). In the negotiations on National Adaptation Plans (NAPs) and LDC matters, the key demand from developing countries was more support for the implementation of NAPs beyond support for their formulation. As in previous years, the matter was deferred to the finance negotiations. The review of the progress, effectiveness and performance of the Adaptation Committee remained undecided. However, a significant procedural agreement was reached through the adoption of rules of procedure for the LDC Expert Group which did not have any terms of reference during the first 20 years of its existence. Overall, while COP27 had been dubbed as an 'Adaptation COP', the topic was overshadowed by the strong attention on Loss & Damage⁶⁹ and significant work remains for negotiations in 2023 including at COP28.

5. Negotiation Outcomes on Adaptation 2019-2022

The main negotiation outcomes on adaptation achieved in the first three years after the adoption of the Paris rulebook are summarised in Table 4. Outcomes are concentrated in the finance, transparency and cross-cutting dimensions. Correspondingly, the primary governance functions were provision of support and enhancement of transparency. No outcomes solely attributable to the dimensions of planning, implementation or effectiveness were adopted.

V. Too Little, Too Slow? An Assessment of Negotiation Outcomes on Adaptation Since 2019

1. Achievements, Expectations, and the Role of International Law

A comparison between the baseline of adaptation provisions in the Paris Agreement together with its

rulebook as of December 2018 (Table 2) and decisions taken until end of 2022 (Table 4) shows that additional negotiation outcomes were achieved on adaptation finance and transparency, but not specifically on planning, implementation and effectiveness.⁷⁰ However, the comparison is only based on legal decision text and does not consider the activities, reports and capacity building conducted by bodies under the UNFCCC, especially the Adaptation Committee and the LDC Expert Group. For example, draft supplementary guidance for the development of Adaptation Communications was finalised before COP27⁷¹ but did not get mentioned by any decision. Additionally, numerous initiatives were announced outside of the negotiation space. For example, the Bill & Melinda Gates Foundation pledged to invest USD 1.4 billion to support adaptation of smallholder farmers by scaling up existing programmes and interventions.⁷²

Has sufficient progress been made at the UN climate change conferences in the three active negotiation years since 2019? The answer depends on the expectations different actors have. Out of the six negotiation demands on adaptation listed in the 'Plan for Solidarity, Fairness and Prosperity' endorsed by several Ministers and senior government officials from the Global South⁷³, two were fully met and two were partially met by November 2022. The Climate Vulnerable Forum, an alliance of developing countries, concluded that COP27's outcomes 'directly responded to most of the key asks as outlined by the vulnerable nations in our Accra-Kinshasa Commu-

68 For LDCs and SIDS, submission and timing is at their discretion (Decision 18/CMA.1, paragraph 4)

69 Obergassel et al (n 51)

70 The work programme on the GGA was classified as a 'cross-cutting' matter.

71 Adaptation Committee, 'Draft supplementary guidance for voluntary use by Parties in communicating information in accordance with the possible elements of an adaptation communication' (2022). FCCC/SB/2022/5/Add.1, 30 September 2022.FCC/SB/2022/5/Add.1, 30 September 2022.

72 Gates Foundation Calls for Bold and Immediate Action at COP27, Announces New Commitment to Meet the Climate Adaptation Needs of Smallholder Farmers <<https://www.gatesfoundation.org/ideas/media-center/press-releases/2022/11/helping-african-and-asian-farmers-with-climate-change-adaptation>> accessed 12 December 2022.

73 Climate Action Network International. *COP26 Five-Point Plan for Solidarity, Fairness and Prosperity*, July 2021. <<https://climatenetwork.org/resource/cop26-five-point-plan-for-solidarity-fairness-and-prosperity/>> accessed September 2021.

nique' including its adaptation priorities.⁷⁴ However, many commentators agree that while COP27 had initially been dubbed as an 'Adaptation COP', its outcomes do not justify this label.⁷⁵ The most commonly mentioned unmet demand was more financial support for adaptation to most vulnerable countries.

Apart from additional adaptation finance, what else could have been agreed upon since 2019 that would have advanced adaptation? On planning, the Paris Agreement already contains a provision that 'Each Party shall, as appropriate, engage in adaptation planning processes' and refers to NAPs.⁷⁶ While it could have been decided to make NAPs mandatory or to prescribe certain characteristics of NAPs, this would have run counter to the provision that 'adaptation action should follow a country-driven (...) approach'.⁷⁷ Similarly, on matters of implementation, Hall & Persson (2018) observe that 'developing countries have traditionally argued for more country autonomy in how they use international adaptation financing'.⁷⁸ Indeed, there is a trade-off between specific global requirements on adaptation and national sovereignty which can hinder agreeing to further substantive rules. Moreover, many decisions on implementation and effectiveness require actions at other governance levels. For instance, only one of the four demands of the 'global climate adaptation overhaul'

that the UN Secretary General called for ahead of COP27⁷⁹ is under the immediate authority of the UNFCCC (adaptation finance) while creating more investable projects, better climate risk data and universal coverage of early warning systems can be called for, but not solely affected by the COP.⁸⁰ Likewise, half of the global priorities for adaptation proposed by Tye et al. (2022) actually fall under national and local jurisdictions.⁸¹ The question raised by former leaders of the UNFCCC secretariat is therefore especially relevant for adaptation: what can reasonably be expected to be regulated under international law?⁸²

The analysis of legalisation of adaptation under UNFCCC by Hall & Persson (2018) concluded that due to the vital role of national and local contexts for adaptation we are 'unlikely to see high obligation and precision' at the global level.⁸³ The concept of governance functions is helpful to articulate more precisely *how* international law can facilitate change including through soft rules such as signalling which can assert considerable influence even in the absence of formal obligations. While the Paris Agreement and its rulebook made extensive use of both signalling and rule-setting, decisions taken since then fall predominantly under the governance functions of provision of support and enhancing transparency (see Table 4).

Many of the adaptation negotiation sessions since 2019 have largely been about procedural matters and technical details that are necessary for the multilateral process to work. At times it seems that a mismatch exists between what the negotiations are expected to deliver on adaptation and what they actually address (Table 3). Even COPs that make substantial progress on adaptation such as COP26 cannot 'close the adaptation gap' as was implied by the subtitle of the 'Glasgow imperative' of the COP26 Presidency.⁸⁴ While international law and the momentum created by UN climate change conferences are vital for advancing adaptation, the adaptation gaps identified by the recent IPCC report require actions and commitment from a broad range of actors at all levels, especially by national governments.

2. Work Programme on the Global Goal on Adaptation and Outlook to COP28

The Paris Agreement established 'the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate

74 Climate Vulnerable Forum. *COP27 Delivers Landmark Outcome on Loss & Damage*. <<https://thecvf.org/our-voice/statements/chair/cop27-delivers-landmark-outcome-on-loss-damage/>> accessed 16 December 2022.

75 E.g., Stockholm Environment Institute (2022). *COP27 delivers on finance for Loss and Damage, disappoints on fossil fuels, adaptation*. <<https://www.sei.org/about-sei/press-room/cop27-delivers-on-finance-for-loss-and-damage/>> accessed 16 December 2022; Adaptation is also not mentioned under the "Five Key Takeaways" from COP27 published by the UNFCCC secretariat <<https://unfccc.int/process-and-meetings/conferences/sharm-el-sheikh-climate-change-conference-november-2022/five-key-takeaways-from-cop27>> accessed 1 December 2022.

76 Article 7.9b.

77 Article 7.5.

78 Hall and Persson (n 21), 556.

79 (n 31).

80 In fact, the Cover decision of COP27 contains a section on Early Warning Systems with reference to the call of the UN Secretary General and invites development partners to provide support (Decision 1/CP.27, section VII)

81 What the World Really Needs to Adapt to Climate Change, 15 December 2022. <<https://www.wri.org/insights/climate-adaptation-priorities>> accessed 15 December 2022.

82 Kinley et al (n 48).

83 Hall and Persson (n 21), 547.

84 UK Presidency (n 3).

change, (...) in the context of the temperature goal referred to in Article 2.⁸⁵ Its wording represents a compromise between different proposals⁸⁶ but also reflects the challenges inherent in expressing adaptation in a substantive way that is simultaneously applicable to all countries.⁸⁷ At COP26, a two-year work programme on the GGA was launched and COP27 decided to initiate the development of a framework for the GGA.⁸⁸ Some commentators expressed that not having already agreed to a framework at COP27 would constitute lack of progress. However, the content and quality of the framework critically determine its ability to affect positive change. After all, it is possible that 'the framework of the GGA will strongly influence what type of adaptation action will be prioritised'⁸⁹ and that it 'create[s] new winners and losers in the race to access finance'.⁹⁰ Both concerns reinforce the need for a carefully crafted and thoroughly debated framework. Adopting a half-backed framework at COP27 might have seemed like progress but could have jeopardized the ability of the framework to make a difference. In fact, while many seem to assume that a framework for the GGA will somewhat automatically advance adaptation, this is not a given. A systematic review of experiences from the Millennium Development Goals found that 'globally agreed goals do not easily trickle down from the global to the national level'.⁹¹ National conditions including administrative capacity and economic development were identified alongside adequate support as key influencing factors for the implementation of a global goal.

Some of the demands made on the framework for the GGA appear contradictory, e.g., providing precise guidance for domestic action and a list of standardized indicators for global aggregation while at the same time remaining completely non-prescriptive, fully flexible to countries' circumstances and priorities, and avoiding any additional burden for developing countries. The inherent trade-offs between specificity and non-prescription and between global relevance and national flexibility need to be discussed technically and politically. Akin to the quest of determining which countries are 'particularly vulnerable'⁹², these trade-offs cannot be 'solved' by academia.⁹³ A similar trade-off exists for simplicity and meaningfulness of any global indicators.⁹⁴ Evidence shows that simplistic indicators like 'Number of countries with a plan' or 'number of beneficiaries' that do not consider the *quality* of plans and inter-

ventions can provide a false sense of progress or be unreliable altogether.⁹⁵ Contrary to the approach of SDG-style indicators, the Adaptation Gap Report demonstrates how global progress on adaptation can be meaningfully assessed without a rigid indicator-based framework.⁹⁶

No proposal available at COP27 for a framework was advanced enough to garner support from all Parties. It will be important to structure the four workshops in 2023 under the work programme on the GGA in a way that provides for focused discussions on specific aspects of the framework as well as on how the framework ought to make a difference for adaptation. Without advancing and converging on these matters throughout the year, it will be difficult to get to a suitable framework that could be adopted at COP28.

3. Implications for Future Research

The framework proposed in Table 1 enables tracking of negotiation outcomes over time and is useful to

85 Article 7.1

86 Craft, B., & Fisher, S. (2015). *National experiences can inform a global goal for climate change adaptation*. IIED Briefing, April 2015

87 See section III.2 above.

88 Some commentaries falsely state that a framework had already been established, e.g., Alayza et al, 'COP27: Key Takeaways and What's Next' 8 December 2022 <<https://www.wri.org/insights/cop27-key-outcomes-un-climate-talks-sharm-el-sheikh>> accessed 9 September 2022.

89 E Beauchamp, C da Silva Bernardo and M P Bueno Rubial, 'Progressing the Global Goal on Adaptation — key issues' (2021) IIED Briefing.

90 P Pringle, A Thomas and E Strachanm, 'What next for the Global Goal on Adaptation?' (2021) Climate Analytics.

91 T Hickmann et al, 'Success factors of global goal-setting for sustainable development: Learning from the millennium development goals' (2022) Sustainable Development.

92 Article 4.4 of the UNFCCC requires developed countries to "assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation"

93 R J T Klein, 'Identifying countries that are particularly vulnerable to the adverse effects of climate change: an academic or political challenge?' (2009) 3 Carbon & Climate Law Review 3, 284–291.

94 T Leiter et al, 'Adaptation metrics: Current landscape and evolving practices' (2019) Background paper for the Global Commission on Adaptation. See <<https://gca.org/reports/adaptation-metrics-current-landscape-and-evolving-practices/>> accessed 9 September 2022.

95 UNEP (n 7), Chapter 2; Leiter (n 94); P W Pauw, C Grüning and C Menzel, 'Number of beneficiaries as an indicator for adaptation: do the numbers add up?' (2020) FS-UNEP Collaboration Centre for Climate & Sustainable Energy Finance.

96 UNEP (n 7).

structure the assessment of progress on adaptation under the UN climate change negotiations. The framework facilitates a descriptive assessment but requires additional analysis to evaluate whether the outcomes are sufficient and from whose perspective. Importantly, as the example of the framework for the GGA illustrates, negotiation progress is not simply a linear or binary matter and faster decisions do not necessarily equate to better progress. The significance and meaningfulness of particular negotiation outcomes need to be critically assessed against insights from available literature, country experiences and experiences from other UN treaties.

Future research needs to further explore the potential and limits of global adaptation governance and of international law on adaptation under the UNFCCC and the Paris Agreement. The concept of governance functions is useful for qualifying the way negotiation outcomes can facilitate change, but imprecise definitions can reduce their analytical value. Furthermore, research about adaptation in the UN climate change conferences needs to pay closer attention to the actual content of the negotiations (Table 3) and be precise in the interpretation of decision texts. Further research on the underlying politics of adaptation at the global level could help explaining particular negotiation outcomes.

VI. Conclusion

This article presents the first account of the adaptation negotiations during the implementation phase of the Paris Agreement, i.e., since the adoption of its rulebook at COP24 in December 2018. Assessing progress on adaptation is more challenging than for mitigation since it cannot be counted in the same

way as greenhouse gas emission reductions. A novel framework is therefore proposed to track negotiation outcomes based on the dimensions of UNEP's Adaptation Gap Report and the concept of governance functions. A descriptive assessment of negotiation progress is presented based on comparing negotiation outcomes agreed until COP27 in November 2022 with the baseline from COP24 in 2018. During this period, negotiation outcomes on adaptation mainly concentrated on provision of support and enhancement of transparency whereas the Paris Agreement made greater use of signalling and rule-setting. While adaptation received a boost at COP26 in Glasgow, little progress was made at COP25 in Madrid and, despite high expectations, adaptation was overshadowed at COP27 by attention to Loss & Damage.

Many agenda items covering adaptation remain primarily procedural which contrasts to expectations that negotiations under UNFCCC could be the primary means of 'closing' adaptation gaps. While overall progress on adaptation globally has been 'too little, too slow'⁹⁷, the potential and limits of international law for governing a strongly context-specific subject matter need to be considered when assessing what could be reasonably regulated on adaptation globally. Importantly, the development of a framework for the global goal on adaptation does not automatically advance adaptation and it cannot substitute for decisions and commitments at other governance levels. Moreover, trade-offs between specificity of guidance and non-prescription, and between global relevance and diverse country contexts cannot be resolved apolitically by academia. The mandated workshops under the work programme on the global goal on adaptation need to be carefully orchestrated to debate *how* adaptation can be facilitated through governance functions and to advance on key aspects of a potential framework ahead of COP28. Ultimately, the adaptation gap cannot be closed as long as greenhouse gas emissions continue to rise.

⁹⁷ This phrase is part of the title of the 2022 Adaptation Gap Report by UNEP (n 7).

Table 1: Framework for tracking negotiation outcomes on adaptation.

Dimension	Description	Governance Functions (most applicable ones per dimension)
Planning	Decisions concerning any preparatory efforts and capacity building for planning, legislation, and access to adaptation finance	2.Rules and standards; 5.Knowledge and learning
Finance	Provision of support (finance, technology, capacity building)	4.Means of implementation
Implementation	Decisions concerning the implementation of any actions that seek to reduce climate risks, including reducing exposure and vulnerability to hazards, and building adaptive capacity and resilience	1.Guidance and sending signals; 2.Rules and standards
Effectiveness	Effectiveness of actions in reducing climate risks, building resilience or improving adaptive capacity	1.Guidance and signalling; 2.Rules and standards; 3. Transparency and accountability; 5.Knowledge and learning
Transparency	Rules, regulations and arrangements for the provision of information to steer the behaviour of actors and to promote accountability	3.Transparency and accountability
Cross-cutting	Aspects that are applicable to multiple of the above dimensions	Any, but especially 1.Guidance and signalling, and 5.Knowledge and learning

Table 2: Baseline for Tracking Negotiation Progress on Adaptation Based on the Paris Agreement and its Rulebook

Dimension	Provisions of the Paris Agreement and its rulebook	Legal qualifier	GF ¹
Planning	Adaptation planning processes including NAPs ²	shall, as appropriate	2
	Assessment of climate change impacts and vulnerability ³	shall, as appropriate	2, 5
	Assisting developing countries in identifying effective adaptation practices, adaptation needs, priorities, challenges and gaps ⁴	should	2, 5

Finance ⁵	International support shall be provided to developing country Parties ⁶	shall	4
	Collective quantified goal from a floor of USD 100 billion per year ⁷	shall	4
	Provision of scaled-up financial resources should aim to achieve a balance between adaptation and mitigation ⁸	should	4, 1
Implementa- tion	Strengthening the global response including by (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience ⁹	aims to	1
	Global Goal on Adaptation ¹⁰	establish	1
	Implementation of actions ¹¹	shall, as appropriate	2
	Integrating adaptation into policies and actions, where appropriate ¹²	should	1, 2
	Adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach , (...), and should be based on (...) the best available science and, as appropriate, traditional and indigenous knowledge ¹³	should	1, 2
	Strengthening institutional arrangements to support the synthesis of relevant information and knowledge, and the provision of technical support ¹⁴	should	5, 4
	Building the resilience of socioeconomic and ecological systems ¹⁵	shall, as appropriate	1
Effective-ness	Improving the effectiveness and durability of adaptation actions ¹⁶	should	1
Transparency	Adaptation communications: submission and periodical update ¹⁷ , list of topics ('elements') Parties are invited to use ¹⁸ , development of supplementary guidance for voluntary use ¹⁹	should; invited to	3
	Enhanced transparency framework : Provide information related to climate change impacts and adaptation ²⁰ ; Modalities, procedures and guidelines for the transparency framework including a list of topics ²¹	should, as appropriate	3
	Global Stocktake: Assess collective progress including on adaptation ²²	shall	3

Cross-cutting	Recognition of adaptation as a global challenge faced by all with local, subnational, national, regional and international dimensions ²³	recognize	1
	Adaptation efforts of developing country Parties shall be recognized ²⁴	shall	2
	Greater levels of mitigation can reduce the need for additional adaptation efforts ²⁵	recognize	1
	Sharing information, good practices, experiences and lessons learned ²⁶	should	5
	Strengthening scientific knowledge on climate, including early warning systems ²⁷	should	5
	Monitoring and evaluation and learning ²⁸	shall, as appropriate	2,3,5

1 Governance Function

2 Article 7.9, especially 7.9b

3 Article 7.9c

4 Article 7.7d

5 Various additional Articles stipulate the provision of support for specific matters, e.g., for the implementation of transparency provisions (Article 13.14 and 13.15)

6 Article 7.13, Article 9.1, 9.2 and 9.3

7 Decision 1/CP.21, paragraph 53

8 Article 9.4

9 Article 2.1b

10 Article 7.1

11 Article 7.9, especially 7.9a

12 Article 7.5

13 Article 7.5

14 Article 7.7b

15 Article 7.9e

16 Article 7.7e

17 Article 7.10

18 Decision 9/CMA.1, paragraph 7 and Annex

19 Decision 9/CMA.1, paragraph 15

20 Article 13.8

21 Decision 18/CMA.1, especially Annex chapters I and IV

22 Article 14.1

23 Article 7.2

24 Article 7.3

25 Article 7.4

26 Article 7.7a

27 Article 7.7c

28 Article 7.9d

Table 3: Adaptation Agenda Items 2019-2022

Body	2019 (incl. COP25)	2021 (incl. COP26)	2022 (incl. COP27)
COP			Matters related to adaptation (Report and review of the Adaptation Committee)
	Report of the Adaptation Committee		
	Matters of Least Developed Countries		
CMA		Matters related to adaptation (Report of the Adaptation Committee and ‘work on the GGA’)	Matters related to adaptation (Report and review of the Adaptation Committee; work programme on the GGA)
	Report of the Adaptation Committee		
	Public registry of Adaptation Communications		
	Adaptation Fund (under ‘Matters related to finance’)		
Joint SBI-SBSTA	Report of the Adaptation Committee		
			Work programme on the Global Goal on Adaptation
SBI	Reporting guidelines on National Communications for Annex I countries		
	National Adaptation Plans		
	Matters of Least Developed Countries		
	Adaptation Fund		
SBSTA			Voluntary review of adaptation information
	Nairobi Work Programme		

Table 4: Main Negotiation Outcomes on Adaptation 2019-2022 including COP25, COP26 and COP27.

Dimension	Negotiation outcomes on adaptation 2019-2022	Legal qualifier	GF ¹
Planning	No explicit outcome	/	/

Finance	Doubling of adaptation finance from 2019 levels by 2025 ²	urges	4
	Report on the doubling to be prepared by the Standing Committee on Finance by COP28	requests	4
	Market mechanisms contribute to adaptation funding: 5% of the issuance value of measures under Article 6.4 and an additional monetary contribution related to the scale of the activity go to the Adaptation Fund	shall	4
	Parties and stakeholders using cooperative approaches are strongly encouraged to commit to contribute resources for adaptation ³ , in particular through contributions to the Adaptation Fund	strongly encouraged	4
	Calls for a reform of multilateral development banks to increase their climate ambition ⁴	calls	1, 4
Implementation	No explicit outcome (see cross-cutting dimension for work on the GGA)	/	/
Effective-ness	No explicit outcome	/	/
Transparency	Information on adaptation submitted via Biennial Transparency Reports can be voluntarily reviewed as part of the technical expert review. The review will also consist of identifying areas of improvement and capacity-building needs related to reporting ⁵	may, on a voluntary basis; decides	3
	Development of a training course for experts undertaking the voluntary review ⁶	requests	3
	Revised guidelines for national communications of Annex I Parties including a structure for reporting adaptation information ⁷	adopts	3
	Public registry of Adaptation Communications ⁸ is approved	adopts	3
Cross-cutting	Work programme on the Global Goal on Adaptation established for a two-year period including four workshops each year ⁹	establish and launch	-
	Development of a framework for the Global Goal on Adaptation initiated ¹⁰	decides	1
	Urges Parties to adopt a transformational approach to adaptation ¹¹	urges	1
	Rules of procedure of the Least Developed Countries Expert Group adopted ¹²	adopts	3

1 Governance Function

2 Decision 1/CMA.3, paragraph 18

3 Decision 3/CMA.3 Annex, paragraph 67 and Decision 2/CMA.3, Annex paragraph 37

4 Decision 1/CP.27, Sharm el-Sheikh Implementation Plan, paragraph 37 and 38.

5 Decision (Reviews on a voluntary basis of adaptation information)/CMA.4, paragraph 1 and 2.

6 Decision (Reviews on a voluntary basis of adaptation information)/CMA.4, paragraph 8.

7 Decision 6/CP.25.

8 Decision 21/CMA.3, paragraphs 2 and 3.

9 Decision 7/CMA.3, paragraphs 2 and 12.

10 Decision (Work programme on the GGA)/CMA.4, paragraph 8.

11 Decision 1/CP.27, paragraph 18 and 1/CMA.4, paragraph 34.

12 Decision (Matters relating to the LDCs)/CMA.4, paragraph 15 and Annex.

7 From planning to implementation? Tracking implementation of national adaptation plans

7.1 Tracking adaptation progress at the national level

At the national level, an important question for research and policy alike is whether national climate change policies and national adaptation plans (NAPs) are being implemented and what effect they have, particularly in developing countries. A comprehensive assessment of this question had not yet been undertaken until the publication of the article contained in this chapter. Available evidence indicates that implementation is not far reaching. For example, in Grenada, a small island developing state in the Caribbean, the “revision of the National Climate Change Strategy and Action Plan 2007 – 2011 revealed that few activities have been implemented or contributed to the achievements of its strategic objectives” (Government of Grenada, 2017, p.16).

The significance of this research lies not only in better understanding the impacts and limitations of plans, but also in testing the robustness of proxy indicators that are commonly used for global progress assessments on adaptation. As Ford et al. (2015, p.968) note: “Metrics of this nature [policy adoption and financing] are insightful, but on their own are not necessarily indicative of meaningful adaptation. Monitoring and evaluating adaptation policies and programs offer an alternative and complementary approach.” Accordingly, my article examines whether countries have mechanisms in place to track the implementation of their adaptation plans, and whether they report about progress and in what form.

Two highly policy relevant findings of the article are:

- It provides empirical evidence that the indicator “Number of countries with a climate change plan” as used under the SDG13 can give a false sense of progress.
- Assessments that are only based on statements of intent rather than on evidence of actual practice can overestimate implementation by up to a factor of four.

Beyond the climate change literature, these findings also add to a newly evolving literature around the progress review systems of the SDGs and what can be learned for their successors.



Do governments track the implementation of national climate change adaptation plans? An evidence-based global stocktake of monitoring and evaluation systems

Timo Leiter¹

Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science (LSE), Houghton Street, London WC2A 2AE, United Kingdom

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ABSTRACT

Although over 70 countries adopted a national climate change adaptation plan (NAP), little is known about the extent to which these plans are implemented. NAP monitoring and evaluation (M&E) systems can play an important role in tracking implementation but have rarely been studied. Based on a systematic review including outreach to country representatives and international organizations, a comprehensive inventory of NAP M&E systems is compiled documenting government practices from over 60 countries. In contrast to previous studies, this stocktake does not rely on stated intentions of M&E but requires evidence such as monitoring and evaluation reports. The extent of NAP M&E involvement globally and countries' respective status are determined and compared to a baseline from the 2017 Adaptation Gap Report of the United Nations Environment Programme. Results show a 40% increase in the number of countries that are developing or using NAP M&E systems and almost a doubling of published NAP evaluations. However, over 60% of countries that adopted a NAP do not systematically assess its implementation, leaving a critical gap in understanding the impacts of NAPs. These findings support calls for greater attention to the quality of adaptation planning and for assessing its implementation and effectiveness.

1. Introduction

Adaptation to climate change has been recognized as an important policy matter by more than 170 countries (Nachmany et al., 2019). Since its adoption in 2015, the Paris Agreement has provided additional momentum by encouraging all countries to pursue national adaptation planning (UNFCCC, 2015, Article 7.9). The 2020 progress report on national adaptation plans (NAPs) by the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) found that “125 of the 154 developing countries had undertaken activities related to the process to formulate and implement NAPs” (UNFCCC, 2020a, paragraph 16). However, little is known about the extent to which these plans have been implemented and even less about their effects.

Literature on adaptation governance has traditionally examined processes of adaptation planning and mainstreaming rather than their impacts on adaptation action (e.g., Bauer et al., 2012; Mullan et al., 2013). More recently, attention has shifted to the quality of planning and its potential effectiveness (Möhner et al., 2021; Olazabal and De

Gopegui, 2021; Runhaar et al., 2018). The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) likewise observed: “There is a minority of academic literature that provides information on the implementation of adaptation plans, in contrast with the large accumulation of literature that discusses concepts, strategies, and plans of adaptation” (IPCC, 2014, p.877). In addressing this gap, this article examines if countries are tracking the implementation of their NAP and if they report on progress made.

To date, literature on monitoring and evaluation (M&E) of adaptation has predominantly focused on the level of projects or communities rather than at the national level (Bours et al., 2014; Adaptation Committee, 2016). Very few articles have addressed mechanisms that countries use to assess the implementation of their NAPs (Leiter, 2015; Klostermann et al., 2018). This article therefore conducts a global stocktake of NAP M&E systems and compares it to a baseline from 2017. In contrast to previous studies, it assesses the actual evidence of M&E practices rather than stated intentions of M&E in government documents. The article concludes by discussing the implications for our

E-mail address: T.L.Leiter@lse.ac.uk.

¹ ORCID ID: <https://orcid.org/0000-0003-4982-8063>.

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understanding of adaptation progress and calls for further empirical research into the implementation of adaptation policy.

2. Monitoring and evaluation of national adaptation plans

The Paris Agreement mentions a national adaptation plan as a possible part of adaptation planning processes that “each Party shall, as appropriate, engage in” (UNFCCC, 2015, Article 7.9). While the term “national adaptation plan” (NAP) is therefore applicable to all countries, differences in countries’ planning systems mean it is not universally used. For example, some countries have action plans that jointly cover mitigation and adaptation (e.g., the Philippines) or use other designations such as a national adaptation strategy (e.g., South Africa) or a national adaptation programme (e.g., the United Kingdom). The term NAP is therefore used in this article as an umbrella term referring to an operational planning document from a national government that is explicitly directed at adaptation to climate change and that “include[s] a mix of policies and measures with the overarching objective of reducing the country’s [climate] vulnerability” (Niang-Diop and Bosch, 2005, p.186).²

M&E has been viewed as an integral part of adaptation planning (UNFCCC, 2010). Accordingly, one of the four elements that the NAP technical guidelines propose is: “Reporting, monitoring and review” (UNFCCC, 2012). A recent assessment of 54 national documents addressing adaptation gives the impression that most had “invested significant effort” in M&E during the planning process (see Table 3 and 5 in Morgan et al., 2019). However, this analysis is based on a three-point Likert scale with very low thresholds where a simple acknowledgement of the importance of M&E and an unspecified “consideration” of M&E were sufficient to score the middle or highest category, respectively. Consequently, its findings are contradicted by another study of 38 NAPs which found the plans to be “weaker in the articulation of implementation and monitoring measures, raising concerns about whether plans will translate into action and how success will be measured” (Woodruff and Regan, 2019, p. 53). An earlier study likewise found that very few national adaptation M&E systems have advanced beyond initial steps, i.e., concluding the opposite of what Morgan et al. claim (Leiter et al., 2017). This contradiction points to the need for a systematic review of M&E systems used by national governments to track the implementation of their adaptation plans.

Literature on assessing adaptation progress has so far been predominantly focused on the level of projects and communities (Bours et al., 2014; Faulkner et al., 2015; Adaptation Committee, 2016; Leiter, 2018). Very few studies have examined national adaptation M&E systems, i.e., the arrangements and procedures governments put in place to track if action on adaptation is taken and if their country becomes better adapted to a changing climate (Leiter, 2015; EEA, 2015, 2020; Klostermann et al., 2018). Hammill et al. (2014) analyzed the national adaptation M&E systems of eight pioneering countries. A first global review was undertaken for the Adaptation Gap Report 2017 of the United Nations Environment Programme (UNEP) (Leiter et al., 2017). Since then, at least 43 additional countries have begun engaging in the NAP process (UNFCCC, 2017, 2020a). Accordingly, Woodruff and Regan (2019)’s study of NAPs recommends to “continue to research and develop approaches to evaluate and track adaptation progress” (p. 69).

Adaptation planning is typically depicted in form of a policy cycle that includes M&E (Adaptation Committee, 2015). However, whether M&E is actually undertaken is rarely examined. Scott and Moloney

(2021) observe that “there is scant empirical evidence of how local governments are completing the adaptation planning cycle by monitoring or evaluating their efforts” (p. 1). At the national level, an evaluation in Europe found that less than half of countries that had planned a periodic review of their NAP were actually monitoring its implementation (European Commission, 2018). This article therefore examines to what extent countries are indeed tracking their NAP implementation.

3. Material and methods

3.1. Scope and research questions

This study explores whether there is an overarching M&E system for a country’s NAP as suggested by the NAP technical guidelines (UNFCCC, 2012). It does not attempt to identify specialized monitoring systems (e.g., of flood-safety policies) that may provide information relevant for adaptation. Furthermore, separate M&E systems of sectoral or sub-national adaptation plans, where existing, are not within the scope of this article. For example, some federally organized countries have state-level climate actions plans (e.g., India) which occasionally have M&E systems separate from a national adaptation M&E system, e.g., in some provinces of Morocco and South Africa (Hammill et al., 2014; Western Cape Government, 2020). However, NAP M&E systems usually draw on information from sectoral monitoring systems and, to different degrees, from subnational data sources (Hammill et al., 2014; Leiter, 2015).

Earlier studies have shown that numerous countries are developing NAP M&E systems, but that few have become operational (Leiter et al., 2017). The extent to which countries are following-up on adopted NAPs is currently not known. Therefore, the research questions are:

1. Which distinct development stages of NAP M&E systems are common in practice?
2. Do countries have dedicated arrangements for monitoring and evaluating the implementation of their national adaptation plans?
3. To what extent has this situation changed compared to a 2017 baseline?
4. What practices can be observed regarding the development of national adaptation M&E systems and their role in the policy cycle?

These questions directly respond to the research need expressed by Woodruff and Regan’s (2019) study of 38 NAPs and to the need for methods to assess national adaptation progress (Ford et al., 2015; Berrang-Ford et al., 2019). They are also highly relevant to the debate on how to inform the Global Stocktake of collective progress under the Paris Agreement (Adaptation Committee, 2021).

3.2. Research design and analytical framework

Previous studies of M&E in national adaptation planning often relied on stated intentions rather than on evidence of M&E systems’ existence and usage. To fill this gap, an empirical research design has been chosen that is able to identify and validate relevant evidence from multiple sources (see Section 3.3). Two comparative frameworks of NAP M&E systems have been considered as possible analytical frameworks, namely the M&E supplementary materials to the NAP technical guidelines (Price-Kelly et al., 2015) and a study of three European NAP M&E systems (Klostermann et al., 2018). Both frameworks outline components of NAP M&E systems but do not describe different stages of their development process and operation that could be used to compare countries. Another gap in both frameworks concerns differences between monitoring and evaluation. Monitoring is commonly defined as tracking ongoing implementation and informing its management whereas evaluation is seen as assessing effectiveness and lessons learned (OECD, 2002). Both processes may be organized separately under a common NAP M&E system. While the two frameworks acknowledge the

² Contrary to the study by Morgan et al. (2019), National Adaptation Programs of Action (NAPAs), which were introduced in 2001 for Least Developed Countries to present a list of priority funding needs, are not considered as a NAP because they are not an operational planning instrument. For the same reason, Möhner et al. (2021) do not include them in their account of national adaptation planning.

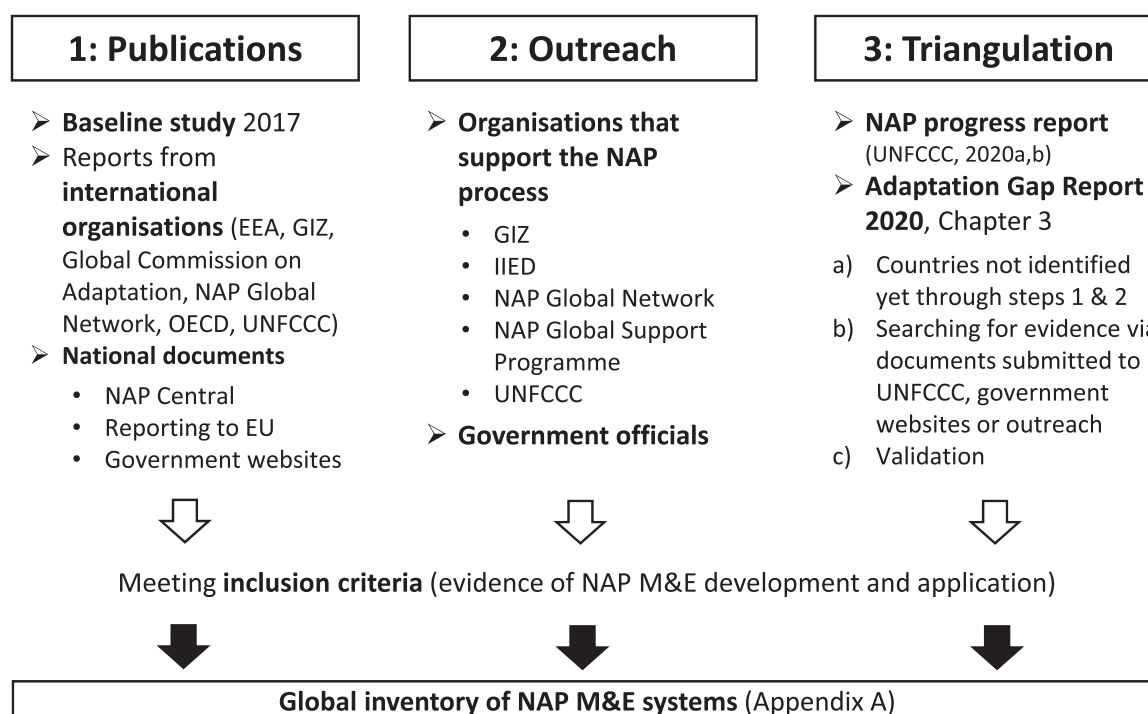


Fig. 1. Steps of the search strategy and triangulation.

Table 1
Themes on NAP M&E development practices and the policy cycle.

Theme	Aspects to be addressed
Motivation to undertake NAP M&E	What motives countries to engage in developing NAP M&E systems? What types of legal and policy mandates for the development of NAP M&E systems emerge from the stocktake?
Development process of the NAP M&E system	What characterizes the development of NAP M&E systems? How is the development process coordinated and who is involved? What role have support organizations played?
Role of NAP M&E in the policy cycle	Are countries utilizing M&E reports as part of the policy cycle? Do monitoring and evaluation serve different functions? How are findings from the M&E system communicated?

differences, they do not elaborate on their practical implications.

In the absence of a suitable framework, the four descriptive M&E development stages of the baseline study are used as a starting point. However, rather than adopting them a-priori, the observed evidence is used to test how well they are able to describe the current global status of NAP M&E systems. An advantage of this approach is its openness to the diversity of countries' adaptation planning contexts and ways of conducting M&E. This exploratory design is complemented by a systematic review as outlined in the next section.

3.3. Data gathering and analysis

Systematic reviews have become a common method in climate change adaptation research (Berrang-Ford et al., 2015). They aim at systematically and transparently searching relevant information to answer the research questions. Information on the current status of NAP M&E systems is so far largely unavailable in the scientific literature. Therefore, a novel search strategy has been designed that combines

multiple sources of published and unpublished information and assesses their completeness through a triangulation with two global reports from the UNFCCC secretariat and UNEP, respectively (Fig. 1). To be included, information has to be explicit about ways of tracking the implementation of NAPs or needs to directly describe NAP implementation progress or its evaluation.

A distinctive feature of this study is that it requires evidence of the actual development or application of M&E. Accordingly, general statements of the intention of undertaking M&E in the future, for example included in NAPs or Nationally Determined Contributions (NDCs), are not sufficient for inclusion. Two types of evidence are considered: published documents (usually published by government entities or on their behalf) and evidence from key informants. Examples of published evidence are monitoring and evaluation reports and any documents that contain details of the NAP M&E system and its development. A second source of evidence is information from people directly involved in the development or application of NAP M&E systems, either government officials or employees of international organizations. To ensure the validity of this type of information, only information from contacts personally known to the author were considered.

The systematic review took place in three steps (Fig. 1). First, publications on NAP M&E were identified and screened for relevant evidence. NAP M&E is a highly specialized topic that is addressed internationally by only a few organizations and that is covered by technical bodies under UNFCCC, namely the Adaptation Committee and the Least Developed Country Expert Group. The starting point of the identification was a baseline study undertaken as part of UNEP's Adaptation Gap Report 2017 (Leiter et al., 2017). This baseline was complemented by relevant reports published by international organizations (European Environment Agency, OECD), development cooperation entities (Germany's bilateral development agency (GIZ) and the NAP Global Network), civil society organizations (the International Institute for Environment and Development, IIED) and a background paper for the Global Commission on Adaptation (Leiter et al., 2019). National documents were identified via the NAP online portal of the

Table 2
Stages of NAP M&E development and application.

Status	Developing a NAP M&E system				Communicating NAP M&E information		
	Stating a commitment intention	Early stage	Development stalled	Advanced stage	NAP M&E system approved	Progress report published	Evaluation published
Short definition	Intention of undertaking M&E	Tangible efforts towards NAP M&E development	NAP M&E development has stopped before 2015	Details of the NAP M&E system have been developed	The final NAP M&E system has been approved	Information on implementation progress published	Evaluation published
Common features	Either a generic commitment without any details or a specific commitment outlining, e.g., the intended time interval of reporting, but with otherwise just general or hypothetical information	Observed actions include: A training on NAP M&E, stakeholder outreach on the objective and basic aspects of the M&E system, draft institutional arrangements, a draft list of indicators, inventories of relevant data sources, formation of a working group	Tangible or advanced steps had been undertaken before 2015 but the efforts seem to have stalled.	Observed actions include: An M&E framework detailing objectives and components of the M&E system, a results framework with outcomes and outputs, an elaborate system of indicators, an expert group developing the NAP M&E system, final institutional arrangements	Observed forms include: A published NAP M&E plan, agreements between ministries to share data and operationalize the M&E system, a formal approval by relevant government bodies, a formalization through laws or regulation	At least one detailed report with information on the progress of NAP implementation has been published.	At least one comprehensive evaluation of NAP implementation has been published. All types of evaluations (including mid-term evaluations) count.
Examples	Niue, State of Palestine	Benin, Cook Islands, Jordan	Australia, Mongolia, Tunisia	Canada, Grenada, Thailand	Indonesia, St. Lucia	Brazil, Japan, United Kingdom	Chile, Finland, Philippines, Spain

UNFCCC secretariat³ and through the ‘Climate Change Laws of the World’ database.⁴ In addition, information on adaptation planning under the EU monitoring regulation⁵ and as part of the evaluation of the EU Adaptation Strategy (European Commission, 2018) was screened for relevant evidence. Information about other industrialized countries was searched for at relevant government websites, usually those of the Ministry of the Environment or of a technical environment agency.

Published information might be outdated and ongoing developments are not necessarily reported publicly before completion. Therefore, in a second step, the main organizations that support developing countries on the topic of NAP M&E were contacted, namely the UNFCCC secretariat, the NAP Global Network, the NAP Global Support Programme, IIED, and GIZ. These organizations are in direct contact with the responsible country authorities which ensures that information is up-to-date. In a few cases, government officials were contacted directly where personal connections already existed. Outreach took place via email in October 2020 and again between February and July 2021.

To reduce the risk of missing existing evidence of NAP M&E systems, information gained from steps one and two was triangulated for completeness through two global accounts, the NAP progress report from the UNFCCC secretariat (UNFCCC, 2020b), and a review of country submissions to UNFCCC by Möhner et al. (2021). Both sources do not contain any details about the respective NAP M&E systems. To verify that indicated countries are indeed engaged in NAP M&E, three avenues were pursued: (1) the UNFCCC secretariat was contacted for further details, (2) the website of the responsible ministry was searched for further information, and (3) where contact persons were known, outreach as described under step two was carried out. Results of the triangulation are described in Appendix B.

Evidence gathered through these three steps was compiled in a global inventory of NAP M&E systems (Appendix A). Documents that were not available in English or German were translated using free online document translation websites⁶ (the inventory includes documents in 12 languages). The information in the inventory was then qualitatively analyzed as follows. For the first research question, countries included in the inventory were plotted on a continuum from the least advanced to those with fully operational M&E systems. The plot showed common stages where multiple countries had advanced to a similar level. The features of these stages were used to revise the four categories of the baseline study (see Section 4.1). Countries were then grouped according to the newly defined stages which answered research question 2 (see Section 4.2). To analyze changes since 2017 (third research question), the baseline from 2017 was adjusted to be comparable to the new stages (see Appendix C). To structure responses to the fourth research question, three themes and corresponding aspects were defined (Table 1) focusing on observations from the stocktake that make a novel contribution and have not been addressed in detail elsewhere or not with global coverage.

4. Results

4.1. Common development stages of NAP M&E systems

The evidence in the inventory was analyzed for commonalities among countries regarding the degree of M&E development or application they have reached. Countries were plotted from the least advanced to the most advanced and those at similar levels were grouped

³ NAP Central: <https://www4.unfccc.int/sites/NAPC/Pages/national-adaptation-plans.aspx>.

⁴ <https://climate-laws.org/>.

⁵ The latest reporting round was in 2019. Country’s submissions are available in the country profiles of the Climate Adapt Portal: <https://climate-adapt.eea.europa.eu/countries-regions/countries>.

⁶ <https://translate.google.com> and <https://www.deepl.com>.

Table 3
Countries according to the development stage of their NAP M&E system.

Stage	Countries (as of 1 August 2021)	Proportion per region
Early stage	(6 countries) Benin, Cook Islands, Jordan, Paraguay, Sri Lanka, Uganda	Non-Annex-I (6): 100% Africa (2): 33% Europe (0): 0% LDCs (2): 33% SIDS (1): 17%
NAP M&E development stalled before 2015	(6) Australia, Mongolia, Nepal, Poland, Tanzania, Tunisia	Non-Annex-I (4): 66% Africa (2): 33% Europe (1): 17% LDCs (2): 33% SIDS (0): 0%
Advanced stage	(22) Albania, Bulgaria, Cameroon, Canada, Colombia, Ethiopia, Fiji, Grenada, Ireland, Moldova, Morocco, Mozambique, Nauru, Peru, Rwanda, Senegal, St. Vincent and the Grenadines, Suriname, Thailand, Togo, Tonga, Vietnam	Non-Annex-I (19): 86.5% Africa (7): 32% Europe (4): 18% LDCs (3): 14% SIDS (3): 14%
NAP M&E system approved	(5) Finland, Indonesia, Philippines, St. Lucia, Turkey	Non-Annex-I (4): 80% Africa (0): 0% Europe (2): 40% LDCs (0): 0% SIDS (1): 20%
Monitoring information published	(23) Austria, Belgium (Flanders), Brazil, Burkina Faso, Cambodia, Chile, Cyprus, France, Germany, Japan, Kenya, Kiribati, Lithuania, Mexico, Netherlands (Delta Programme), Norway, Portugal, Slovakia, Spain, South Africa, South Korea, Switzerland, United Kingdom	Non-Annex-I (9): 39% Africa (3): 13% Europe (13): 56.5% LDCs (3): 13% SIDS (1): 4.5%
Evaluation published	(15) Belgium, Cambodia, Chile, Czech Republic, Finland, France, Germany, Ireland, Mexico, Netherlands, Philippines, South Korea, Spain, Switzerland, United Kingdom	Non-Annex-I (5): 33% Africa (0): 0% Europe (10): 67% LDCs (1): 7% SIDS (0): 0%

Notes: “Non-Annex I” refers to the countries not listed in Annex I of the UNFCCC Convention from 1994. Figures are rounded to the nearest half-percentage.

together. The aim was to determine common stages that are sufficiently distinct to ensure a reliable designation of countries. The resulting stages of NAP M&E development were then compared to the four stages that had been used in the baseline study in 2017, namely (1) Initial steps, (2) Advanced stage, (3) Fully operational and reporting, and (4) Evaluation published (Leiter et al., 2017). It became apparent that four stages were not sufficient to describe the observed record. The former third stage was therefore split into two, adding a new one for approved but not yet applied M&E systems. Another new stage was added for countries whose development of NAP M&E arrangements appears to have stalled and not resumed since the Paris Agreement got adopted. Minimum requirements were also defined for the entry level stage. In particular, mere statements of intent or very general M&E sections in NAPs were not considered as evidence for having started the development of a NAP M&E system.

Table 2 outlines common stages of developing or applying NAP M&E systems as observed in the inventory. A distinction is made between four development stages and two reporting stages. The stocktake showed that some countries first developed a monitoring system followed later on by an evaluation method (e.g., Germany). It was therefore considered whether Table 2 should consist of two separate development processes, one for monitoring and one for evaluation. However, at present this would have only made a difference for a relatively small number of countries, i.e., would have disproportionally increased the complexity compared to the added value. In many cases, information on the development of the evaluation method was also not available.

Table 4
Number of countries engaged in NAP M&E.

Stage	Number of countries		Proportion of countries engaged since 2015	
	2017	2021		
Number of countries for which evidence of M&E development or application was found	46	63	2017: Out of 40 countries	2021: Out of 57 countries
Number of countries involved since 2015, i.e., excluding those where M&E development appears to have stalled	40	57	100%	100%
Early stage	7	6	17.5%	10.5%
Process stalled before 2015	6	6	(Excluded since process stalled)	
Advanced stage	14	22	35%	39%
M&E system approved	4	5	10%	9%
Monitoring published	14	23	35%	40%
Evaluation published	8	15	20%	26.5%
NAP monitoring is under development (early stage or advanced)	21	28	52.5%	49%
At least one NAP monitoring and/or evaluation report published	17	27	42.5%	47.5%
At least one monitoring AND one evaluation report published	5	11	12.5%	19.5%

Notes: Countries can appear twice in the reporting stage. Therefore, percentage values across stages do not add up to 100%. Percentages are rounded to nearest half-percent. Table 3 contains the list of countries.

Therefore, in cases of a temporal disconnect between the development of monitoring and evaluation arrangements, the development stages in Table 2 refer only to the development of the monitoring system. Although this presents a simplification, it serves the purpose of obtaining an overview of countries' NAP M&E status. Details of the type and format of evaluations are included in the inventory (Appendix A).

4.2. Extent and status of NAP M&E systems

The systematic review identified over 100 documents detailing the status of the NAP M&E systems of more than 60 countries (Appendix A). Countries were classified according to the common stages and their features as outlined in Table 2. Explanations for each country's classification are described in Appendix A.

In total, 63 countries were found to have been engaged in the development or application of a NAP M&E system at some point in time (Tables 3 and 4). However, in six countries the development of the NAP M&E system appears to have stalled more than five years ago, leaving 57 countries that have been engaged since the adoption of the Paris Agreement. Out of these, six countries are still in an early phase while 22 (39%) are at an advanced stage. Moreover, 23 countries have published information about the progress of their NAP implementation at least once and 15 countries have undertaken at least one NAP evaluation. Eleven countries (~20%) have published both a progress report and completed an evaluation, namely Belgium, Cambodia, Chile, France, Germany, Mexico, the Netherlands, South Korea, Spain, Switzerland and the United Kingdom.

While the stocktake identified countries on all continents and across all levels of economic development, the proportion of developing countries among those that report on NAP implementation is currently 39% while just accounting for one-third of those that have published an evaluation (Table 3). So far, only three Least Developed Countries were found to have published a NAP implementation report, namely Burkina Faso, Cambodia, and Kiribati. Noteworthy is the high proportion of European countries (accounting for more than half of those reporting

Table 5

Number and proportion of countries with a NAP that are tracking its implementation and reporting about it.

Out of the 70 countries that have adopted a NAP, evidence could be found that:	23 countries (33%) have published at least one progress report
	15 countries (21.5%) published at least one NAP evaluation
	27 countries (38.5%) published at least one progress <i>and/or</i> one evaluation report
	11 (16%) countries published at least one progress <i>AND</i> at least one evaluation report

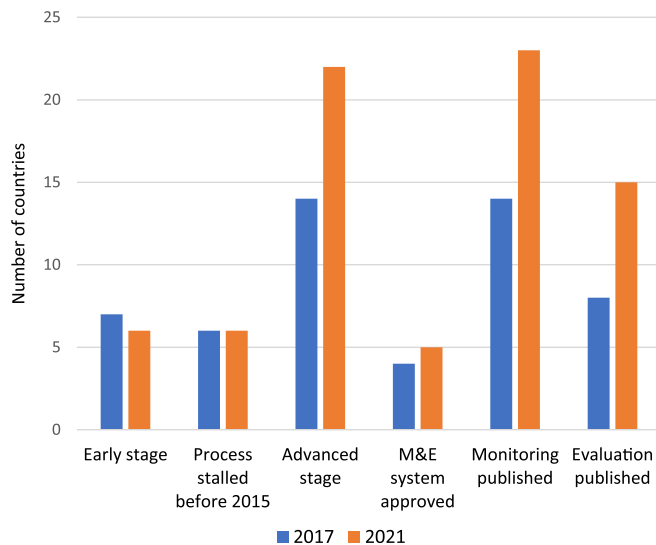


Fig. 2. Number of countries per NAP M&E stage in 2017 and 2021.

and two-thirds of those that evaluate, respectively) which can be partly explained by the early start of adaptation planning in Europe and by efforts from the European Commission to promote adaptation M&E by member states (EEA, 2020; Biesbroek et al., 2010). Japan and South Korea are the only non-European industrialized countries so far that communicate information on NAP implementation to the public.

Table 4 shows the proportion of countries in each of the six stages out of the 57 countries for which evidence of NAP M&E has been found. Of additional interest is the proportion out of all countries that adopted a NAP. As outlined in the second section, countries use different titles for their adaptation planning documents. In contrast to other clearly defined documents under the UNFCCC and the Paris Agreement such as National Communications or NDCs, there is no global list of countries with a NAP. In fact, the number of countries varies with the applied conditions of what counts as a “NAP”. Using the definition of a detailed planning instrument on adaptation (see Section 2), the number can be estimated by adding the following: (a) NAPs from developing countries submitted to NAP Central (23),⁷ (b) member countries of the European Environment Agency indicated as having a NAP (30 out of 33 countries) (EEA, 2020, Table 1.2⁸), (c) countries that were identified through the systematic review as having adopted a NAP but are neither listed on NAP

Central nor are EEA members (17).⁹ Hence, the minimum number of countries with a detailed national adaptation planning instrument in place is estimated at 70 which is just above half the number of countries reported by Nachmany et al. (2019) as having adopted an “adaptation framework” (120 countries) which they define as containing obligations and principles on adaptation (i.e., applying lower requirements than for an operational planning instrument). Given that no evidence of NAP M&E was found through the systematic review for any of the 70 countries not already included in the inventory, the estimated lower boundary of 70 countries with a NAP can be put in relation to the number of countries that evidently report on NAP implementation. The results are shown in Table 5.

Compared to these figures, a recent analysis of NAPs, NDCs and National Communications (Möhner et al., 2021) found a far higher number of countries that have supposedly “undertaken” NAP monitoring (67 countries) and “planned or undertaken” an evaluation (60). The difference was found to be largely due to counting *intentions* for M&E rather than evidence of M&E having actually been undertaken (see Appendix C). While most NAP documents state some form of intent about M&E, the systematic review found only a minority of countries to be at the reporting stage. In addition, the first round of NDCs available until mid-2020 typically stated intentions which further explains the difference. Hence, the evidence-based figures reported in Table 4 are more robust estimates of the number of countries engaged in NAP M&E than intention-based ones.

Despite the outreach to NAP support organizations and officials, it is possible that additional countries are engaged in NAP M&E or are more advanced than shown in Table 3, for example where M&E development or application is undertaken as part of government internal operations and remaining undisclosed to the public. However, triangulation with the NAP progress report of the LEG (UNFCCC, 2020b) shows that only a small number of countries might have been missed (Appendix B). It is therefore expected that the inventory contained in Appendix A presents a fairly complete account of the global extent of NAP M&E as of 1 August 2021, particularly for countries in the most advanced stages.

4.3. Changes compared to 2017

To enable a comparison, the baseline from the 2017 Adaptation Gap Report (Leiter et al., 2017) had to first be adjusted according to the revised number of M&E development stages (see Section 4.1). In addition, information obtained through the systematic review allowed reconstructing the situation in 2017 and comparing it with the baseline. For Argentina and Costa Rica which had originally been categorized as being at an early stage, no evidence of NAP M&E activities could be found. In contrast, several countries were missing from the baseline and have been added. In essence, the comparison of the original with the reconstructed baseline demonstrates the superiority of the systematic review compared to the non-systematic search that was conducted in 2017. The adjusted baseline is shown in Appendix C.

Since 2017, 17 additional countries have engaged in NAP M&E (Table 4). Almost ten countries more are in the advanced stage and in the progress reporting stage, respectively (Fig. 2). The number of NAP evaluations almost doubled. Most notably, the number of developing countries sharing information on NAP implementation more than doubled between 2017 and 2021. Small Island Development States (SIDS) in particular increased their engagement in NAP M&E. Meanwhile, the group of six countries that appeared to have stalled their NAP M&E development before 2015 remained in this status in 2021 which confirms the original classification. Given the otherwise strong

⁷ As of 1 August 2021, the list includes 24 countries, but Uruguay's is a sectoral adaptation plan, leaving 23: <https://www4.unfccc.int/sites/NAAP/Pages/national-adaptation-plans.aspx>.

⁸ The document distinguishes between adaptation strategies (30 countries) and adaptation plans (20). Yet, most of the adaptation strategies are very detailed (e.g., Italy's is 195 pages, Ireland's is 110) and therefore count as a NAP under the definition used in this article.

⁹ Albania, Australia, China, Cook Islands, Indonesia (RAN API), Japan, Mexico (Programa Especial de Cambio Climático), Nauru, Niue, Peru, Philippines (NCCAP), Russia, South Africa, South Korea, Thailand, Tonga, Turkey.

increases, it is surprising that the number of countries that are in an early stage decreased by one country. This may be due to a detection bias in cases where early-stage activities are not documented in publications and where contacts through the surveyed NAP support organizations do not exist. However, funding for NAP readiness from the Green Climate Fund is likely to increase this score (see Section 5). Overall, there is a clear trend of more NAP M&E systems becoming operational and resulting in monitoring and evaluation reports.

4.4. Development of NAP M&E systems and their role in the policy cycle

Country examples referred to in this section are based on documents listed in Appendix A.

4.4.1. Motivation and mandate

The engagement of an increasing number of countries in NAP M&E raises the question what motivates them to do so. Countries generally state very similar purposes for undertaking NAP M&E as captured by *Environment and Climate Change Canada* (2018): “A robust approach to evaluating progress is needed to increase understanding, support informed decision-making and continuous improvement, and ultimately, enhance climate resilience” (p.6). Countries are also influenced by international reporting provisions and regional organizations. In Europe, EU member states need to report biennially on progress in national adaptation planning to the European Commission, and the European Environment Agency has put a strong emphasis on M&E (EEA, 2015, 2020). Globally, the increase in NAP M&E in recent years might be due to a number of factors including greater awareness for the need to adapt, a momentum among countries to renew or newly establish more detailed adaptation policies, and reporting provisions in the Paris Agreement. In fact, countries are encouraged to report on adaptation progress under the enhanced transparency framework and through Adaptation Communications (UNFCCC, 2018a, Decisions 18/CMA.1; UNFCCC, 2018b, Decision 9/CMA.1).

Another explanation is the inclusion of M&E requirements in national climate change laws. In at least nine countries, M&E of adaptation implementation is stipulated by law (Fiji, Finland, Greece, Japan, Kenya, Ireland, Mexico, Norway, and the UK). Mandates for NAP M&E were also found in national climate change policies (e.g., in South Africa and Grenada) or in the NAP itself (e.g., in Paraguay and Peru). In Moldova, a government decision formalized an adaptation planning process including M&E. The type of mandate can directly influence the NAP M&E development process. Country experiences show that a weak mandate can make involvement of line ministries difficult and slow down the elaboration of the NAP M&E system (Leiter, 2013; Hammill et al., 2014).

4.4.2. Development of NAP M&E systems

An interesting finding of the stocktake is that NAP M&E systems are rarely fully developed at the time a NAP is adopted. While it is common for NAPs to include an M&E section, its level of detail and specificity varies widely. It often just contains statements of intent or relatively general descriptions of future M&E arrangements. Some NAPs contain more specific guidance, for example about the content of future progress reports (e.g., in Grenada's NAP) or they list the development of an M&E system among the NAP's priority actions (e.g., in the NAPs of Albania and St. Vincent and the Grenadines). Countries that were classified as more advanced regarding M&E had, for example, developed detailed results frameworks including outcomes, outputs and indicators as in the National Climate Change Action Plan of the Philippines or in Tonga's joint action plan on adaptation and disaster risk reduction.

In some cases, specific M&E plans or frameworks are published as separate documents after the NAP has been adopted, e.g., in Fiji, St. Lucia and the Philippines. Some countries commission studies of possible M&E designs and indicators and have them published by technical environment agencies, e.g., in Germany, the Netherlands and

Ireland. A consistent finding for most countries is that the development process of the NAP M&E system has taken many years. In Germany, for example, it took five years from the first publication of a system of draft indicators to the publication of the first monitoring report. The reasons for these multi-year development periods are manifold. For one, the number of stakeholders that need to be consulted and whose active involvement is required is high, usually including numerous line ministries and technical agencies and, depending on the scope of M&E, also subnational authorities.

Another reason are resource or capacity constraints. For example, the NAP M&E frameworks of Kenya and Mozambique could not be implemented as the necessary data and staff was not available. Kenya is therefore currently simplifying its adaptation M&E system. Other countries also changed the intended structure of the NAP M&E system over time, e.g., to adjust it to new domestic policies or as a result of lessons learned during the development process (e.g., Colombia). In some countries, notably Brazil, incoming administrations de-prioritized climate action and delayed associated work including NAP progress reporting. After all, M&E is not just a technical matter, but can influence the policy debate (e.g., if it shows a lack of progress) and be in turn shaped by politics of various kinds (from power plays between ministries to the general stance of an administration towards transparency).

The development process of NAP M&E systems is generally coordinated by the same government entities that coordinate the NAP, typically the Ministry of the Environment or a technical agency. Some countries have formed technical working groups to coordinate the NAP M&E development process, e.g., in Finland. It is also common to engage government-external expertise. For example, Canada and Finland established advisory groups for the formulation of indicators and Germany, South Africa and the UK commissioned studies and involved the scientific community and relevant business associations, e.g., from the insurance or tourism industry. However, the M&E development process is not commonly documented and only few countries have published studies about the development of the NAP M&E system (e.g., Germany and the UK).

The stocktake also found that the development of NAP M&E systems is a continuously evolving process that often proceeds even as first monitoring reports have been published. For example, Austria, Germany, Kenya, Mexico, South Africa, South Korea and the United Kingdom have all continued to advance their M&E system after the first monitoring or evaluation report was published. Germany, for instance, has developed a methodology for a NAP evaluation as an additional component to the existing monitoring and progress reports. The fastest countries to produce a NAP progress report were those that opted for a pragmatic design with the intention to elaborate it concurrently, e.g., Brazil. Hence, in contrast to the usual practices of M&E of projects where the M&E design is typically kept constant throughout the duration of the intervention, national adaptation M&E systems are more dynamic and often evolve over time.

The stocktake shows that practically all developing countries engaged in NAP M&E received financial or capacity building support from bi- or multilateral donors, either at the start of the process in form of e.g., a training or for the entire development of the NAP M&E system. M&E support is either provided as part of overall NAP support projects or as specialized support, e.g., requested through the country support hub of the NAP Global Network.¹⁰ Two organizations have provided specific NAP M&E support to more than ten countries (Germany's International Development Agency (GIZ) and the NAP Global Network (IISD)) and another two to at least five countries (the International Institute for Environment and Development (IIED) and the United Nations Development Programme including via the NAP Global Support Programme). France, Japan and the European Union have also funded NAP M&E support.

¹⁰ <https://napglobalnetwork.org/activities/supporting-national-level-action/>.

4.4.3. M&E and the policy cycle

Almost half of the 23 countries that published a NAP progress report also conducted an evaluation. Some countries completed their first progress report only recently (e.g., Burkina Faso) or are still in an early phase of NAP implementation which partially explains why just four developing countries have published a NAP evaluation report to date (Cambodia, Chile, Mexico, Philippines). In fact, the stocktake found twice as many progress reports than evaluation reports. The often higher frequency of progress reports, e.g., in Mexico or Spain is a contributing factor, although this is not the case in every country (e.g., Austria intends to publish a joint M&E report). Four countries have published evaluations without having public progress reporting in place (Czech Republic, Finland, Ireland, Philippines) but each of them is close to finalizing or has already approved its monitoring system.

M&E sections in NAPs commonly describe monitoring and evaluation as separate processes whereby the purpose of evaluations is to assess results, generate lessons and provide recommendations. In contrast, progress reports typically assess the degree of implementation (e.g., in Brazil, France and Germany). In several countries, the process of conducting evaluations is organized separately to progress monitoring. In the United Kingdom and Ireland, a national climate law has established independent expert bodies that evaluate progress. In other countries, NAP evaluations are being commissioned by government agencies, but carried out by third parties (e.g., in Germany and Mexico). Some countries combine M&E in a joint report (e.g., intended by Austria) or use the label “M&E report” with different emphases on, for instance, recent implementation (e.g., Brazil’s first NAP M&E report) or on achievements and remaining gaps (e.g., in the Philippines). A smaller number of countries also stated they would undertake government-internal monitoring on an annual basis (e.g., the Czech Republic), but this could not be verified.

By now, NAP evaluations have informed the preparation of successive NAP documents in at least half a dozen countries (e.g., in Chile, Spain and South Korea). Mid-term evaluations have provided inputs for the remaining implementation period in, for instance, Belgium and Cambodia. However, the number of countries that have gone through more than one implementation and reporting cycle (i.e., countries that have adopted the third iteration of their NAP) is still small (Germany, South Korea, United Kingdom). These countries have institutionalized NAP reporting and sequenced it in a way that informs the policy review process. Successive NAP iterations have also been informed by insights from progress reports (e.g., in Germany). Hence, the traditional view from project-level M&E where monitoring and evaluation have well-defined and clearly separate functions (OECD, 2002) does not necessarily apply in the same way to national policy M&E arrangements.

The most common format in which findings of NAP M&E systems are disseminated are progress or evaluation reports or reports to parliament. Appendix A includes more than 50 NAP M&E reports with the United Kingdom accounting for almost 20%. NAP reporting typically has a multi-year frequency. For example, Austria and Germany publish a NAP monitoring report every four to five years. While numerous countries’ NAP documents state an intent for annual progress monitoring (e.g., in Brazil and the Philippines), this has rarely been realized, at least not via public reports (the Czech Republic mentions annual government-internal monitoring). Some countries use a biennial cycle of progress updates instead, e.g., Portugal and the United Kingdom. Very few countries are currently sharing NAP indicator data in online portals (exceptions are Cambodia and South Africa).

5. Discussion

Less than 40% of countries that adopted a NAP were found to monitor or evaluate its implementation. Even if the five countries with approved NAP M&E designs are included, it still means the majority of countries with a NAP in place does not have mechanism to systematically track its implementation. Without at least basic ways of following-

up on plans, their effectiveness as a main driver of adaptation action can be called into question. Moreover, global indicators such as the SDG indicator “13.2.1 Number of countries with (...) national adaptation plans” (United Nations, 2020, p. 14) risk misleading policy makers and the public by assuming that adaptation is being taken care of. While national adaptation planning is essential, whether it is also effective depends on a variety of factors and cannot be assumed as given. The findings of this study therefore support calls for a greater emphasis on the quality of adaptation planning and highlight the need to assess their implementation and its effects.

Europe is currently the only continent where M&E of the NAP forms a regular part of the policy cycle in the majority of its countries (EEA, 2020). However, the comparison between the situation in 2017 and 2021 (Fig. 2 and Table 4) shows a substantial increase in the number of developing countries that track and report their NAP progress. This trend is partly due to targeted support from specialist organizations like the NAP Global Network whose donors respond to obligations under the Paris Agreement to support developing countries in matters related to adaptation planning and transparency (Article 13, paragraphs 14 and 15). The number of countries engaging in the development of NAP M&E systems is likely to further increase as a result of NAP readiness funds from the Green Climate Fund. As of November 2020, proposals from 57 countries had been approved for NAP support which can include M&E, as is the case in Bangladesh and Moldova (GCF-IEU, 2021, p. 40). Furthermore, increased anchoring of M&E provisions in national climate laws also provides an impetus to put in place mechanisms that support effective implementation (see Section 4.4.1).

Whether NAP M&E systems are able to fulfill their intended purposes depends on whether their design is suitable, operationally feasible and whether gathered information is disseminated effectively. This study did not examine the quality and usefulness of the individual NAP M&E systems. Moreover, even well-functioning M&E systems do not guarantee ambitious action. Future research therefore needs to examine the fit between NAP M&E systems and their intended purposes as well as the factors that determine how well NAP M&E functions in practice.

An important advancement of the current study is its focus on actual evidence rather than on stated intentions of M&E which, as it turns out, often remain unfulfilled. The evidence-based stocktake demonstrates that a reliance on stated intentions in documents such as NDCs leads to a gross over-estimation of the number of countries that have actually undertaken NAP M&E. For example, the number of countries reported by Möhner et al. (2021) is three to four times higher than what the evidence suggests (67 rather than 23 countries as having “undertaken” monitoring and 60 rather than 15 countries as having an “evaluation planned/undertaken”; see Section 4.2). This finding is potentially transferable to other topics and it cautions against inferring the state of actual practice from future-oriented statements in country submissions to UNFCCC. Instead, the findings confirm the need for more empirical research on the implementation of climate policies (Rykkia et al., 2014).

Another contribution of the stocktake is a better understanding of the development and practice of NAP M&E systems. Previous studies of NAPs like Morgan et al. (2019) or Woodruff and Regan (2019) have treated M&E in simplistic ways, usually distinguishing only the presence or absence of M&E. Given the large differences between NAP M&E systems that were already noted by earlier research such as Hammill et al. (2014), EEA (2015) and Leiter et al. (2017), the meaningfulness of such simplistic accounts is very limited. In addition, the stocktake found that the development process of NAP M&E systems proceeds through multiple stages over multi-year periods and can evolve dynamically (e.g., simultaneously reporting and advancing the M&E methods for future reports). Accordingly, NAP M&E systems differ from traditional project-level M&E practices which needs to be accounted for in their design and needs to be considered by those that support NAP M&E development. This finding confirms an earlier analysis by Berrang-Ford et al. (2017) that adaptation M&E frameworks developed for the project, community or sector-level cannot simply be “scaled-up” to be used as

NAP M&E systems.

The lack of mechanisms to track implementation is significant given the importance placed on NAPs under the Paris Agreement as a central part of countries' adaptation response (Article 7.9) and because of the sizable investment that has already been made in developing NAPs (USD 55 million disbursed for adaptation planning readiness by the Green Climate Fund alone; GCF-IEU, 2021, pp. 40–49). The current lack of knowledge on national adaptation progress inhibits our ability to assess whether countries are effectively preparing individually and collectively for the risks posed by climate change. The Paris Rulebook acknowledges the role of NAP M&E systems by stipulating:

“112. In order to enhance their adaptation actions and to facilitate reporting, as appropriate, each Party should report on the establishment or use of domestic systems to monitor and evaluate the implementation of adaptation actions. Parties should report on approaches and systems for monitoring and evaluation, including those in place or under development.” (UNFCCC, 2018b, Decision 18/CMA.1, Annex, paragraph 112).

In fact, NAP M&E systems are highly relevant for the debate on how to assess global progress of adaptation under the Global Stocktake of the Paris Agreement because information provided by countries will be among the primary inputs (UNFCCC, 2018b, Decision 19/CMA.1). Countries that monitor adaptation actions can therefore benefit from a better understanding of their domestic progress while generating information to fulfill international reporting requirements (Leiter et al., 2017). Accordingly, future research should examine the content and usage of NAP M&E systems and its influence in national adaptation processes as well as its role for global adaptation assessments.

6. Conclusion

Literature on adaptation planning has paid little attention to how implementation will be tracked. This gap is addressed through the first evidence-based global stocktake of NAP M&E systems which substantially advances previous accounts by documenting government practices from over 60 countries. It finds that M&E mechanisms are often developed only after NAPs have been adopted and typically take several years before reporting commences. This study therefore clarifies recent contradictions in the literature on NAPs about the extent of M&E (see Section 2). In fact, less than 40% of the 70 countries that adopted a NAP report on progress or evaluate it. This situation greatly affects the ability to understand whether adaptation planning makes a difference. It also reduces the information basis countries have to report to UNFCCC and to inform the Global Stocktake. While the number of countries engaged in developing or applying NAP M&E systems has increased by more than 40% compared to 2017, the majority are not operational yet. This gap calls for further attention to M&E as part of NAP processes and NAP support, including readiness support from the Green Climate Fund. Further research on the quality and usage of NAP M&E systems is essential to understand how they can best support adaptation policy and action.

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Appendix A. –C. Supporting information

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8 Assessing global adaptation progress: insights from projects of multilateral climate funds

8.1 An empirical analysis of implemented adaptation projects

Before beginning my PhD, I already authored several publications on adaptation M&E (e.g. Leiter, 2013, 2015, 2016, 2017). In the introductions of these publications, I often found myself looking for a reference that confirmed that implementation of adaptation increased globally. While it was widely known that more and more projects were being funded across the world, there was no comprehensive assessment of these actions. The IPCC AR5 stated in 2014 that implementation of adaptation had been increasing, and put a confidence statement around it, but it actually did not provide a systematic empirical basis to underpin that statement – unlikely the AR6 whose respective chapter is based on the results of the Global Adaptation Mapping Initiative (Berrang-Ford et al., 2021).

The focus of statements about global adaptation progress had long been on planning and finance, including in the early editions of the Adaptation Gap Report, a flagship global environmental assessment by UNEP (UNEP, 2014, 2016). I was keen to explore the implementation of adaptation: what is actually being done with international climate finance? Which adaptation approaches are being invested in and who benefits?

In January 2020, UNEP invited experts to a workshop to develop a new structure for the Adaptation Gap Report. I was among the invited experts and proposed a new focus on implementation which has since become one of the three core chapters of the Adaptation Gap Report. The first edition of the newly structured report finally provided an opportunity to realise my earlier idea of studying adaptation projects by examining the three multilateral funding bodies under the UNFCCC and the Paris Agreement: the Adaptation Fund, the Green Climate Fund, and the Global Environment Facility.

8.2 Limitations

My analysis was published in chapter 5 of the Adaptation Gap Report 2020 (Leiter, 2021b; this chapter), but I did not find the time to publish the results separately as a journal article. Nevertheless, they contain novel insights that had not previously been explored in such a comprehensive coverage of the Global South. The main limitation of the study was that it was desk-based and reliant on the information provided in project documents. The analysis was carried out solely by me (hence, can be included in this thesis), but the analysis could have been strengthened by using multiple coders. Also, while the chapter contains details about how the study was undertaken, it was not yet common in 2020 to release a detailed Annex alongside the main report (this has changed starting with the 2021 edition of the Adaptation Gap Report). This presents a limitation for any replications of the analysis. Nevertheless, in recent years an increasing number of journal articles has started exploring the data provided by global climate funds and some of them might have been inspired by my chapter in the 2020 Adaptation Gap Report.

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Chapter 5

Progress in implementing
adaptation: insights from
project proposals and
scientific literature

Lead Author: Timo Leiter (Grantham Research Institute on
Climate Change and the Environment, London School of
Economics and Political Science).

Photo: © UNEP

Key messages

- ▶ Since 2006, the United Nations Framework Convention on Climate Change (UNFCCC) climate funds have financed close to 400 projects with the primary aim of adaptation. A trend towards larger projects (from more than US\$10 million to over US\$100 million) is apparent since 2017, which might signal a shift in programming from smaller pilots to larger scale implementation.
- ▶ The most frequently addressed sectors by projects under UNFCCC climate funds align with two of the three sectoral priorities for adaptation mentioned in the first round of nationally determined contributions (NDCs), namely agriculture and water. Health as the third priority is seldom the primary subject of adaptation projects in developing countries. However, evidence from scientific articles shows that extreme heat is the fourth most-targeted climate hazard globally.
- ▶ The top three climate hazards addressed by adaptation projects under UNFCCC climate funds and by actions documented in the literature are drought, rainfall variability and flooding.
- ▶ The actors most commonly targeted are national and local governments, individuals and households, farmers and pastoralists, local communities and technical government agencies. Engagement of the private sector has remained low except for tourism, agriculture and the insurance industry.
- ▶ UNFCCC climate funds primarily monitor portfolio indicators at the output level. As at May 2019, the Adaptation Fund had reached over 6 million direct beneficiaries and trained close to 100,000 people on climate resilience measures, while the Least Developed Countries Fund (LDCF) projects that were active as at 30 June 2020 had reached more than 13.6 million direct beneficiaries and trained 414,000 people.
- ▶ Evidence of adaptation outcomes, such as reduced vulnerability, however, is still rare to find even within evaluations of UNFCCC climate fund projects. To understand whether adaptation actions make a difference, more attention is needed to assess the effects of adaptation, safeguard against maladaptation and share lessons learned.

5.1 Introduction

The preceding two chapters examined progress in adaptation planning and finance. This chapter looks at implementation of adaptation by addressing the question: are adaptation actions taking place? It provides one of the first global accounts of implemented adaptation actions, including which hazards they address, who is adapting, how they align with the adaptation priorities in NDCs, whether they target the most vulnerable and whether gender and nature-based solutions are considered. Findings of this analysis are therefore directly relevant for the Global Stocktake and can serve as a baseline for future Adaptation Gap Reports.

5.2 Scope and data sources

While information on climate risks and adaptation planning processes is generally available (for example, for national planning see [chapter 3](#)), information on adaptation actions is scattered across funding and implementing entities and

information on results is scarce and not easily comparable or aggregable. Therefore, this implementation chapter of the Adaptation Gap Report focuses on adaptation actions and their results. This is an important complement to the assessment of planning and finance in chapters 3 and 4, neither of which examine whether on-the-ground action actually follows from plans, nor the impacts that financial investments have had. For resources administered by UNFCCC climate funds, this chapter provides the first combined account of the actions that the finance translates into on the ground.

As outlined in the 2017 Adaptation Gap Report (United Nations Environment Programme [UNEP] 2017), global assessments of adaptation require a coherent data source with global coverage. While [chapter 3](#) on national adaptation planning is based on submissions by countries to the UNFCCC, few countries have so far reported on actions other than creating enabling environments and even fewer have reported results of adaptation actions (Lesnikowski *et al.* 2015). For this year's report, two original data sources have been employed, namely project proposals funded by UNFCCC climate funds and

observed adaptation actions documented in scientific articles. As these data sources have only limited overlap, combining them enables greater insight into the extent of adaptation than what would otherwise be possible. For example, actions funded by UNFCCC climate funds only cover developing countries, while responses documented in scientific articles are in principle open to any type and form of adaptation anywhere.

Nevertheless, even when taken together, both sources cover only part of the large variety of actions and actors that contribute to adaptation worldwide. Autonomous and community-based actions, adaptation by the private sector as well as the many activities with co-benefits for adaptation are not accounted for. However, finding reliable data with global coverage has been identified as a bottleneck to assessments of adaptation progress (Ford *et al.* 2015). The two data sources chosen for this chapter have two decisive advantages: they have undergone some form of quality review and are accessible online, making them feasible for a desk-based analysis of global adaptation progress with immediate relevance to the UNFCCC community.

One of the difficulties of assessing adaptation progress is defining what counts as adaptation (Ford and Berrang-Ford 2016). In line with the intention to understand explicit adaptation actions under the UNFCCC, this chapter takes a conservative approach whereby actions need to directly aim towards climate risk reduction, meaning they need to have adaptation as their explicit objective. This approach includes mainstreaming, capacity-building and technology transfer as long as they are targeted at addressing climate risks, while excluding efforts that only indirectly support adaptation. The purpose of this chapter is not to identify the maximum number of activities that could somehow be linked to adaptation, but to form the basis for determining whether those that explicitly aim at adaptation actually support it.¹

The chapter also excludes readiness and other preparatory actions such as vulnerability assessments or national planning that are setting the foundation for later implementation of actions. This is not to discount the importance of such preparatory efforts, but rather to enable a better understanding of whether adaptation ultimately takes place. Furthermore, under the framework of the 2020 Adaptation Gap Report (see section 1.2), progress in national planning is addressed in chapter 3 and financial flows including readiness funds in chapter 4. Finally, since this chapter is mainly concerned with

actual implementation rather than possible future actions, its focus is on implementation that is ongoing or has already been completed. The cut-off date for scientific articles was December 2019² and for adaptation projects 30 November 2020. The project pipeline of UNFCCC climate funds was considered separately to enable an outlook on near-term adaptation actions.

Adaptation actions can be funded by a variety of sources. For those funded by international climate funds, this first edition of the implementation chapter of the Adaptation Gap Report focuses on the climate funds under UNFCCC, i.e. those that officially serve the Paris Agreement, namely the Adaptation Fund,³ the Green Climate Fund (GCF)⁴ and the Global Environment Facility (GEF), which manages the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF).⁵ Together, these funds account for a significant, albeit partial, share of international adaptation finance (approximately 50 per cent of adaptation finance reported by Annex II countries in 2016, but a far lower percentage if all multinational sources are considered; see figure 4.3 in chapter 4). It was not feasible for this year's report to undertake an analysis of projects from other international funding sources such as multilateral development banks, partly because details of their portfolios relevant to adaptation are not commonly available online. However, future reports will intend to expand the analysis to cover further funding bodies.

To account for adaptation responses in all countries and irrespective of funding source, the second data source for this chapter is scientific articles that describe implemented adaptation actions. Since 2016, literature on adaptation has been growing at a rate of over 10,000 articles per year (Callaghan, Minx and Fosters 2020). However, most articles are conceptual rather than empirical, discussing concepts or undertaking vulnerability assessments rather than documenting actual adaptation. The Global Adaptation Mapping Initiative (GAMI) has been created to systematically screen and review the scientific literature (articles published in scientific journals between January 2013 and December 2019) to find evidence of human adaptation that has already occurred (details of the methodology are described in Berrang-Ford *et al.* forthcoming). It enables a comparison between trends documented in the literature and trends under UNFCCC climate funds. Together, both sources provide a unique account of observed adaptation actions.

¹ Independent reviews of the practice of applying the Organisation for Economic Co-operation and Development (OECD) Rio markers found that up to two-thirds of projects labelled as 'adaptation' did not have any relation to adaptation (Weikmans *et al.* 2017).

² This date has been determined by the Global Adaptation Mapping Initiative (Berrang-Ford *et al.* forthcoming).

³ The Adaptation Fund was established in 2001 under the Kyoto Protocol and operationalized in 2007. Since 1 January 2019, the Adaptation Fund has also served the Paris Agreement.

⁴ The Green Climate Fund was set up in 2010 and became operational in 2015.

⁵ The LDCF and the SCCF were established in 2001. The LDCF is exclusively focused on adaptation in least developed countries (LDCs), while the SCCF is open to all developing countries and primarily supports adaptation. In addition to these two funds, the GEF Trust Fund previously supported adaptation through the Strategic Priority on Adaptation (SPA), which ran from 2004 to 2010. The GEF now finances primary adaptation projects solely through the LDCF and the SCCF. However, numerous projects under the GEF Trust Fund have adaptation co-benefits that are not accounted for in this chapter.

5.3 Implemented adaptation actions

In collaboration with the secretariats of the Adaptation Fund, the GCF and the GEF, the number of projects that primarily aim at adaptation have been identified alongside the number of proposals in the pipeline. Excluding readiness projects, close to 400 explicit adaptation projects were counted, 51 per cent of which have started since 2015 (see [table 5.1](#)). In addition, the Global Adaptation Mapping Initiative identified almost 1,700 articles that document the implementation of adaptation actions (Berrang-Ford *et al.* forthcoming). The articles provide evidence of some degree of adaptation in almost every country while indicating regional concentrations in South-East Asia; Eastern, Southern and parts of West Africa; Europe; and North and Central America. The majority of adaptation actions documented in scientific articles published between 2013 and 2019 are in the early or expanding stages of implementation, with less than 15 per cent under widespread implementation (see [figure 5.1](#)).

Adaptation projects implemented under UNFCCC climate funds vary widely in content and budget. The total number of projects, while providing a rough indication of the extent of adaptation actions globally, conceals these differences and must therefore be interpreted with care. One way towards a more meaningful interpretation is to differentiate projects by funding size. [Figure 5.2](#) shows the number of projects that have started per year since 2015 according to four categories of grant size: US\$0.5–10 million, US\$11–25 million, US\$26–50 million, and more than US\$50 million (based on total grant amount provided by the fund, excluding co-financing and non-grant based forms of funding such as loans). Before 2015, the largest grant provided for individual projects by UNFCCC climate funds was less than US\$15 million and grant sizes rarely exceeded US\$10 million. Few projects had a successor or a follow-up phase. Since 2017, a trend towards larger projects is apparent, which might signal a shift in programming from smaller pilots to larger scale projects that address climate risks more widely. This trend has been facilitated by the GCF, which accounts for 82 per cent of all projects with grant sizes above US\$10 million since 2015.

Accounting for different funding sizes explains that despite a decrease in the total number of new projects since 2018, the overall funding volume per year has in fact increased (see [chapter 4](#)). To understand what these figures mean on the ground, adaptation projects that have started since 2015 were analysed regarding the sectors covered, the hazards responded to, and the actors adapting (see [figures 5.3–5.5](#)). The analysis is based on the short project descriptions on the funds' websites (see [box 5.1](#)). If that information was inconclusive, the detailed project documents were consulted.

Of the 203 projects that have started since 2015, 53 per cent are located in least developed countries (LDCs) and

Box 5.1. Adaptation projects funded by UNFCCC climate funds

- **Adaptation Fund** (www.adaptation-fund.org): an interactive map of projects, a list of projects by sector and a list of all projects are provided. Project documents are available online.
- **Green Climate Fund** (www.greenclimate.fund): a list of all projects can be filtered for adaptation. Project documents, gender assessments and annual performance reports are available online.
- **Global Environment Facility** (www.thegef.org): a list of all projects is available for download and can be filtered by topic area or fund (for example, LDCF or SCCF). Short project descriptions with a timeline are presented for most projects. Project documents are available online.

14 per cent in small island developing states (SIDS). The sectors most commonly addressed were agriculture (including food security) and water, which correspond to the top two priorities mentioned in the first round of NDCs that were mainly submitted in 2015 and 2016 (see [figure 5.3](#)). Agriculture and water are closely interlinked and projects often considered them together. Hence, their flipped order compared to NDC adaptation priorities does not indicate a significant divergence. Ecosystems and forestry rank in joint fourth position. A noticeable difference concerns health, which was the third most commonly mentioned adaptation priority in the first round of NDCs, but none of the 203 projects since 2015 were dedicated primarily to adaptation in the health sector. However, the analysis of observed adaptation in scientific articles found that health concerns related to extreme heat were the fourth most-targeted hazard, indicating that health aspects are underrepresented in the sample of projects from developing countries (see [figure 5.4](#)).

To determine the climate hazards that adaptation projects responded to, up to three of the most prominently mentioned hazards in each project description were extracted. If a broad range of hazards was mentioned without a specific focus, the label 'multitude of hazards' was applied. Drought and inland flooding were most often mentioned, followed by rainfall variability. This order is almost identical to the top three hazards addressed by responses documented in the literature (see [figure 5.4](#)). Hence, most adaptation actions deal either with too much or too little water, extreme events, and sea-level rise alongside associated salinization of soils or water resources. Extreme heat ranked as the fourth most

Table 5.1. Number of Adaptation Fund, GCF and GEF explicit adaptation projects under implementation, completed or in the pipeline as at 30 November 2020

	Implementation		Pipeline (approved ¹)	Pipeline (proposals)
	Implementation started during 2006–2020	Percentage started since 2015		
Adaptation Fund	86	65% (56)	4 ²	9 ³
GCF	54	100% (54)	11	29 ⁴
GEF-LDCF	161	42% (67)	18 ⁵	38 ⁶
GEF-SCCF	74	35% (26)	3	4
GEF Trust Fund (SPA 2004–2010)	22	0%	N/A	N/A
Total	397	51% (203)	36	80

¹ Referring to projects that have been approved but whose implementation has not yet started.

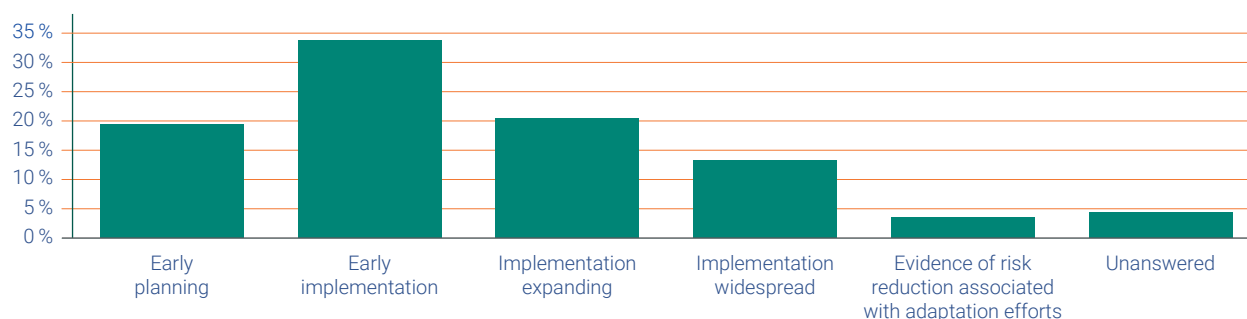
² Proposals stated on the Adaptation Fund website under [Project waitlist](#).

³ Proposals stated on the Adaptation Fund website under [Active pipeline projects](#) as 'Proposal not approved'.

⁴ Number of funding proposals (not concepts) in the entire pipeline.

⁵ For LDCF and SCCF, the numbers provided are for proposals that have been CEO endorsed but are not yet under implementation.

⁶ For LDCF and SCCF, the data provided is for Council-approved and CEO-approved concepts that are not yet CEO endorsed or under implementation.

Figure 5.1. Stage of implementation of adaptation actions documented in scientific articles

Note: This figure is based on data from the Global Adaptation Mapping Initiative (Berrang-Ford *et al.* forthcoming) which identified close to 1,700 scientific articles published between 2013 and 2019 that document adaptation actions. It shows the percentage of articles per stage of implementation. It is worth noting that just 3.5 per cent of articles referred to some degree of achieved risk reduction.

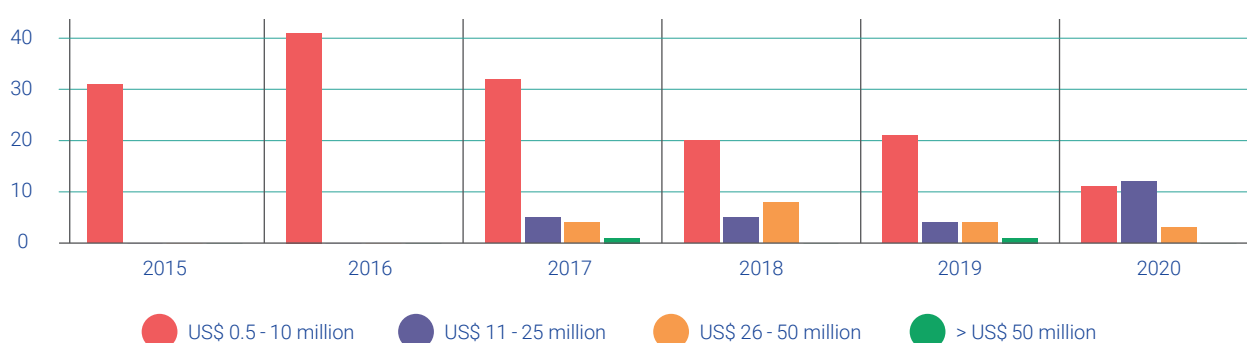
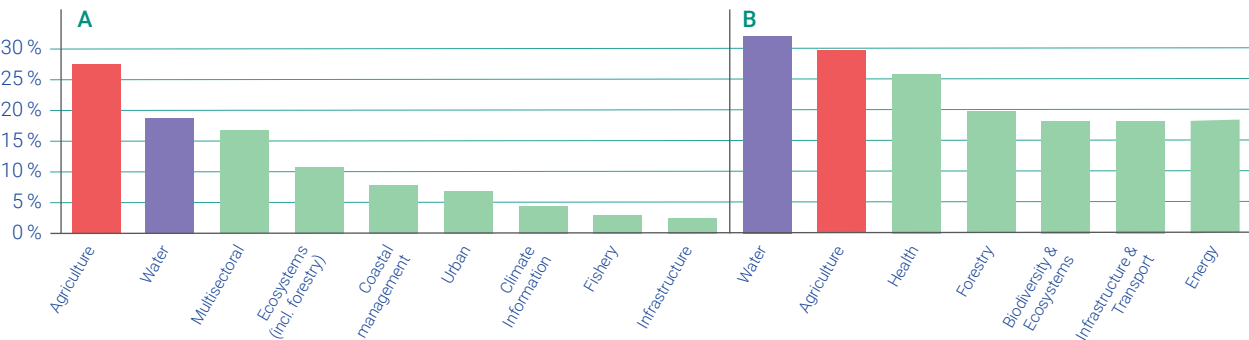
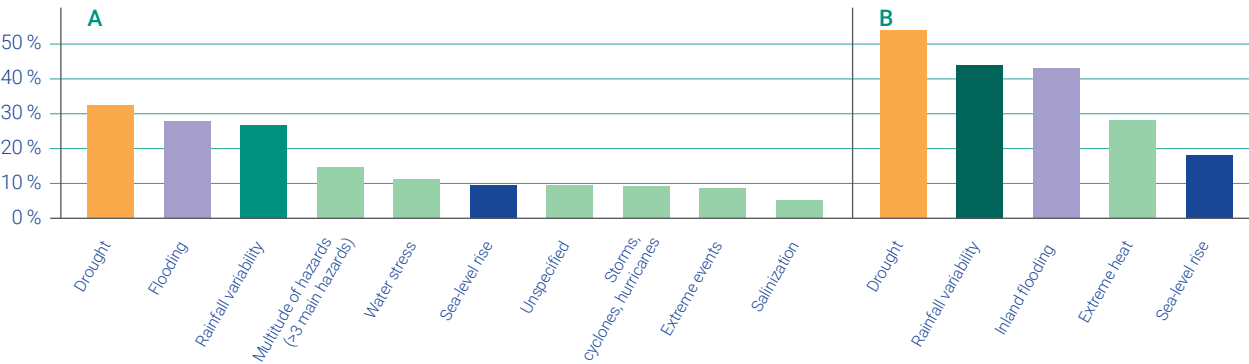
Figure 5.2. Number of primary adaptation projects per year and size of grant (excluding co-financing)

Figure 5.3. Panel A: Primary sectors of UNFCCC climate fund adaptation projects since 2015
Panel B: Sectors identified as adaptation priorities in the first round of NDCs



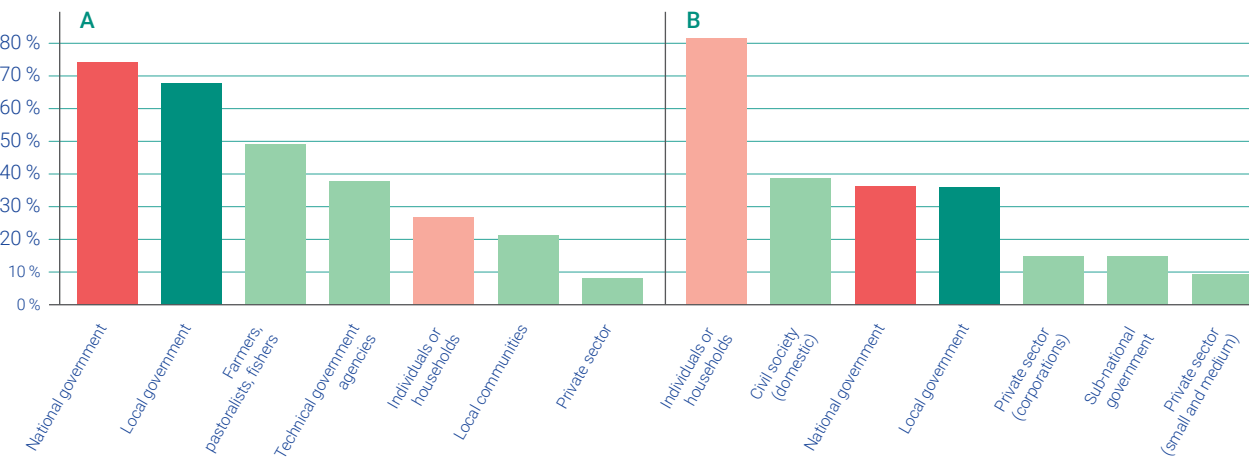
Note: Agriculture and water were marked in the same colour in both panels to highlight the alignment of the top two sectors between UNFCCC adaptation projects and NDCs. **Panel A** is based on the primary sector of each of the 203 projects (the designation of sectors used by UNFCCC funds is not harmonized, therefore, a reassignment was necessary to obtain comparability). The bars in **Panel A** add up to 100 per cent because each project was assigned to just one primary sector (1.5 per cent were left unassigned due to missing project documents). **Panel B** shows the five most frequently mentioned priority adaptation sectors in the first round of NDCs (GIZ 2020). The bars in Panel B do not add up to 100 per cent because each NDC mentions multiple adaptation priorities.

Figure 5.4. Panel A: Hazards addressed by UNFCCC climate fund projects
Panel B: Hazards addressed by observed adaptation responses documented in scientific articles from 2013–2019



Note: Identical hazards in Panels A and B have been highlighted in the same colour to ease comparison. The hazards most frequently addressed by the 203 adaptation projects that have started since 2015 under UNFCCC climate funds (**Panel A**) and by adaptation actions documented in scientific articles (**Panel B**) are shown (Berrang-Ford et al. forthcoming). The Global Adaptation Mapping Initiative used the label 'Extreme precipitation and inland flooding', whereas 'Flooding' in Panel A includes both inland and coastal flooding.

Figure 5.5. Panel A: Actors targeted by adaptation projects under UNFCCC climate funds since 2015
Panel B: Actors addressed by observed adaptation as documented in scientific articles



Note: Identical types of actors in **Panels A** and **B** have been highlighted in the same colour to ease comparison. The Global Adaptation Mapping Initiative (Berrang-Ford et al. forthcoming) that provided the data for **Panel B** divided the private sector into small and medium-sized enterprises and larger ones (corporations). In **Panel A**, the label 'Private sector' includes any business involvement, irrespective of its size.

commonly addressed hazard by actions documented in the literature, while very few of the projects in developing countries addressed its impacts on human health.⁶

Adaptation projects under UNFCCC climate funds have primarily targeted national and local governments, farmers, local communities, technical government agencies (such as agricultural services or meteorological offices) and individuals and households (see figure 5.5). Projects often address different target groups through different components or activities. As the vast majority of adaptation actions reported in scientific articles took place at the local level, they therefore had far less involvement of national governments than local governments. Private sector engagement was equally low among both data sources except for the tourism sector in Europe and Australasia (Berrang-Ford *et al.* forthcoming). Farming associations and the insurance industry were among the most common private sector actors involved in developing countries. Additional findings from the analysis of project descriptions are:

- ▶ At least 22 per cent and possibly up to two-thirds of projects that have started since 2015 target the most vulnerable.⁷
- ▶ Six per cent of projects are primarily aimed at gender and adaptation and an additional 15 per cent explicitly mention gender aspects in their short descriptions.⁸ The Adaptation Fund, the GCF and the GEF require a gender assessment for every project and some GCF projects also have an associated gender action plan available on each project's webpage (see box 5.1).
- ▶ Twelve per cent of projects either focus primarily on advancing climate information and services or have a component addressing it. At least another 20 per cent include it as one of their outputs.
- ▶ Twelve per cent of projects fall into ecosystem-based adaptation or conservation and another 15 per cent partially focus on it (see section 6.5 for details).
- ▶ The most common linkages to related topics were to natural resource management (mainly countering degradation through restoration, afforestation and rehabilitation), land and soil management and disaster risk reduction.

5.4 Adaptation results

As outlined in chapter 2, results of adaptation can be separated into outputs (what has been done) and outcomes (what effects these outputs have had). For example, training farmers about better adapted farming techniques may lead to new knowledge that, if properly applied, may have a positive effect on yields and eventually on farmers' livelihoods and well-being. The outputs (such as number of trainings and people trained) are typically directly measurable, while their effects occur later, are influenced by multiple factors, and may require more complex methods or concepts (for example, what constitutes resilience or well-being) to be measured. Accordingly, most of the portfolio indicators used by international climate funds remain at the level of outputs (Leiter *et al.* 2019). For example, as at May 2019, the Adaptation Fund had reached over 6 million direct beneficiaries and trained close to 100,000 people on climate resilience measures (Adaptation Fund 2019). Projects under the LDCF that were active as at 30 June 2020 had reached more than 13.6 million direct beneficiaries and trained 414,000 people (Global Environment Facility [GEF] 2020). As at 31 December 2019, GCF-funded activities under implementation were reported to have reached a total of 10 million direct and indirect beneficiaries (GCF 2020).

Output indicators are useful to illustrate immediate products and services created by a project and their reach. However, they neither capture whether outputs are being utilized (for example, whether participants apply the knowledge gained at a training) nor their effects (for example, whether beneficiaries' vulnerability has been reduced). One challenge in measuring adaptation outcomes is that they depend on the context and can differ among people living in the same location due to differential levels of vulnerability (Thomas *et al.* 2018). In the worst case, maladaptive actions could leave those most vulnerable worse off than before (Schipper 2020). Accordingly, adaptation outcomes are context- and people-specific and cannot easily be expressed in a few global indicators (Leiter and Pringle 2018). Although UNFCCC climate funds do employ some sector-specific portfolio indicators at the outcome level – for example increased income or hectares of natural habitat restored –, these indicators are usually only relevant to a small part of the portfolio (Leiter *et al.* 2019). Therefore, information on outcome-level results of adaptation projects remains limited to date.

Out of almost 1,700 scientific articles identified by the Global Adaptation Mapping Initiative, less than 3.5 per cent were classified as being at the stage of risk reduction (see figure 5.1). While risk reduction was often

⁶ For an overview of adaptation and human health, see the 2018 Adaptation Gap Report (UNEP 2018).

⁷ This was determined based on information about the vulnerability of the beneficiaries as mentioned in the projects' online descriptions or project documents. A more precise determination would require a closer analysis of the project contexts and would depend on the definition of who counts as 'most vulnerable'.

⁸ Not mentioning gender aspects in the short descriptions does not mean that the projects do not consider gender. A more detailed exploration would require an analysis of the project's gender assessments.

alluded to, evidence of it remained the exception rather than the norm. Assessments of risk or vulnerability reduction at the end of a project lifetime are similarly rare, despite having shown to be useful complements to traditional project monitoring systems. Their applicability, however, depends on the type of project and the available resources (Leiter 2018).

Given the limited information on the results of implementation, more attention needs to be paid to understanding the effects of adaptation actions, ensuring systematic risk reductions and avoiding maladaptation. One positive trend is that annual reports by the UNFCCC climate funds to the Conference of the Parties (COP) increasingly provide information on outputs rather than just on financial allocations and spending. New approaches to assessing results, for example via high-frequency mobile phone surveys of subjective resilience, offer the potential to directly monitor effects on beneficiaries in a resource-efficient way (Jones 2019; von Engelhardt and Jones 2018).

5.5 Outlook

As of 30 November 2020, 36 approved adaptation projects under UNFCCC climate funds were ready to start and 80 funding proposals were in advanced stages awaiting approval (see table 5.1). Around twice as many concept notes had been submitted to the funds' secretariats for review. However, the lack of information on lasting outcomes of adaptation projects raises concerns over their effectiveness. A review by the GCF's Independent Evaluation Unit (2018) found that "more than two-thirds of the GCF-approved funding proposals did not clearly define causal pathways that show how activities lead to climate change impact" (p.2). Climate funds and project developers alike need to focus more attention on how exactly adaptation is intended to occur amidst social realities and multiple drivers of vulnerability. Theories of change offer a way to map the intended change process and gain a common understanding about the mechanisms of change (Oberlack

et al. 2019). However, they need to be developed in a socially inclusive way and informed by local experiences in order not to miss causes of risk that could reduce effectiveness, particularly among the most vulnerable groups (Forsyth 2018). Greater attention to scrutinizing proposed theories of change and their assumptions also provides the basis to better monitor what matters during implementation and to adjust actions as needed. Rather than performing an accountability function, well-designed monitoring systems and evaluations need to be seen as an opportunity for learning and lesson-sharing.

Another concern for the outlook on implementation progress is that continued high amounts of global greenhouse gas emissions imply rising levels of climate risk (Intergovernmental Panel on Climate Change [IPCC] 2018; UNEP 2020). The adaptation gap is therefore inextricably linked to the emissions gap. As stated in the foreword to the first edition of the Adaptation Gap Report, "ambitious and immediate mitigation action is the best insurance against an insurmountable future adaptation gap" (UNEP 2014; see also 2.2). Although progress made in implemented adaptation as documented in this chapter is positive, it may not be able to keep pace with increasing levels of risk, despite the trend towards larger projects. In fact, 2020 saw for the first time more projects approved with funding sizes between US\$11 million and US\$50 million than those up to US\$10 million which had, with rare exceptions, been the maximum project value under UNFCCC climate funds until 2017 (see figure 5.2). While funding volume is no indication of the quality of a proposal, the possibility to design projects larger than US\$10 million offers the potential to more comprehensively address climate risks and underlying causes of vulnerability and to upscale tested applications. Finally, future adaptation projects also need to consider the occurrence of compound risks from climate hazards, economic recession and a global health crisis which could exceed levels of resilience that might have otherwise been sufficient to withstand individual shocks (Phillips *et al.* 2020). Future editions of the Adaptation Gap Report will continue to look at levels of implementation and achieved results in order to understand adaptation progress and identify areas for improvement.

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9 Conclusion

This PhD thesis has responded to numerous calls for more research into the implementation of adaptation to climate change in order to better understand whether and how we are adapting to climate change. For example, Ford et al. (2015) stated in 2015 that “further research is needed to develop more substantive measures of adaptation progress for global-scale application.” (p.968). My research has therefore aimed to “improve our understanding of global progress on adaptation to climate change” (section 2.5.1, p.33).

When I started my PhD in 2018, to my knowledge, empirical research on any of the research questions outlined in section 2.5 did at best scarcely exist, if at all. My PhD research has produced novel findings based on rigorous empirical analysis. Details have been discussed in the discussion and conclusion sections of each article/chapter. Rather than repeating them here, the following presents a snapshot of novel findings originating from my thesis:

Global progress on implementation (Chapters 7 and 8)

- More than 60% of countries that adopted a national adaptation plan (NAP) are not tracking its implementation.
- Estimating countries’ implementation performance on the basis of policy pledges can lead to a substantial overestimation by up to a factor of four.
- At least one of the official indicators under the Sustainable Development Goal 13 can provide a dramatically false sense of progress.
- Since 2006, multilateral climate funds have financed close to 400 projects that primarily aim at adaptation to climate change.
- The most frequently addressed sectors by projects under UNFCCC multilateral funds align with two of the three sectoral priorities for adaptation mentioned in the first round of nationally determined contributions (NDCs), namely agriculture and water.

Transparency as a governance mechanism in global environment agreements (Chapter 4)

- A global environmental agreement can have inherently opposing transparency rules (mandatory vs. voluntary and international review vs. national discretion). Such a coexistence of contrasting transparency rules under one global treaty cannot be well explained by existing frameworks of state-led transparency.
- The development of transparency rules under the Paris Agreement has been substantially influenced by subject-related factors that act in concert with political factors. This finding challenges a conclusion from previous studies on transparency in global environmental governance.
- Common assumptions of transparency as a governance mechanism need to be scrutinised regarding the complex interplay between political and subject-related influences on transparency rules.
- Understanding the potential of transparency as a governance mechanism requires a more granular analysis of transparency rules that govern how transparency operates.

Adaptation in UN climate change negotiations (Chapter 6)

- A shift in governance functions has taken place at the UN climate change negotiations regarding adaptation: Decisions adopted since 2019 have concentrated on support and transparency while the Paris Agreement made greater use of signalling and rule-setting.
- There is a major discrepancy between what researchers and civil society expect the negotiations would be debating and what they actually do.
- My participant observation at the UN climate change negotiations is reemphasising the findings of a small body of literature on global adaptation governance: the potential and limits of international law for governing a strongly context-specific subject matter need to be

thoroughly considered when assessing what could be reasonably regulated on adaptation at the global governance level.

Research methods (Chapters 4-6; Langlet et al., 2023)

- The research contained in this thesis demonstrates the importance of ‘being in the room’ when global environmental agreements and their subsequent implementation rules are being negotiated.
- It confirms the recognition that participant observation is an essential research method in global environmental governance.

During my PhD studies, I have transferred findings from my research into two major global environmental assessments, the Sixth Assessment Report of the IPCC Working Group II and UNEP’s Adaptation Gap Report. In addition to the chapters contained in this thesis, I have also contributed to the **Global Adaptation Mapping Initiative**. One of its key findings is that out of the 1,682 articles that were identified as documenting implementation of adaptation, only 30 articles (less than 2 percent) “present primary evidence of risk reduction, for example, improved food security and health outcomes measured through indicators such as increased agricultural yields and caloric intake” (Berrang-Ford et al., 2021a, p.992¹).

My research has developed and applied several new research frameworks and produced two new and comprehensive global datasets, an inventory of over 100 policy documents and implementation reports in more than 10 languages, and a database of over 400 adaptation projects funded by international climate finance. The first database is publicly available and included in the Annex to this thesis.

Reflecting on the question posed by Berrang-Ford et al. in 2011 (“Are we adapting to climate change”) and its follow-up question about progress at the global level (Ford et al., 2015), my PhD thesis has made significant contributions, produced novel findings, and generated new datasets in a research area that continues to be understudied and that presents significant challenges for exploration. The unique access I gained to the negotiation sites of the UNFCCC and to national government officials has been part of what made these discoveries possible. In short, we now know more and have better insights about the implementation of adaptation at the global level. As such, I have contributed to addressing the ‘grand challenge’ of research on adaptation tracking.

¹ Together with Alexandra Lesnikowski, I co-led this analysis which is detailed in Supplementary File 2: “What evidence do we have that adaptation responses are reducing risk?”.

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Annex

Annex 1: Supplementary materials to the article on national adaptation M&E systems published in *Environmental Science & Policy* (2021)

Annex 1.A: Inventory of national adaptation plan M&E systems.

Annex 1.B: Results of the triangulation.

Annex 1.C: Adjusted 2017 baseline of national adaptation M&E systems

Supplementary materials to the article:

Leiter, T. (2021). Do governments track the implementation of national climate change adaptation plans? An evidence-based global stocktake of monitoring and evaluation systems. *Environmental Science & Policy*, 125, 179-188.

<https://www.sciencedirect.com/science/article/pii/S1462901121002379>

The supplementary materials are shown on the following pages exactly as published in conjunction with the article. The direct link to the supplementary materials is: <https://ars.els-cdn.com/content/image/1-s2.0-S1462901121002379-mmc1.docx>

Supplementary material to:

Do governments track the implementation of national climate change adaptation plans? An evidence-based global stocktake of monitoring and evaluation systems

Timo Leiter^a

^a Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science (LSE), Houghton Street, London, WC2A 2AE, United Kingdom

Email: T.L.Leiter@lse.ac.uk

ORCID ID: <https://orcid.org/0000-0003-4982-8063>

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Appendix A: Inventory of national adaptation plan M&E systems

This inventory contains all identified documents describing the NAP M&E systems and the monitoring and evaluation reports resulting from these systems. NAPs are only listed if they are the primary source of information about the M&E system. As stated in sections 3.2, a novel feature of this inventory and the accompanying analysis is that it is based on evidence of M&E having been conducted. Hence, simple statements of intent or generic M&E sections in NAPs do not suffice to be included (see Table 2). Accordingly, some countries that adopted a NAP but which includes insufficient content on M&E and where no other evidence could be found through the systematic review (Figure 1) are not listed (e.g. Sudan or Timor-Leste). This inventory also provides explanations as to why each country has been assigned to a particular NAP M&E development stage.

This inventory is current as of 1 August 2021. It is possible that additional countries have undertaken steps towards the development of a national adaptation M&E system and might be missing here, for example if they are only reporting government internally or if they have not shared relevant information with the UNFCCC or via other international adaptation events or knowledge platforms. However, the search strategy outlined in section 3.3 has been designed to minimise the chances of missing countries that have an explicit NAP M&E system in place or taken tangible steps towards its development. Triangulation with the NAP progress report from the UNFCCC secretariat (UNFCCC, 2020b) suggests that only a small number of countries may have been missed in the reporting stages (see Appendix B below).

Documents in any language were considered and have been translated with online translation services. Where not available in English, the inventory lists documents in their original language together with a translation of the title. Documents are listed per country in chronological order starting with the newest document.

Albania

Albania's NAP defines 16 overarching goals with 1-2 indicators each and outlines monitoring principles and the content to be included in progress reports. The development of a results-based monitoring system is among the priority actions described in the NAP. However, no evidence of its development or of the publication of a NAP progress report could be obtained (the NAP states that progress reports would be conducted every four years, meaning the first one would be expected in 2021). Since specific indicators have been included in the NAP, Albania was categorised as being at an **advanced stage** of developing its NAP M&E system.

Republic of Albania (2017). National Adaptation Planning (NAP) to Climate Change in Albania. Framework for the Country Process.

Austria

Austria published its first NAP progress report in 2015. During a presentation in 2019, it was stated that Austria will address matters of monitoring and evaluation in a joint report, starting from the second progress report that was planned for 2020 (Schmidt & Leitner, 2019). However, that report has not been published yet as of 1 August 2021. Accordingly, Austria is classified as **operational on adaptation monitoring but not on evaluation**.

Schmidt, A., & Leitner, M. (2019). *Austrian Monitoring and Evaluation System – Climate Change Adaptation*. Presentation held at the 4th European Climate Change Adaptation Conference, 30 May 2019 in Lisbon, Portugal.

Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft [Federal Ministry for Agriculture, Forestry, Environment and Water] (2015). Anpassung an den Klimawandel in Österreich. Fortschrittsbericht. [Adaptation to Climate Change in Austria. Progress report].

Australia

The proposed adaptation progress monitoring framework from 2013 has not been implemented due to a change in government. The National Climate Resilience and Adaptation Strategy from 2015 does not refer to it. The Strategy briefly mentions the importance of evaluating progress of implementation but does not provide any details on how M&E would be done. No evidence of further activities in this regard could be found. Australia has therefore been classified as **development of the NAP M&E system stalled before 2015**. A new national adaptation strategy has been announced for the second half of 2021 (<http://environment.gov.au/climate-change/adaptation/strategy>).

Australian Government (2013). Climate Adaptation Outlook. A Proposed National Adaptation Assessment Framework. Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education.

Belgium

A mid-term evaluation of Belgium's NAP has been published in 2019 and a progress report of implementation of the Flemish Climate Policy including adaptation was published in 2015. Belgium is therefore classified as having published a NAP evaluation and a progress report for the Flemish region (Flanders). Although the latter is strictly speaking a sub-national progress report, due to the significance of the Flemish region in the Belgian governance system (one of two regions, the third is the capital Brussels) it has been included in this inventory.

Commission Nationale Climate (2019). Mid-term evaluatie van het Nationale Adaptatie Plan (2017-2018). [Mid-term evaluation of the National Adaptation Plan (2017-2018)]
http://cdr.eionet.europa.eu/be/eu/mmr/art15_adaptation/envxgbhfg/Evaluatie_mid-term_NAP_2019_20190227_NL.DOCX

Vlamse Overheid (2015). Voortgangsrapport 2015. Vlaams Klimaatbeleidsplan 2013-2020. Luik Adaptatie. [Flemish Government (2015). Progress report 2015 of the Flemish Climate Policy 2013-2020. Adaptation part.]
<https://www.lne.be/sites/default/files/atoms/files/VR%202016%201504%20MED.%20VORA2015%20-%203%20bijlage.pdf>

Benin

A training for government officials on how to develop a national adaptation M&E system has been conducted at the end of 2017 followed by a stocktake of relevant existing M&E systems and the elaboration of recommendations for the NAP M&E system. The results from the stocktake and the recommendations are intended to inform the respective section of the NAP document which is expected to be finalised in 2021. Accordingly, Benin has been classified as still being at an **early stage**.

This information has been provided by GIZ which is supporting the development of the adaptation M&E system in Benin as part of a NAP support project implemented on behalf of the German Federal Ministry for the Environment (BMU).

Brazil

A NAP M&E report which contains information on implementation (hence fulfilling the role of a progress report, but not of a comprehensive NAP evaluation) was published in 2017. A second progress report is currently under development. Brazil has therefore been classified as **having reported on the implementation of its NAP**.

Government of Brazil (2017). National Adaptation Plan. 1st Monitoring and Evaluation Report 2016-2017. Retrieved from:
http://euroclimaplus.org/intranet/documentos/repositorio/Plan%20Nacional%20de%20Adaptaci%C3%B3n_2016.pdf

Bulgaria

The M&E section of Bulgaria's NAP includes institutional arrangements, a sequence of steps for obtaining information about the implementation of measures and considerations for the development of performance indicators. The NAP also includes a detailed action plan with activities, expected results and targets. Bulgaria has therefore been categorised as being at an **advanced stage** of developing its adaptation M&E system. Bulgaria's 2019 submission under the EU adaptation reporting directive states that a mid-term progress assessment is planned for 2025.

Bulgaria (2015). National Climate Change Adaptation Strategy and Action Plan.
[https://www.moew.government.bg/static/media/ups/categories/attachments/Strategy%20and%20Action%20Plan%20-%20Full%20Report%20-%20Final%20\(2019-07-03\)%20-%20ENDfe5736c9ec14302fd11facffcd1473d.docx](https://www.moew.government.bg/static/media/ups/categories/attachments/Strategy%20and%20Action%20Plan%20-%20Full%20Report%20-%20Final%20(2019-07-03)%20-%20ENDfe5736c9ec14302fd11facffcd1473d.docx)

Burkina Faso

As of July 2021, the first NAP progress report has been completed and is in the layout stage. Burkina Faso's NAP monitoring has therefore been classified as operational since the report is completed and just about to be published. The development of the progress report has been supported by the NAP Global Network.

Cambodia

A national adaptation M&E framework was adopted in 2016 and resulted in an online portal which, amongst others, provides information on institutional readiness indicators. A mid-term evaluation of the Cambodia Climate Change Strategic Plan 2014 – 2023 has been published in 2019. The

development of the adaptation M&E system has been supported by IIED and GIZ on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). The mid-term evaluation has been supported by the Cambodia Climate Change Alliance (CCCA) programme and the United Nations Development Programme (UNDP).

Government of Cambodia (2020). Monitoring Climate Change Responses. [online portal].
<https://ncsd.moe.gov.kh/dcc/monitoring-climate-change-response>

Garcia, J. & Chey, T. (2019). Mid term review of Cambodia Climate Change Strategic Plan 2014 – 2023. Draft Evaluation Report, July 2019. https://ncsd.moe.gov.kh/sites/default/files/2019-08/CCCSP%20MTR_Final%20Evaluation%20Report_final_cleared.pdf

Government of Cambodia (2016). Cambodia's national climate change monitoring & evaluation framework. Department of Climate Change, General Secretariat, National Council for Sustainable Development.

Rai, N., Brooks, N., Ponlok, T., Baroda, N., & Nash, E. (2015). *Developing an M&E Framework for Climate Change: Tracking Adaptation and Measuring Development (TAMD) in Cambodia*. Research Report, International Institute for Environment and Development (IIED), London. Available at: <http://pubs.iied.org/10118IIED>

Cameroon

Section 4.5. "Monitoring and evaluation" of Cameroon's NAP includes five overarching progress indicators as well as indicators for every proposed measure. However, no further information could be obtained whether the M&E system has been implemented. Cameroon has therefore been classified as being at an **advanced stage** of developing its NAP M&E system.

Republique du Cameroun [Republic of Cameroon] (2015). Plan National d'Adaptation aux Changements Climatiques du Cameroun [National Climate Change Adaptation Plan of Cameroon].
https://www4.unfccc.int/sites/NAPC/Documents/Parties/PNACC_Cameroun_VF_Valid%c3%a9e_24062015%20-%20FINAL.pdf

Canada

Canada launched an Expert Panel on Climate Change Adaptation and Resilience Results in [August 2017](#) "to help define how to measure progress in building Canada's resilience to climate change" (website of the Government of Canada, see below). The Expert Panel published a report with possible indicators in 2018. A new tender for the refinement of adaptation indicators was published in November 2020. Since the system to monitor and report on progress does not seem to have been finalised yet, Canada is classified as being at an **advanced stage** of its adaptation M&E system.

Environment and Climate Change Canada (2018). *Measuring Progress in adaptation and climate resilience: Recommendations to the Government of Canada*.
www.publications.gc.ca/collections/collection_2018/eccc/En4-329-2018-eng.pdf

Government of Canada (2018). Expert Panel on Climate Change Adaptation and Resilience Results. Retrieved from (website last modified on 26 June 2018):
<https://www.canada.ca/en/environment-climate-change/services/climate-change/adapting/expert-panel-adaptation-resilience.html>

Chile

A monitoring report of the implementation progress of the National Action Plan on Climate Change 2017 – 2022 has been published in 2019. An evaluation of the first National Action Plan on Climate

Change (2008-2012) has also been carried out. On this basis, Chile is classified as having **produced both a monitoring report and an evaluation**.

Gobierno de Chile [Government of Chile] (2020). Informe de Seguimiento 2019 Del Plan de Acción Nacional de Cambio Climático 2017 – 2022. Ministerio del Medio Ambiente. [Information on the implementation of the national climate change action plan 2017-2022. Ministry of the Environment].

Cook Islands

Cook Island's Second joint national action plan for climate change and disaster risk management 2016-2020 (JNAP II) includes an M&E section that specifies a list of requirements for the M&E system and a table with relevant reporting obligations. No further information could be obtained on whether the M&E system has been developed. The Cook Islands have therefore been classified as being at an **early stage**.

Cook Islands Government (2016). Second joint national action plan for climate change and disaster risk management 2016-2020 (JNAP II).

Colombia

The development of Colombia's national adaptation M&E system is ongoing and potential indicators have been proposed (see references below). Colombia is therefore classified as being at an **advanced stage**.

Cruz, L.C. (2019). Colombia's Progress in Developing a National Monitoring and Evaluation System for Climate Change Adaptation. Country Brief 5A. NAP Global Network.
<http://napglobalnetwork.org/wp-content/uploads/2019/02/nap-en-2019-snapshot-colombia-progress-in-developing-a-national-monitoring-and-evaluation-system-for-climate-change-adaptation-.pdf>

Country case study provided by C.R. Vargas in:

Leiter, T., Buitrago, M.F., Druta, A., Guiterrez, J.E., Harley, M., Makholela, T., Ponlok, T., Ramarou, T., Vargas, C.R., & Wallin, E. (2017). Country-specific assessments of adaptation progress. In: UNEP: *The Adaptation Gap Report 2017: Towards Global Assessment* (pp. 23-33). United Nations Environment Programme (UNEP), Nairobi, Kenya.

Romero-Ruiz, M. et al. (2016). *Sistema Nacional de Indicadores de Adaptación al Cambio Climático (SIACC): propuesta de protocolos de indicadores incluidos en el sistema* [National System of Indicators of Adaptation to Climate Change (SIACC): Proposal of indicators protocols included in the system]. https://www.ctc-n.org/system/files/dossier/3b/actividad_2.3.4_protocolos_final_v4.pdf

Bouroncle, C. et al. (2016). *Sistema Nacional de Indicadores de Adaptación al Cambio Climático (SIACC): definición del conjunto de indicadores* [National System of Indicators of Adaptation to Climate Change (SIACC): Definition of the indicator set]. <https://www.ctc-n.org/resources/sistema-nacional-de-indicadores-de-adaptacion-al-cambio-climatico-siacc-colombia-definici>

Czech Republic

The Czech Republic reported in 2019 under the EU adaptation reporting directive: "There is a system in place to monitor the implementation of the NAP on an annual basis. However, for the time being it is only used for internal purposes by the Ministry of the Environment. The overall monitoring of the NAP and the publication of its results will happen in 2019". However, the NAP from 2015 does not mention the monitoring process and no evidence of the "overall monitoring in 2019" could be

obtained. The NAP mentions an evaluation to be conducted in 2019 which has been published (see below). Since no details of the internal monitoring could be obtained and it is not mentioned in the NAP (which has a section on evaluation only), the Czech Republic is not listed under monitoring, but under “**Evaluation published**”.

Czech Republic (2019). Vyhodnocení plnění Národního akčního plánu adaptace na změnu klimatu. [Evaluation of the implementation of the National Action plan on climate change adaptation]. [https://www.mzp.cz/C1257458002F0DC7/cz/vyhodnoceni_plneni_planu_klima/\\$FILE/OEOK-vyhodnoceni_NAP_AZK-20200221.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/vyhodnoceni_plneni_planu_klima/$FILE/OEOK-vyhodnoceni_NAP_AZK-20200221.pdf)

Information reported by the Czech Republic in 2019 under the EU adaptation reporting directive: http://cdr.eionet.europa.eu/Converters/run_conversion?file=cz/eu/mmr/art15_adaptation/en_vxemjpw/MMR_National_adaptation_actions_-_art15_1.xml&conv=586&source=remote

Cyprus

Cyprus reported in 2019 under the EU adaptation reporting directive: “[The] DOE [Department of Environment] drafted a **progress report** that was sent to the relevant stakeholders and then to the Council of Ministers for adoption. The 1st Annual Report that was adopted by the Council of Ministers on 5th December 2018 includes, inter alia, the following: (...) Activities carried out for the implementation of the NAS and NAP for the period 2017-2018.” Cyprus has therefore been classified as **having published a NAP monitoring report**, but not an evaluation.

Information reported by Cyprus in 2019 under the EU adaptation reporting directive: http://cdr.eionet.europa.eu/Converters/run_conversion?file=cy/eu/mmr/art15_adaptation/en_vxfqwbq/MMR_National_adaptation_actions_-_art15_1.xml&conv=586&source=remote

Ethiopia

A working paper on adaptation M&E for Ethiopia’s NAP has been drafted in 2020 supported by the NAP Global Network, but a final version has not been published as of July 2021. No evidence could be obtained of any further developments. Ethiopia has therefore been classified as being at an **advanced stage** of developing its NAP M&E system.

Federal Democratic Republic of Ethiopia (2020). Technical Working Paper on Monitoring & Evaluation of Ethiopia’s National Adaptation Plan Process. Working draft. Environment, Forest and Climate Change Commission, Climate Change Planning, Implementation and Coordination Directorate.

Fiji

Fiji has published a NAP M&E framework with the stated purpose “to provide guidance to the CCICD on how a system to comprehensively monitor and evaluate the NAP process should be designed” (p.1 of the below document). No evidence could be obtained whether it has been further elaborated or implemented. Fiji has therefore been classified as at an **advanced stage** of developing its NAP M&E system.

Government of the Republic of Fiji (2020). Monitoring and Evaluation Framework for Fiji’s National Adaptation Plan Process. http://fijiclimatechangeportal.gov.fj/sites/default/files/documents/ME-Fiji-NAP-Process_0.pdf

Finland

Finland published an evaluation of its first national adaptation strategy in 2009. The mid-term evaluation of its 2nd NAP states: “A framework for monitoring adaptation was developed in 2015-2017 in broad-based stakeholder cooperation coordinated by Tapio. A set of indicators to support the monitoring of adaptation commissioned by the Ministry of Agriculture and Forestry was

published in 2017. However, so far no headway has been made in the introduction of the indicators and organisation of monitoring at the practical level. (...) the **annual progress reports** referred to in the National Adaptation Plan **were not available**.” (p.38-39 in the first reference below). Finland has therefore been classified as having an **approved M&E system** but **no operational NAP monitoring while having two published evaluations**.

Government of Finland (2020). Implementation of Finland’s National Climate Change Adaptation Plan 2022 – A Mid-term Evaluation. Ministry of Agriculture and Forestry 2009: 9. [Also available in Finnish] <https://julkaisut.valtioneuvosto.fi/handle/10024/162461>

GIZ (2017). Finland: Developing an M&E system for the National Adaptation Plan. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
https://www.adaptationcommunity.net/wp-content/uploads/2017/09/11-giz2017-factsheet-finland_EN.pdf

Government of Finland (2009). Evaluation of the Implementation of Finland’s National Strategy for Adaptation to Climate Change 2009. Ministry of Agriculture and Forestry 4a/2009.
http://mmm.fi/documents/1410837/1721034/Adaptation_Strategy_evaluation.pdf/043c0964-58c5-4fce-8924-cc47748cf766

France

France has published a mid-term and a final evaluation of its 1st NAP as well as a monitoring report and is classified accordingly as having **two evaluation reports and having published a progress report**.

GIZ (2017). France: Monitoring and Evaluation of the French National Adaptation Plan. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
https://www.adaptationcommunity.net/wp-content/uploads/2017/09/giz2017-factsheet-france_EN.pdf

Républic Francaise (2015). Evaluation du plan national d'adaptation au changement climatique. [Evaluation of the national climate change adaptation plan]. Rapport n° 010178-01 établi par, MINISTÈRE DE L'ÉCOLOGIE, DU DÉVELOPPEMENT DURABLE ET DE L'ÉNERGIE.
http://cgedd.documentation.developpement-durable.gouv.fr/documents/cgedd/010178-01_rapport.pdf

Républic Francaise (2013). Évaluation à mi-parcours du Plan national d'adaptation au changement climatique (PNACC). [Mid-term evaluation of the national climate change adaptation plan].
https://www.ecologie.gouv.fr/sites/default/files/ONERC_Rapport_evaluation_mi-parcours_PNACC_VF.pdf

Républic Francaise (2013). Suivi du Plan national d'adaptation au changement climatique (PNACC), État des actions et mesures au 14 juin 2013. [Monitoring of the National Climate Change Adaptation Plan (PNACC), Status of actions and measures as of June 14, 2013]
https://www.ecologie.gouv.fr/sites/default/files/ONERC_PointAvancement_2ans_2013.pdf

Germany

Germany has so far published **two monitoring reports** (2015 and 2019) which are based on climate change impact and response indicators as well as **two progress reports** on the implementation of the national adaptation strategy (published in the same years). In addition, in 2019 the first independent **evaluation report** has been published. Germany has been classified accordingly as having published

NAP progress reports and an evaluation report. Several publications describing the development of the M&E system have also been published.

Gaus, H., Silvestrini, S., Kind, C., & Kaiser, T. (2019). Politikanalyse zur Evaluation der Deutschen Anpassungsstrategie an den Klimawandel (DAS). Evaluationsbericht. Umweltbundesamt. [Policy analysis for the evaluation of the German Strategy for Adaptation on Climate Change. Evaluation Report. German Environment Agency] (only available in German, but another report outlining the underlying evaluation method is available in English – see below).
<https://www.umweltbundesamt.de/publikationen/politikanalyse-zur-evaluation-der-deutschen>

Kind, C., Kaiser, T. & Gaus, H. (2019). Methodology for the evaluation of the German adaptation strategy. Umweltbundesamt [National Environment Agency].
<https://www.umweltbundesamt.de/publikationen/methodology-for-the-evaluation-of-the-german>

Die Bundesregierung [The Federal Government] (2019). Second Progress Report on the German Strategy for Adaptation to Climate Change (DAS).
https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Klimaschutz/klimawandel_das_2_fortschrittsbericht_en_bf.pdf

Umweltbundesamt [National Environment Agency] (2019). 2019 Monitoring Report on the German Strategy for Adaptation to Climate Change
https://www.umweltbundesamt.de/sites/default/files/medien/421/publikationen/das_2019_monitoring_report_bf.pdf

Die Bundesregierung [The Federal Government] (2015). Adaptation to Climate Change. Initial Progress Report by the Federal Government on Germany's Adaptation Strategy
https://www.bmu.de/fileadmin/Daten_BMU/Pool/Broschueren/fortschrittsbericht_anpassung_klimawandel_en_bf.pdf

Umweltbundesamt [National Environment Agency] (2015). Monitoringbericht 2015 zur Deutschen Anpassungsstrategie an den Klimawandel. [Monitoring report 2015 for Germany's adaptation strategy to climate change; only available in German].
https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/monitoring_bericht_2015_zur_deutschen_anpassungsstrategie_an_den_klimawandel.pdf

UBA (2015). Evaluation of the German Strategy for Adaption to Climate Change (DAS) – Reporting and Closing Indicator Gaps. Climate change publication 16/2015.
https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/neuclimathe_change_16_2015_evaluation_of_the_german_strategy_for_adaption_to_climate_change_das.pdf

Schönthaler, K. et al. (2011). Summary in 'Development of an indicator system for the German Adaptation Strategy to Climate Change (DAS)'. German Federal Environment Agency. Available at: <http://www.umweltbundesamt.de/sites/default/files/medien/461/publikationen/4230.pdf>

Schönthaler, K. et al. (2010). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environmental Agency. Available at: <http://www.umweltbundesamt.de/publikationen/establishment-of-an-indicator-concept-for-german>

Grenada

Grenada's NAP includes a list of indicators for each Programme of Action and outlines topics to be covered by NAP progress reports. A workshop to further develop the NAP M&E system has been conducted in July 2019 (a technical report resulting from the workshop is referenced below). No progress report has yet been compiled. Grenada is therefore categorised as remaining at an **advanced stage** of developing its NAP M&E system. The development of Grenada's NAP M&E system is being supported by the NAP Global Network.

Government of Grenada (2020). Developing a Climate Adaptation Monitoring and Evaluation System for Grenada's National Adaptation Plan. Ministry of Climate Resilience, the Environment, Forestry, Fisheries, Disaster Management and Information of Grenada.

<https://climatefinance.gov.gd/embedded-pdf/developing-a-climate-adaptation-monitoring-and-evaluation-system-for-grenadas-national-adaptation-plan/>

Government of Grenada (2017). National Climate Change Adaptation Plan for Grenada, Carriacou and Petite Martinique. <https://www.gov.gd/egov/docs/other/Grenada-National-Adaptation-Plan-2017.pdf>

Indonesia

Indonesia's National Action Plan for Climate Change Adaptation (RAN API) was adopted in 2012. Its Synthesis Report (available in English) mentions M&E only very briefly. However, an Executive Summary of the RAN API published in 2019 states that its actions would be monitored through a National Climate Change Registry System which was ratified by a ministerial regulation and would include, amongst others, the implementation status of activities. It further states that the registry would be accessible through the website of the Ministry of Environment and Forestry, but it could not be located there. No information on any progress reports of the RAN API could be obtained. On 1 April 2021, Indonesia launched a new National Climate Resilience Policy including a detailed M&E framework. Based on the ratification of the National Climate Change Registry System and based on the M&E framework of the Climate Resilience Development Policy, Indonesia is classified as "**NAP M&E system approved**".

Kementerian Perencanaan Pembangunan Nasional/Bappenas [Ministry of National Development Planning/Bappenas] (2021). Pemantauan, Evaluasi, dan Pelaporan Aksi Ketahanan Iklim dalam Kerangka Perencanaan Pembangunan Nasional [Monitoring, Evaluation, and Reporting of Climate Resilience Actions in the National Development Planning Framework]. https://lcdi-indonesia.id/wp-content/uploads/2021/04/Buku-5_Pemantauan-Evaluasi-dan-Pelaporan.pdf

Ministry of National Development Planning/National Development Planning Agency (Bappenas) (2019). National Adaptation Plan Executive Summary. <http://lcdi-indonesia.id/wp-content/uploads/2020/05/Executive-Summary-NAP.pdf>

Ministry of National Development Planning/National Development Planning Agency (Bappenas) (2012). National Action Plan for Climate Change Adaptation (RAN API). Synthesis Report. https://www.bappenas.go.id/files/2913/4985/2794/national-action-plan-for-climate-change-adaptation-ran-api-synthesis-report_20121226163242_0.pdf

Ireland

A study on possible indicators to monitor the implementation of Ireland's National Adaptation Framework has been published but no regular progress reports have been published as yet. However, Ireland's Climate Action and Low Carbon Development Act 2015 has created an independent Climate Change Advisory Council and "a key task of the Council is to conduct an annual review of progress made" (p.1, 2020 report). The Council serves an evaluative function and has been publishing annual reports since 2017, but their primary focus has been on mitigation with only

limited coverage of adaptation. Nevertheless, its annual reports have included recommendations on adaptation policy. In the absence of detailed monitoring reports and in the presence of independent oversight reports, Ireland has been classified as being at an **advanced stage of developing its NAP monitoring system and as having published NAP evaluations**.

Environment Protection Agency (2021). Policy Coherence in Adaptation Studies: Selecting and Using Indicators of Climate Resilience (2018-CCRP-DS.16). EPA Research Report No.379.

Climate Change Advisory Council (2020). Annual Review 2020.

https://www.climatecouncil.ie/media/climatechangeadvisorycouncil/contentassets/publications/CCAC_AnnualReview2020FINAL.pdf

Climate Change Advisory Council (2019). Annual Review 2019.

<https://www.climatecouncil.ie/media/climatechangeadvisorycouncil/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf>

Japan

According to a presentation given by the Ministry of the Environment of Japan at the Adaptation Committee expert workshop in 2018, monitoring reports of NAP implementation have been published in 2017 and 2018. Accordingly, Japan has been classified as **reporting on its NAP progress**.

Michihiro Oi (2018). NAP Status in Japan. Presentation given at the Adaptation Committee expert workshop in Tokyo, Japan, on 24 July 2018.

https://unfccc.int/sites/default/files/resource/2_Japan_July%202018_MOEJ%20Adaptation%20Overview%20REV.pdf

Jordan

A workshop on the development of a NAP M&E system has been conducted for government officials in April 2018 by GIZ as part of its NAP support on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). No further information could be obtained on whether the M&E system has been further advanced. Jordan has therefore been classified as being at an **early stage** of developing its NAP M&E system.

Kenya

In 2020, Kenya completed the first implementation progress report of its National Climate Change Action Plan 2018-2022. Accordingly, Kenya is classified as having a **NAP monitoring report in place**.

Government of Kenya (2020). National Climate Change Action Plan 2018-2022. Implementation Status Report, Financial Year 2018/2019. Ministry of Environment and Forestry.

Mutimba, S., Simiyu, S.W., Lelekoiten, T.L., Ospina, A.V., & Murphy, D. (2019). sNAPshot: Kenya's Monitoring and Evaluation of Adaptation: Simplified, integrated, multilevel. Country Brief 5B, NAP Global Network. <http://napglobalnetwork.org/resource/snapshot-kenyas-monitoring-and-evaluation-of-adaptation-simplified-integrated-multilevel/>

Kiribati

Kiribati published a **progress report** of its NAP implementation in 2020 and is classified accordingly.

Government of Kiribati. (2020). Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (KJIP). 2014-2018 Implementation Progress Report. Office of Te Beretitenti and NAP Global Network / International Institute for Sustainable Development (IISD).

Government of Kiribati. (2020). KJIP Monitoring and Evaluation Framework. Government of Kiribati and NAP Global Network / International Institute for Sustainable Development (IISD).

Lithuania

An action plan for Lithuania's National Climate Change Policy from 2012 was published in 2013. The action plan contains specific objectives for adaptation together with indicators and quantitative targets. Lithuania reported in 2019 under the EU adaptation reporting directive: "State and municipal institutions provide the Ministry of Environment with the information about the progress by submitting annual activity reports. (...) Every two years, the Government of the Republic of Lithuania prepares a report on the implementation of the Strategy to the Parliament of the Republic of Lithuania." Lithuania has therefore been classified as having an **operational NAP monitoring system, but not an evaluation**.

Information reported by Lithuania in 2019 under the EU adaptation reporting directive:

http://cdr.eionet.europa.eu/lt/eu/mmr/art15_adaptation/envxio9mg/Lithuania_report.pdf/manage_document

Government of the Republic of Lithuania (2013). DĖL NACIONALINĖS KLIMATO KAITOS VALDYMO POLITIKOS STRATEGIJOS 2013–2020 metų TIKSLŲ IR UŽDAVINIŲ ĮGYVENDINIMO TARPINSTITUCINIO VEIKLOS PLANO PATVIRTINIMO. [National Climate Change Policy Strategy 2013 - 2020. TARGETS AND IMPLEMENTATION OF THE INTERINSTITUTIONAL OPERATIONS PLAN]. <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.447537>

Mexico

Mexico adopted two "Special Programmes on Climate Change", one for the period 2009-2012 and one for the period 2014-2018. Evaluations of both have been published and annual progress reports of the second programme have also been published for the years 2014, 2015 and 2016 (the one from 2016 is referenced below). Mexico is therefore classified as having an operational monitoring system and as having published relevant evaluations. However, no information could be obtained regarding any further progress monitoring after 2017.

INECC (2017). Evaluación Estratégica del Programa Especial de Cambio Climático 2014-2018

[Strategic Evaluation of the Special Program of Climate Change 2014-2018].

https://www.gob.mx/cms/uploads/attachment/file/261388/Informe_evaluacion_PECC_final_limpio_1.pdf

Government of Mexico (2017). Programa Especial de Cambio Climático 2014-2018 – Logros 2016.

[Special Programme on Climate Change 2014-2018. Achievements 2016].

https://www.gob.mx/cms/uploads/attachment/file/314952/Logros_PECC_2016.pdf

GIZ (2012). Evaluación del Programa Especial de Cambio Climático. [Evaluation of the Special

Programme on Climate Change]. Deutsche Gesellschaft für Internationale Zusammenarbeit

(GIZ) GmbH. https://imco.org.mx/wp-content/uploads/2013/2/studie_2_pecc_web_ok4.pdf

Moldova

Moldova has advanced in developing the M&E system of its NAP but the system is not operational yet as of July 2021. It is intended to be further developed through an approved GCF NAP readiness support project. Based on the case study from the 2017 Adaptation Gap Report (see below), Moldova has been classified as being at an **advanced stage** of developing its NAP M&E system.

Country case study provided by Ala Druta in:

Leiter, T., Buitrago, M.F., Druta, A., Guiterrez, J.E., Harley, M., Makholela, T., Ponlok, T., Ramarou, T., Vargas, C.R., & Wallin, E. (2017). Country-specific assessments of adaptation progress. In: UNEP: *The Adaptation Gap Report 2017: Towards Global Assessment* (pp. 23-33). United Nations Environment Programme (UNEP), Nairobi, Kenya.

Mongolia

As part of climate policy support to the Mongolian government by GIZ on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), a guidance document on adaptation M&E was developed in 2013. However, no information could be obtained whether further actions towards developing a national adaptation M&E system have been undertaken and Mongolia is also not listed in this regard in UNFCCC (2020b). It has therefore been classified as “**NAP M&E development stalled before 2015**”.

GIZ (2013). Guidance for Integrating Monitoring and Evaluation of Climate Change Adaptation into Strategies in Mongolia. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Morocco

Monitoring of adaptation in priority sectors has been integrated into regional environmental monitoring systems of several regions in Morocco. Studies to harmonise the regional systems to inform a national adaptation monitoring system have been carried out supported by GIZ on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). No information about further advancements of a national adaptation M&E system could be obtained. Morocco has therefore been classified as being at an **advanced stage**.

GIZ (2017). Morocco: Adaptation monitoring and evaluation as part of the Regional Information Systems. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
<https://www.adaptationcommunity.net/wp-content/uploads/2017/11/05-giz2017-en-factsheet-morocco.pdf>

Mozambique

A framework for a national adaptation M&E system was published in 2014 but is not yet in operation and is meant to be refined according to provisions of the Paris Agreement and its Rulebook. Mozambique has therefore been classified as being at an **advanced but not yet at an approved stage** of its national adaptation M&E system.

Republic of Mozambique (2014). National Climate Change Monitoring and Evaluation System (SNMAMC). National Council for Sustainable Development.

IIED (2014). Tracking Adaptation and Measuring Development in Mozambique.
<https://pubs.iied.org/sites/default/files/pdfs/migrate/10102IIED.pdf>

Nauru

The M&E section in Nauru’s Framework for Climate Change Adaptation and Disaster Risk Reduction from 2015 lays out a lean M&E framework including specifying responsibilities and provisions for monitoring and evaluation. No further information on M&E activities or tracking of the Framework’s implementation could be obtained. Given Nauru’s circumstances, the clear and concise provisions in the document are deemed sufficient to classify Nauru as being at an **advanced stage**.

Government of the Republic of Nauru (2015). *Framework for Climate Change Adaptation and Disaster Risk Reduction (RONAdapt)*.
https://reliefweb.int/sites/reliefweb.int/files/resources/NRU_2015_RONAdapt_Framework.pdf

Netherlands

Netherlands' first National Adaptation Strategy was adopted in 2007 and its second one in 2016. A draft monitoring strategy was published in 2015 but no evidence could be obtained for its actual application. Likewise, no information about a possible evaluation of the first adaptation strategy could be found. However, an implementation programme under the second adaptation strategy was adopted for the period 2018-2019 and an evaluation of that programme was published in 2020. Furthermore, a sizable part of Netherlands' adaptation response is implemented through the Delta Programme for which an M&E framework has been proposed in 2016. According to the government's adaptation knowledge portal, "The Delta Programme annually monitors and assesses how the Delta Decisions, Preferential Strategies, and Delta Plans have been elaborated and implemented up to that point. The Delta Plan on Spatial Adaptation is also [monitored](https://klimaatadaptatienederland.nl/en/policy-programmes/) annually." (<https://klimaatadaptatienederland.nl/en/policy-programmes/>). Further details are provided on the same website (<https://klimaatadaptatienederland.nl/en/policy-programmes/monitoring-evaluation/>). Accordingly, the Netherlands has been classified as having **an operational monitoring system** (while limited to the Delta Programme, it accounts for a majority of the topics in the adaptation strategy) and as having **published an evaluation**.

Programmateam NAS (2020). Nationaal perspectief klimaatadaptatie. Groeiende opgave in een snel veranderende omgeving. Rapportage NAS 2017 – 2019 [National perspective on climate adaptation. A growing task in a rapidly changing environment. Report NAS 2017 – 2019]. https://klimaatadaptatienederland.nl/publish/pages/125102/nationaal_perspectief_klimaatadaptatie.pdf

PBL (2016). Keeping track of adaptation in the Dutch Delta Design of a reflexive monitoring and evaluation framework for the Delta Programme. <https://www.pbl.nl/sites/default/files/downloads/pbl-2016-keeping-track-of-adaptation-in-the-dutch-delta-2557.pdf>

PBL (2015). ONTWERP VOOR EEN NATIONALE ADAPTATIEMONITOR. Een monitoring- en evaluatieraamwerk voor de Nationale Adaptatie Strategie. Beleidsstudie. [Draft for a national adaptation monitor. A framework for Monitoring and evaluation of the national adaptation strategy. Background paper] www.pbl.nl/sites/default/files/cms/publicaties/PBL-2015-Ontwerp-voor-een-nationale-adaptatiemonitor-1640.pdf

Nepal

An inventory of existing national M&E systems with potential relevance for adaptation has been compiled in 2013 and Nepal has been included in a study of national adaptation M&E systems by GIZ (Hammill et al., 2014; the factsheet stated below [GIZ, 2014] is a part of this study). Nepal is listed in UNFCCC (2020b) as developing a national adaptation M&E system but independent evidence to verify this status since 2014 could not be obtained. Nepal's new Climate Change Policy from 2020 likewise only includes a statement of intent about M&E and proposes the development of a new Transparency and Accountability Framework. Hence, the previous development of a national adaptation M&E system does not seem to have been finalised. Nepal has therefore been categorised as **"NAP M&E development stalled before 2015"**.

GIZ (2014). Nepal: Results based monitoring for climate adaptation. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. https://www.adaptationcommunity.net/?wpfb_dl=227

Fisher, S., & Slaney, M. (2013). The monitoring and evaluation of climate change adaptation in Nepal: a review of national systems. International Institute for Environment and Development (IIED) and Practical Action.

Norway

Norway has started the monitoring of its adaptation progress around knowledge and exchange platforms and events that bring together government and non-government stakeholders from the national to the local level with a focus on learning (see GIZ, 2014). In 2017, a National Climate Change Law has been adopted which includes annual reporting requirements including on adaptation. Reporting is conducted by the responsible Ministry as part of its annual report of achievements. Accordingly, Norway has been classified as **publishing information on NAP implementation**.

Report to Parliament by the Ministry of Climate and Environment for the budget year 2019:

<https://www.regjeringen.no/no/dokumenter/prop.-1-s-20182019/id2613447/>

GIZ (2014). Norway: Learning by doing for measuring progress in adaptation. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

https://www.adaptationcommunity.net/?wpfb_dl=228

Paraguay

Section “7.4 Monitoreo, evaluación y actualización del Plan Nacional de Adaptación al Cambio Climático” of Paraguay’s NAP defines a specific indicator to be used in future evaluations, namely “Cumplimiento de las acciones establecidas en el cronograma de ejecución del PNACC” [Compliance with the actions established in the PNACC execution schedule]. Therefore, and despite otherwise containing mainly statements of intent about future M&E, Paraguay has been classified as being at an **early stage**. Paraguay is also listed by UNFCCC (2020b) as developing an adaptation M&E system. No further information could be obtained whether the M&E system has been developed.

Government of Paraguay (2017). Plan Nacional de Adaptación al Cambio Climático. [National Plan on Adaptation to Climate Change]

Peru

Peru is currently piloting its national adaptation M&E system (information from the NAP Global Network). Since it is not yet fully operational, Peru has been classified as being at an **advanced but not yet an operational stage** of its NAP M&E system. This classification is confirmed by Peru’s NAP adopted in June 2021 which states that the mechanism for evaluation is still being developed. The development of the adaptation M&E system has been supported by the NAP Global Network.

Gobierno del Perú [Government of Peru] (2020). Plan Nacional de Adaptación al Cambio Climático del Perú: un insumo para la actualización de la Estrategia Nacional ante el Cambio Climático. [National Plan for Adaptation to Climate Change of Peru: an input for updating the National Strategy on Climate Change]

Philippines

The Philippine National Climate Change Action Plan (NCCAP) 2011-2028 contains seven strategic priorities and a draft results chain for each. In 2017, the Climate Change Commission published revised results chains including objectives, outcomes, outputs and indicators. While evidence of the initially intended annual monitoring could not be obtained, a **comprehensive M&E report for the period 2011-2019** has been prepared and its Executive Summary was published in 2019. On this basis, the Philippines have been classified as having an **approved design for its adaptation monitoring and a published evaluation**. The development of the NCCAP M&E system and of its evaluation has been supported by GIZ on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).

Climate Change Commission (2019). The Philippine National Climate Change Action Plan. Monitoring & Evaluation Report, 2011-2016. Executive Brief.

<https://climate.gov.ph/public/ckfinder/userfiles/files/Knowledge/The%20Philippine%20NCCAP%20M%26E%20Executive%20Brief%20%5Bv2%5D.pdf>

GIZ (2017). The Philippines: National Climate Change Action Plan Results-Based Monitoring and Evaluation System. <https://www.adaptationcommunity.net/wp-content/uploads/2018/04/Adaptation-ME-factsheet-Philippines-GIZ-2017.pdf>

Climate Change Commission (2016). National Climate Change Action Plan 2011-2018. Results-based Monitoring & Evaluation System.

Poland

The brief M&E section of Poland's National Adaptation Strategy from 2013 includes a table with indicators and target values. No information could be obtained whether the indicators have been used and whether M&E (including the proposed mid-term evaluation in 2015) has been carried out. Poland's reporting in 2019 under the EU adaptation reporting directive includes the sentence "The NAS is used as framework guidance to help support monitoring indicators and assessment of the implementing actions at the national, regional and local levels" but does not contain any further information about how this would be done. Poland's most recent National Communication from 2017 mentions support from a working group on adaptation for monitoring and reporting of adaptation measures at regional and local levels, but no evidence of any dedicated M&E efforts regarding the NAP are provided. In the absence of any relevant information including in the 2019 submission under the EU adaptation monitoring regulation and in the 2017 National Communication, Poland has been categorised as "**NAP M&E development stalled before 2015**".

Republic of Poland (2013). Polish National Strategy for Adaptation to Climate Change (NAS 2020). https://klimada.mos.gov.pl/wp-content/uploads/2014/12/ENG_SPA2020_final.pdf

Portugal

Portugal has published **two progress reports** for the periods 2015-16 and 2017-18, respectively. Accordingly, it has been classified as **reporting on the implementation of its NAP**.

Portuguese Environment Agency (2016). Relatório Intercalar #1. [Interim Report #1]. https://www.apambiente.pt/_zdata/Alteracoes_Climaticas/Adaptacao/RelatIntercalar1ENAAAC2020/RelatorioIntercalarFinal.pdf

Portuguese Environment Agency (2019). Relatório Intercalar #2. [Interim Report #2]. https://www.apambiente.pt/_zdata/Alteracoes_Climaticas/Adaptacao/RelatorioIntercalar2/ENAAAC_Relatorio%20Intercalar_2017-18_final.pdf

Rwanda

Rwanda's NDC from 2021 includes a list of proposed indicators to monitor adaptation at national level. It has therefore been classified as being at an **advanced stage** of developing a national adaptation M&E system.

Republic of Rwanda (2021). Updated Nationally Determined Contribution. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Rwanda%20First/Rwanda_Updated_NDC_May_2020.pdf

Senegal

A stocktake of relevant sectoral M&E systems for the three sectors agriculture, coastal zones, and water resources has been conducted and recommendations developed for the NAP M&E system. In addition, a draft logical framework and indicators based on the NDC have been developed and reviewed by line ministries. This information has been provided by GIZ which is supporting the

development of the NAP M&E system on behalf of the German Federal Ministry of the Environment (BMU) together with the Agence Française de Développement (AFD). Based on its current status, Senegal's NAP M&E system has been classified as being at an **advanced stage**.

Spain

Four monitoring reports of Spain's NAP have been carried out (2008, 2011, 2013 and 2018) and an **evaluation report** has been published in 2019.

Government of Spain (2019). INFORME DE EVALUACIÓN DEL PLAN NACIONAL DE ADAPTACIÓN AL CAMBIO CLIMÁTICO. [Report on the Evaluation of the National Climate Change Adaptation Plan]: https://www.miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/informeevaluacion_pnacc_tcm30-499212.pdf

Government of Spain (2018). Informe de seguimiento [4th Follow-up Report]. Ministerio Para La Transición Ecológica. https://www.miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/informeevaluacion_pnacc_tcm30-499212.pdf

Slovakia

Slovakia reported in 2019 under the EU adaptation monitoring regulation: "In May 2016 the Government adopted a **progress report** – Information on the progress made in implementing adaptation measures in the Slovak Republic, which analyses the national adaptation process in Slovakia between April 2014 and April 2016. (...). The report deals mainly with qualitative characteristics of the adaptation efforts in the Slovak Republic and has the following structure: information on NAS, priority areas, monitoring of the environment, adaptation in the area of health, adaptation at local level, conclusion. It is showcasing that adaptation concerns were mainstreamed into several sectoral strategies and plans (...)." Slovakia has therefore been classified as having an **operational NAP monitoring system, but not an evaluation**.

Information reported by Slovakia in 2019 under the EU adaptation reporting directive:

http://cdr.eionet.europa.eu/Converters/run_conversion?file=sk/eu/mmr/art15_adaptation/en_vxiirhg/MMR_National_adaptation_actions_-_art15_1.xml&conv=586&source=remote

South Africa

South Africa reported on its climate actions including adaptation in 2016 and 2017 and has recently established new online portals as part of the National Climate Change Information System. Based on the two reports and on the online portal, South Africa has been classified as having an **operational adaptation progress monitoring** in place. However, in 2020 a new NAP has been adopted and states that the M&E system will be further developed.

An online portal with information on adaptation progress monitoring

(<https://ccis.environment.gov.za/nccrd/#/>) and a National Climate Change Response Database (<https://ccis.environment.gov.za/nccrd/#/>) have been established.

Republic of South Africa (2017). South Africa's Second Annual Climate Change Report. Department of Environmental Affairs (DEA). https://www.environment.gov.za/sites/default/files/reports/southafrica_secondnational_climatechange_report2017.pdf

Republic of South Africa (2016). South Africa's First Annual Climate Change Report. Theme E: Monitoring the Adaptation Landscape in South Africa: Desired Adaptation Outcomes, Adaptation Projects and the Intended Nationally Determined Contribution. Department of Environmental Affairs (DEA).

https://www.environment.gov.za/sites/default/files/reports/themeE_adaptation_landscape.pdf

Country case study provided by Tsepang Makholela and Tlou Ramarou in:

Leiter, T., Buitrago, M.F., Druta, A., Guiterrez, J.E., Harley, M., Makholela, T., Ponlok, T., Ramarou, T., Vargas, C.R., & Wallin, E. (2017). Country-specific assessments of adaptation progress. In: UNEP: *The Adaptation Gap Report 2017: Towards Global Assessment* (pp. 23-33). United Nations Environment Programme (UNEP), Nairobi, Kenya.

South Korea

South Korea has undertaken an evaluation of its first NAP. A mid-term evaluation of its second NAP has been proposed for 2018 according to the M&E section of its 2nd NAP which also mentions the development of planning and performance indicators and of progress reviews. In addition, the 2nd NAP also includes a review of the main achievements of the 1st NAP. While all documents appear to be only available in Korean and their identification and translation via online translation portals has been more difficult than for other languages, the obtained information (including exchange with colleagues from the Korea Environment Institute) have led to classifying South Korea as having an **operational NAP progress monitoring** and having **published at least one NAP evaluation**.

제2차 국가 기후변화 적응대책 | 2016-2020 | [Government of Korea (2015). The 2nd National Climate Change Adaptation Plan 2016-2020].

Sri Lanka

The M&E section in Sri Lanka's NAP describes the institutional arrangements and timing of monitoring and states that progress monitoring should be done in relation to the detailed list of actions that the NAP contains. No further information could be obtained whether the M&E system has been further developed or is operational. It has therefore been classified as being at an **early stage**. Sri Lanka is also listed by UNFCCC (2020b) as developing an adaptation M&E system.

Ministry of Mahaweli Development and Environment (2016). National adaptation plan for climate change impacts in Sri Lanka 2016-2025.

<http://www4.unfccc.int/nap/Documents%20NAP/National%20Reports/National%20Adaptation%20Plan%20of%20Sri%20Lanka.pdf>

St. Lucia

St. Lucia has published an **M&E plan** for its NAP which contains institutional arrangements, indicators and provisions for the NAP performance report. However, no evidence of the publication of a performance report could be obtained. St. Lucia has therefore been classified as having an **approved NAP M&E system**. The development of the M&E plan has been supported by the Government of Japan through the United Nations Development Programme's Japan-Caribbean Climate Change Partnership (UNDP J-CCCP).

Government of St. Lucia (2018). *Monitoring and Evaluation Plan of Saint Lucia's National Adaptation Planning Process*. Department of Sustainable Development, St. Lucia. Available at:

<https://climatechange.govt.lc/wp-content/uploads/2018/07/SLU-NAP-ME-May-2018.pdf>

St. Vincent and the Grenadines

The NAP contains a detailed M&E section that outlines considerations and institutional arrangements for the development of its M&E system building, amongst others, on the supplementary materials on M&E to the NAP Technical Guidelines (Price-Kelly et al., 2015 – please see reference list). The NAP also includes a table of a simplified M&E framework and contains "*Strategic Adaptation Action 6. Definition and operationalisation of an overarching M&E framework*". No evidence could be obtained

whether the NAP M&E system has been finalised. St. Vincent and the Grenadines' NAP M&E system has therefore been classified as being at an **advanced stage** of development.

St. Vincent and the Grenadines (2019). National Adaptation Plan for St. Vincent and the Grenadines. https://www4.unfccc.int/sites/NAPC/Documents/Parties/FINAL%20NAP_SVG_Approved.pdf

Suriname

Suriname's NAP includes only a brief M&E section but outputs and key performance indicators are defined for its five overarching objectives. It has therefore been classified as being at an **advanced stage** of developing the NAP M&E system.

Suriname (2019). Suriname National Adaptation Plan (NAP). https://www4.unfccc.int/sites/NAPC/Documents/Parties/Suriname%20Final%20NAP_apr%202020.pdf

Switzerland

Switzerland has adopted an adaptation action plan for the period 2014-2019 and one for the period 2020-2025. The second one contains a chapter summarising the implementation progress of the first one. In addition, separate progress implementation reports ("controlling reports") have been published and in impact evaluation of the first action plan has been conducted. Accordingly, Switzerland has been classified as having an **operational NAP progress monitoring** and having **published a NAP evaluation**.

Bundesamt für Umwelt (2017): Controlling-Bericht zur Strategie Anpassung an den Klimawandel und zum Bericht «Umgang mit lokaler Wasserknappheit in der Schweiz», 1 Dezember 2017. [Controlling report of the climate change adaptation strategy and of the report "Dealing with local water scarcity in Switzerland", 1 December 2017]. https://www.bafu.admin.ch/dam/bafu/de/dokumente/klima/rechtliche-grundlagen/controlling-bericht-strategie-anpassung-klimawandel.pdf.download.pdf/Beilage_04_Controlling-Bericht_DE_zu_BRA_UVEK.pdf

Landis, F.; Hertig, V.; Haefeli, U.; Balthasar, A.; Raible, C. (2017). Schlussbericht Evaluation der Strategie zur Anpassung an den Klimawandel: Modul A. [Final report of the evaluation of the strategy to adaptation to climate change: Module A]. Interface Politikstudien Forschung Beratung und Oeschger Centre for Climate Change Research, Luzern/Bern. Studie im Auftrag des Bundesamts für Umwelt (BAFU). [Study on behalf of the Federal Agency for the Environment].

Tanzania

A national M&E framework for adaptation has been published in 2012 and is being mentioned in Tanzania's most recent National Climate Change Response Strategy 2021-2026. However, the framework is very generic (e.g. explaining what an evaluation is and containing a generic log frame table) and would require further elaboration to be used. The new strategy includes statements of intent for the development of an M&E system and for carrying out a mid-term evaluation. Since statements of intent are not sufficient to meet the category of an early stage and since the 2012 framework is very basic and would itself require further elaboration, in accordance with the criteria used in this study, Tanzania is classified as "**development of an adaptation M&E system stalled before 2015**". This classification corresponds to the information contained in UNFCCC (2020b).

United Republic of Tanzania (2021). National Climate Change Response Strategy (2021-2026). Vice President's Office, Division of Environment.

United Republic of Tanzania (2012). Monitoring and Evaluation Framework for Climate Change Adaptation in Tanzania. Vice President's Office, November 2012.

Thailand

Thailand has developed resilience indicators for six sectors covered by its NAP but the M&E system has not yet been finalised and reporting has not yet started. Thailand has therefore been classified as being at an **advanced stage** of developing its NAP M&E system. The process has been supported by GIZ on behalf of the German Federal Ministry for the Environment (BMU).

GIZ (2021). Thailand's National Adaptation Plan. Factsheet. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. https://www.thai-german-cooperation.info/wp-content/uploads/2021/06/15-GIZ-FACTSHEET-15NAPeng_final.pdf

Tonga

Tonga's Joint National Action Plan 2 on Climate Change Adaptation and Disaster Risk Management 2018-2028 includes a detailed results framework with objectives and indicators. The plan's brief M&E section states that "a comprehensive monitoring and evaluation plan for the JNAP 2 will be developed" (p. 48 of the below reference). On the basis of the proposed results framework, Tonga's NAP M&E system is classified as being at an **advanced stage** of development.

Government of Tonga (2018). Joint National Action Plan 2 on Climate Change Adaptation and Disaster Risk Management 2018-2028.

Togo

The M&E section of Togo's NAP outlines objectives for M&E, defines institutional arrangements and proposes process indicators. Based on the available information, it has been classified as being at an **advanced stage**. No information could be obtained whether the NAP M&E system has been further developed. The development of Togo's NAP document including its M&E provisions has been supported by GIZ on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).

Togo (2015). Plan National d'Adaption aux Changements Climatiques du Togo (PNACC). [National Plan for Adaptation to Climate Change in Togo]. <https://www4.unfccc.int/sites/NAPC/Documents%20NAP/Togo%20NAP.pdf>

Tunisia

In 2013, the Tunisian Observatory for Environment and Sustainable Development (OTEDD) launched an initiative to set up a national climate change adaptation M&E system. However, no information could be obtained whether further actions towards developing this system have been undertaken. Tunisia is also not listed in this regard in UNFCCC (2020b). It has therefore been classified as "**NAP M&E development stalled before 2015**".

Turkey

Turkey's National Climate Change Adaptation Strategy and Action Plan from 2011 includes a detailed results framework with objectives, outputs and performance indicators. Separately, Turkey's Seventh National Communication (2018) states:

"A network-based monitoring and evaluation system has been established to monitor the issues included in the Climate Change Action Plan (IDEP) [another document mainly focusing on mitigation but also including adaptation]. It was decided to monitor the plan 8 months after it was shared with the public. (...) Following the decision, data were started to be entered into the network-based monitoring system created since 2013 for monitoring 541 actions defined in the IDEP. The developments regarding the realization of the actions are

followed in the system where 330 users from responsible institutions/organizations enter data (Ministry of Environment and Urbanization-b, 2016).”

The reference “Ministry of Environment and Urbanization-b, 2016” is Turkey’s 2016 State of the Environment report which does not contain any further information. It remains unclear whether the data from the monitoring system has been published. Furthermore, Turkey’s most recent State of the Environment report from 2020 does not mention the monitoring system anymore. Turkey’s NAP M&E system is therefore classified as being at the stage of an **approved design rather than at an operational stage** of published monitoring information.

Turkey (2018). Seventh National Communication of Turkey to the UNFCCC.

https://unfccc.int/sites/default/files/resource/14936285_Turkey-NC7-2-Seventh%20National%20Communication%20of%20Turkey.pdf

Uganda

Uganda’s National Climate Change Policy from 2015 mentions an M&E framework that “provides a basis to later develop specific performance indicators and targets” (p.48-49). No information could be obtained whether this has been done and Uganda is also not listed in UNFCCC (2020b) as developing a national adaptation M&E system. Uganda has therefore been classified as being at an **early stage**.

Republic of Uganda (2015). Uganda National Climate Change Policy. Ministry of Water and the Environment.

United Kingdom

The UK has an independent Committee on Climate Change whose Adaptation Sub-Committee is preparing biennial progress reports to Parliament to which the government has the statutory duty to respond based on the Climate Change Act from 2008. The progress reports are not just monitoring implementation progress but also provide policy recommendations. Based on the type of content, its level of detail and frequency (biennially) as well as the institutional arrangement, the reporting has been classified as **equivalent to both ongoing monitoring and evaluation**. The two most recent reports are:

Committee on Climate Change (2021). Progress in adapting to climate change.

<https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-adapting-to-climate-change-2021-Report-to-Parliament.pdf>

Committee on Climate Change (2019). Progress in preparing for climate change – 2019 Progress Report to Parliament.

<https://www.theccc.org.uk/publication/progress-in-preparing-for-climate-change-2019-progress-report-to-parliament>

All progress reports can be obtained on the website of the Climate Change Commission:

<https://www.theccc.org.uk/publicationtype/0-report/02-progress-reports/>

Vietnam

A presentation given by representatives from Vietnam at the Annual Retreat of the Partnership on Transparency in the Paris Agreement (PATPA) in 2017 suggests that Vietnam is in the process of developing a national adaptation M&E system including having conducted stakeholder consultations. No further information could be obtained. While Vietnam is not listed in UNFCCC (2020b) as developing a NAP M&E system, based on the presentation from 2017 it was classified as being at an **advanced stage**.

Truc, T. et al. (2017). Transparency for Adaptation: Domestic M&E Systems Process and Indicators. Presentation given at the Annual Partnership Retreat of the Partnership on Transparency in the Paris Agreement (PATPA). <https://www.transparency-partnership.net/media/1326>

Appendix B: Results of the triangulation.

a) Comparison of the list of countries in the 2020 NAP progress report (UNFCCC, 2020b) with those identified through the systematic review (Appendix A)

Table 5 compares the list of countries indicated by the 2020 NAP progress report (UNFCCC, 2020b) as being involved in NAP M&E development or reporting with countries for which evidence could be found through the systematic review. The comparison shows that:

- Key informants directly connected to the respective NAP processes confirmed that four countries reported by the NAP progress report as being at the “monitoring” stage have not yet monitored their NAP implementation (Colombia, Ethiopia, Grenada, Republic of Moldova).
- The NAPs (in case of Angola: its NDC) of three countries (Angola, Guatemala, and Paraguay) mention intentions of M&E, but no evidence for the development or application of NAP M&E could be found.
- China’s and Sudan’s NAP do not contain information on M&E and no further information could be obtained.
- Uruguay currently does not have a NAP but sectoral adaptation plans which are not covered by the scope of this study.
- No information about adaptation policy in Congo could be obtained.
- Hence, it is possible that a small number of countries may be missing (that is, be underreported) in this study, but it is unlikely to be more than two of those aforementioned (most likely China and Guatemala)

b) Comparison of the list of countries in the 2020 Adaptation Gap Report with those identified through the systematic review (Appendix A)

Chapter 3 of the 2020 Adaptation Gap Report (Möhner et al., 2021) examines country submissions to UNFCCC (NAPs, NDCs and National Communications) according to five criteria, one of which is M&E. Under the latter, it reports the number of countries for three specifications:

1. “M&E system in place” (65 countries),
2. “monitoring undertaken” (67 countries), and
3. “evaluation planned/undertaken” (60 countries)

(See Figure 3.3 of the report).

The third one is not comparable with the present study because it does not distinguish between planned and conducted evaluations. Since most NAPs and some NDCs contain statements of intent regarding M&E, it is not surprising that a far larger number of countries was found than through the evidence-based stocktake. Analysis of the country list (which is not included in the report but was kindly shared by the authors) confirmed that requiring evidence rather than counting statements of intent accounts for most of the difference. A small number of new countries was identified that were added to the stocktake, including Rwanda and Turkey (based on their NDC and National Communication, respectively).

Table 5: Comparison of the list of countries in the 2020 NAP progress report with those identified through the systematic review

Category in UNFCCC (2020b)	List of countries	Confirmed by the inventory in Appendix A	Reason for not confirming countries as being in the respective category
“Designing and applying a monitoring and evaluation framework or system for NAPs”	(22 countries) Angola, Burkina Faso, Brazil, Cambodia, Chile, China, Congo, Colombia, Grenada, Guatemala, Kenya, Kiribati, Mozambique, Nepal, Paraguay, Philippines, Saint Lucia, South Africa, Sri Lanka, Sudan, Suriname, Uruguay	(15 countries) Burkina Faso, Brazil, Cambodia, Chile, Colombia, Grenada, Kenya, Kiribati, Mozambique, Nepal, Philippines, Saint Lucia, South Africa, Sri Lanka, Suriname	Guatemala and Paraguay have a NAP with an M&E section and Angola is mentioning in its NDC an intent to monitor adaptation actions, but no information could be obtained whether the stated intentions have been implemented. Sudan’s NAP does not provide any information on M&E, just mentioning it as a gap for further work. Uruguay currently does not have a NAP but sectoral adaptation plans which are not covered by the scope of this study. <u>No information about NAP M&E could be obtained for:</u> China and Congo.
“Monitoring and periodically reviewing the process”	(11) Burkina Faso, Brazil, Chile, Colombia, Ethiopia, Guatemala, Grenada, Paraguay, Republic of Moldova, Sudan, Uruguay	(3) Burkina Faso (as of 2021 only), Brazil, Chile	<u>Key informants directly connected to the respective NAP processes confirmed that the following countries are not reporting on NAP implementation yet (as of July 2021):</u> Colombia, Ethiopia, Grenada, Republic of Moldova. <u>No evidence of NAP monitoring and reporting could be found for:</u> Guatemala, Paraguay, Uruguay and Sudan, but NAP monitoring cannot be ruled out since no key informants were available for these countries.

Appendix C: Adjusted 2017 baseline of national adaptation M&E systems

Table 6 shows the baseline underlying the 2017 data in Table 4. To enable comparability, the figures from the Adaptation Gap Report 2017 (Chapter 4; Leiter et al., 2017) were adjusted to the larger number of stages used in this article (see 4.1) and updated based on what the information in the inventory of NAP M&E systems (Appendix A) reveals about the situation in 2017. For two countries initially included in the 2017 baseline, no evidence of NAP M&E development could be found (Argentina and Costa Rica). Both have therefore been omitted from the baseline.

Table 6: Adjusted baseline of NAP M&E systems in 2017.

Development stage	#	Country
Early stage	7	Cameroon, Chile, Cook Islands, Paraguay, Sri Lanka, Thailand, Uganda
Process stalled since 2015	6	Australia, Mongolia, Nepal, Poland, Tanzania, Tunisia
Advanced stage	14	Burkina Faso, Cambodia, Cameroon, Colombia, Grenada, Kenya, Moldova, Morocco, Mozambique, Nauru, Netherlands, Peru, Togo, Vietnam
M&E system approved	4	Finland, Norway, Philippines, Turkey
Monitoring information published	14	Austria, Belgium, Brazil, France, Germany, Japan, Lithuania, Mexico, Portugal, Slovakia, South Africa, Spain, Switzerland, United Kingdom
Evaluation published	8	Chile, Finland, France, Mexico, South Korea, Spain, Switzerland, United Kingdom
Sum of unique countries	46	All countries under “Evaluation published” appear twice except for South Korea