
5
BASSE METEOROLOGICAL STATION
U. R. R
LATITUDE 13:32°N
LONGITUDE 14:22°W

Chapter 5

Global progress on adaptation implementation

Lead authors: Timo Leiter (Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science), Nick Brooks (Garama 3C Ltd), Alistair Hunt (University of Bath), Lisa Schipper (University of Oxford).

Contributing authors: Finlay Pettengale (University of Cardiff), Chris Gordon (Institute for Environment and Sanitation Studies, University of Ghana).

A meteorologist at the Basse field station in the Upper River Region of The Gambia, one of nine stations that have been upgraded to become automatic and provide reliable and timely climate information thanks to a project supported by UNEP and its partners. Learn more about this project here.

Photo: © UNEP

Key messages

- In the period between 2010 and 2019, more than 2,600 principal adaptation projects have been funded by the top 10 bilateral donors on adaptation, underscoring the significance of bilateral finance as a driver of adaptation. Furthermore, the number of new principal adaptation projects that started during the latter half of this period is 50 per cent higher than the total number for the preceding five years, illustrating a strong acceleration in adaptation implemented with bilateral support since the adoption of the Paris Agreement in 2015.
- The number of activities marked as principal adaptation by the top 10 donors in the Organisation for Economic Co-operation and Development (OECD) Creditor Reporting System is actually significantly higher than 2,600. However, more than one-third of these activities were not found to meet the OECD criteria for principal adaptation, meaning principal adaptation is being over-reported. This analysis confirms similar findings by civil society organizations and academia.
- Under multilateral adaptation finance, between 1 December 2020 and 30 September 2021, 39 new principal adaptation projects funded by the Adaptation Fund, the Green Climate Fund and the Global Environment Facility were started – an increase of 10 per cent compared with the 397 projects started between 2006 and 2020 (assessed in the 2020 Adaptation Gap Report).
- The sectors prioritized across countries' most recent Nationally Determined Contributions closely match the primary sectors being addressed by projects supported with bilateral and multilateral adaptation funding, with agriculture, water, ecosystems and infrastructure featuring in the top five sectors in each list.
- Evidence assessed in this chapter suggests that implementation of adaptation is unevenly distributed, with certain regions having relatively little evidence to suggest that adaptation is taking place, particularly North Africa, Eastern Europe, Central Asia, the Middle East and parts of South America.
- Data on adaptation outcomes and evidence of risk reduction remains scarce. Less than 2 per cent of the 1,682 scientific journal articles that document implemented adaptation provide primary evidence of risk reduction.
- Poor understanding of contextual drivers of vulnerability, top-down design, limited consideration of future climate risks and unclear success criteria reduce the likelihood of adaptation projects achieving risk reduction. More attention is therefore needed on inclusive project design and implementation to better elaborate the intended adaptation process and prevent maladaptation.

5.1 Introduction

The objective of this chapter is to provide a global assessment of the implementation of adaptation, with a particular focus on developing countries. It provides essential information that would not be apparent from solely focusing on the amount of finance and/or the extent and quality of planning, namely whether adaptation is actually taking place, and where and in which sectors it is happening. In addition, this chapter assesses the available data on results and risk reduction achieved and concludes with recommendations for the design and assessment of adaptation actions.

The assessment of global implementation of adaptation in the 2020 edition of the Adaptation Gap Report (AGR2020) was based on an analysis of project documents from the three funds that serve the Paris Agreement (UNEP 2021a), and on the initial results from the Global Adaptation Mapping Initiative (GAMI), a research initiative that systematically assessed documented adaptation in the scientific literature (Berrang-Ford *et al.* 2021). This year's AGR updates and expands the 2020 analysis by assessing data from the top 10 bilateral adaptation donors over the 10-year period from 2010 to 2019. While it does not capture adaptation being implemented by all actors and has limited coverage of actions in developed countries, this combination of data sources provides one of the most comprehensive global assessments of the extent, location and focus of adaptation actions globally available to date. As such, its findings are directly relevant for the Global Stocktake.

The scope and content of this chapter are complementary to Working Group II (WGII) of the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC),[1] which will be published in February 2022. The WGII AR6 will go into detail on key sectors and all geographic regions.

5.2 Scope and data sources

Adaptation actions are undertaken from the local to international level and are carried out by a variety of different actors. At the national level, countries are only just beginning to report on the implementation of their national adaptation plans (Leiter 2021). Consequently, country submissions to the UN Framework Convention on Climate Change (UNFCCC) presently do not provide a sufficient basis for determining the level of implementation worldwide. This chapter therefore uses three comprehensive data sources to obtain an indication of adaptation actions globally:

1. project documents from three funds serving the Paris Agreement (Adaptation Fund [AF], Green Climate Fund [GCF] and Global Environment Facility [GEF]; all adaptation projects until 30 September 2021);

2. Organisation for Economic Co-operation and Development (OECD) statistics on aid activities targeting adaptation to climate change (available for 2010-2019, covering all recipient countries of development aid);

3. implemented adaptation as documented in scientific journals (global coverage, journals indexed in Web of Science, Scopus or Medline, publications between January 2013 and December 2019).

These data sources complement each other and, combined, are able to provide unique insights into the extent and status of implemented adaptation actions globally. However, they do not provide a representative overview of adaptation being implemented across all scales and by all actor groups. Data from the three funds serving the Paris Agreement and OECD statistics, for example, both exclusively provide information about adaptation projects funded by international finance flows and therefore do not capture actions implemented with finance from other sources. As a result, adaptation implemented by actors more likely to operate without this funding (e.g. local or international non-governmental organizations [NGOs], community groups, the private sector and the national governments of developed countries) are likely to be underrepresented. To a certain extent, these actions could be captured by GAMI. However, this would require them to be documented in scientific articles, which is likely to be the exception rather than the rule. Nevertheless, the three data sources used provide longitudinal coverage over 15, 10 and 8 years, respectively, which enables the identification of trends and new developments over time.

Further information about the analysis conducted for this chapter is described in Annex 5.A (online).

5.3 Implemented adaptation actions

5.3.1 Internationally funded adaptation actions

The AGR2020 identified 397 projects primarily aimed at adaptation that were started between 2006 and 2020, funded by the three funds serving the Paris Agreement (AF, GCF and GEF from its Least Developed Countries Fund [GEF-LDCF] and Special Climate Change Fund [GEF-SCCF]). Seven more adaptation projects were started in 2020, and 34 between January and September 2021, giving a total of 437 supported principal adaptation projects. This is an increase of almost 10 per cent since the AGR2020, despite the pandemic. Since 2015, a quarter of new principal adaptation projects have grant volumes above US$ 10 million (table 5.1 and figure 5.1[2]). The number of new adaptation projects that were started in 2020 and 2021 is similar to the number of newly started projects per year in the period from 2015 to 2019. However, this number could have been higher had the pandemic not occurred.

As a new data source, this year's implementation chapter also includes bilaterally funded adaptation projects. Between 2010 and 2019, the top 10 bilateral adaptation donors[3] funded 2,607 principal adaptation projects. Table 5.2 shows the number of newly started projects per year per donor and figure 5.2 shows the development of the total number of projects throughout the decade. The overall trend has been upward except for 2018, when the number of projects funded by the US fell substantially due to the previous administration's position on climate change.[4] This fall was partially offset in 2019 by a strong increase in the number of projects supported by France, Germany and the UK (table 5.2). Despite the drop in 2018, the combined number of new projects started in the last five years of the decade (2015-2019) was 50 per cent higher than for the first five years, which illustrates the strong acceleration in the implementation of principal adaptation projects since the adoption of the Paris Agreement.

1 WGII of the IPCC will prepare the "Impacts, Adaptation and Vulnerability" section of the overall IPCC AR6.

2 The 41 projects include seven projects that were started in 2020, five after the cut-off date of the AGR2020 and two that had not previously been identified.

3 In the order of adaptation finance reported to the OECD, starting with the highest contributors: Japan, Germany, European Union (EU) institutions, France, Netherlands, United States, United Kingdom, Sweden, Switzerland and Korea.

4 The US rejoined the Paris Agreement on 19 February 2021 and the current administration has pledged to quadruple US climate finance compared to its 2013-2016 levels, to over 11 billion per year.

Table 5.1 Number of AF, GCF and GEF principal adaptation projects started since 2006, and number of principal adaptation projects started in 2020 and 2021, as at 30 September 2021

	Total	New in 2020	New in 2021
AF	98	15	6
GCF	68	18	13
GEF-LDCF	172	1	9
GEF-SCCF	76	1	1
GEF – Strategic Priority on Adaptation (SPA) (2004-2010)	22	N/A	N/A
Total	**436**	**35**	**29**

Figure 5.1 Number of new principal adaptation projects per year and size of grant (excluding co-financing) funded by the AF, GCF and GEC-LDCF/SCCF, as at 30 September 2021

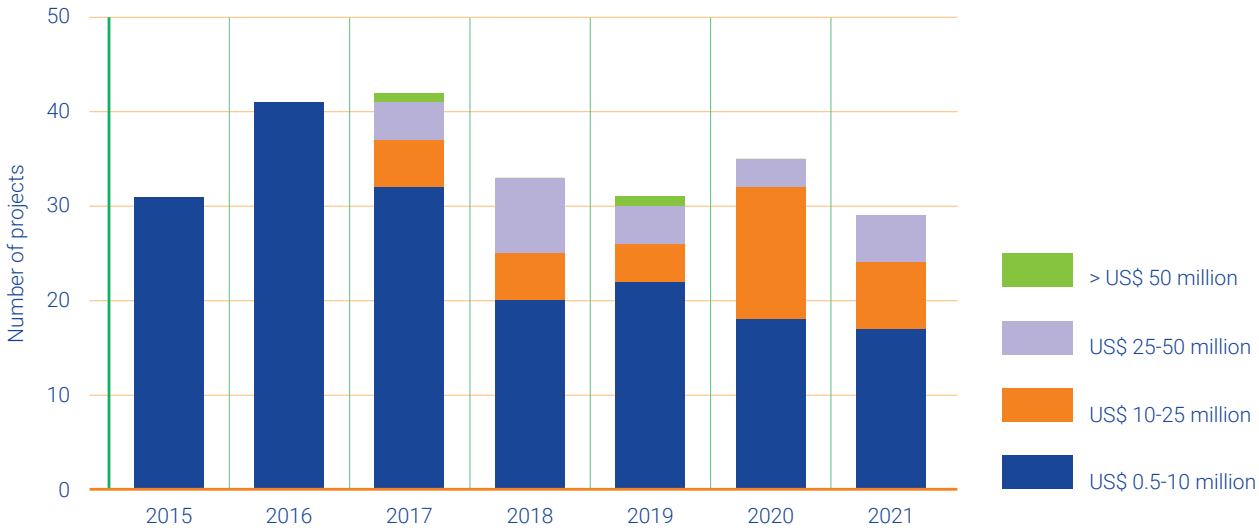
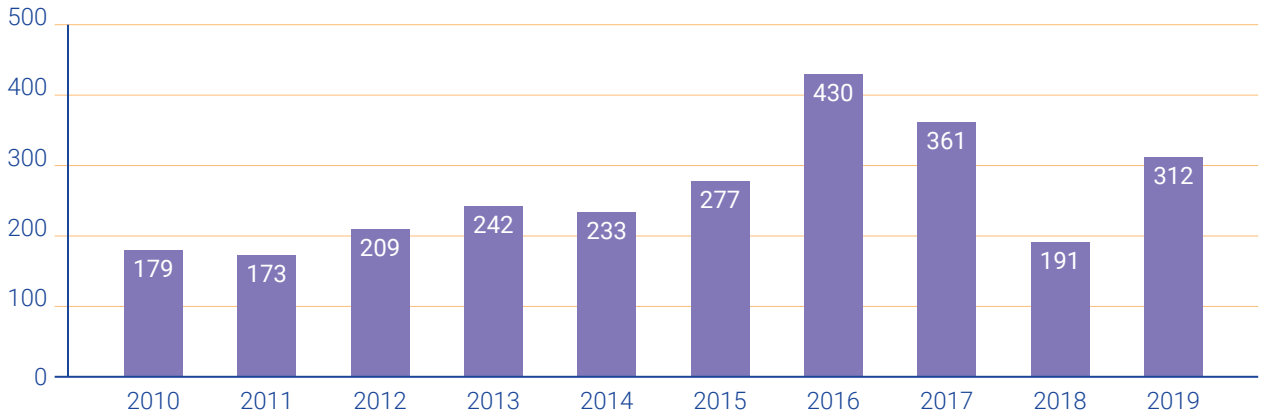


Table 5.2 Number of new principal adaptation projects started per year with funding from the top 10 adaptation donors

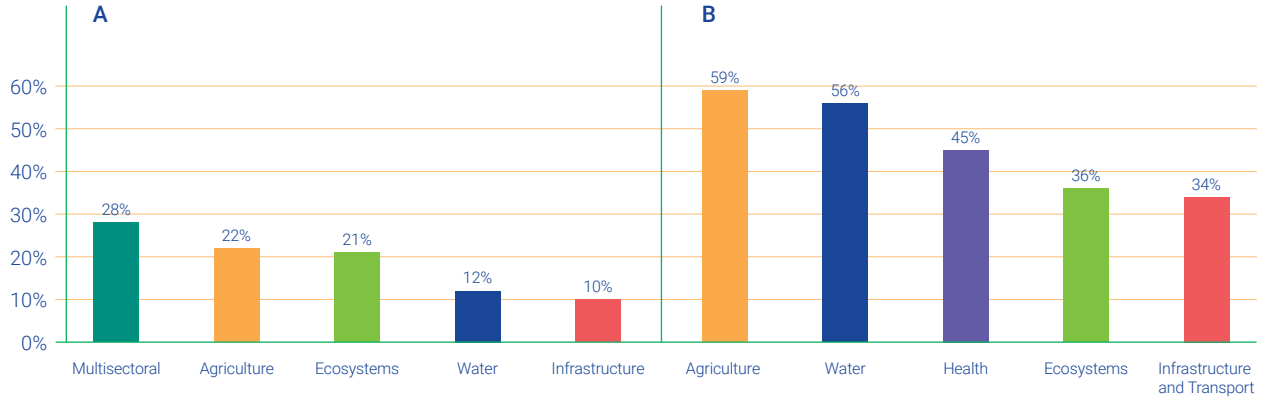
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total per donor
EU institutions	7	15	12	17	3	14	22	29	47	54	220
France	28	14	10	24	27	27	27	30	4	49	240
Germany	5	31	37	41	47	49	55	58	50	91	464
Japan	48	24	26	44	34	29	23	14	9	8	259
Republic of Korea	8	0	3	10	4	4	3	7	12	15	66
Netherlands	2	1	9	2	2	2	5	6	9	11	49
Sweden	6	11	21	2	12	5	21	11	22	5	116
Switzerland	12	15	15	2	12	17	9	10	17	11	120
United Kingdom	25	10	8	29	14	50	20	15	5	53	229
United States	38	52	68	71	78	80	245	181	16	15	844
Total per year	**179**	**173**	**209**	**242**	**233**	**277**	**430**	**361**	**191**	**312**	**2607**

Figure 5.2 Number of new principal adaptation projects started per year with funding from the top 10 bilateral adaptation donors



Note: The term 'principal adaptation project' refers to projects for which adaptation is "fundamental in the design of, or the motivation for, the activity" (OECD 2016).

Figure 5.3 Panel A: Primary sectors addressed by bilaterally funded principal adaptation projects between 2010 and 2019
Panel B: Sectors identified as adaptation priorities in countries' most recent NDCs



Note: Sectors are marked in the same colour in both panels to facilitate comparison. The bars in **Panel A** add up to 100 per cent because each project was assigned to just one primary sector. The bars in **Panel B** do not add up to 100 per cent because each NDC mentions multiple sectors. In **Panel B**, each bar shows the percentage of NDCs mentioning a particular sector out of all NDCs (counting the most recent one per country).
Source: Data for Panel B was sourced from Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ 2021).

The number of activities marked as principal adaptation by the top 10 donors in the OECD Creditor Reporting System is actually significantly higher than 2,607. However, more than one-third of the activities were not found to meet the OECD criteria for principal adaptation, which the OECD defines as adaptation being "fundamental in the design of, or the motivation for, the activity" (OECD 2016). This means that principal adaptation is being over-reported, which confirms similar findings by civil society organizations and academia. The numbers reported in table 5.2 are the result of manual screening of the information provided in the OECD database, and therefore do not include projects that were not found to meet the OECD criteria for principal adaptation (see Annex 5.A [online]).

Almost one-third of the bilaterally funded principal adaptation projects address multiple sectors, while 21 per cent focus primarily on agriculture and 20 per cent on ecosystems (figure 5.3, Panel A). A comparison with the priority sectors mentioned in the most recent Nationally Determined Contribution (NDC) of each country (see Panel B) shows a close match, with agriculture, water, ecosystems and infrastructure occupying four of the top five positions each. NDCs mentioning health as a priority sector for adaptation increased in frequency, from 25 per cent of all NDCs with an adaptation component in the first round of (intended) NDCs to 45 per cent of each country's most recent NDC, up to August 2021. This increase is likely due to the increase in awareness of health-related matters caused by COVID-19.

Over the 10-year period, the composition of primary sectors addressed by new principal adaptation projects has remained relatively constant. Agriculture is an exception to this, having increased significantly to an average of almost 25 per cent over the last five years compared to 16 per cent for the period 2010-2014 (figure 5.4). Water as the primary

Figure 5.4 Composition of primary sectors addressed by new principal adaptation projects per year

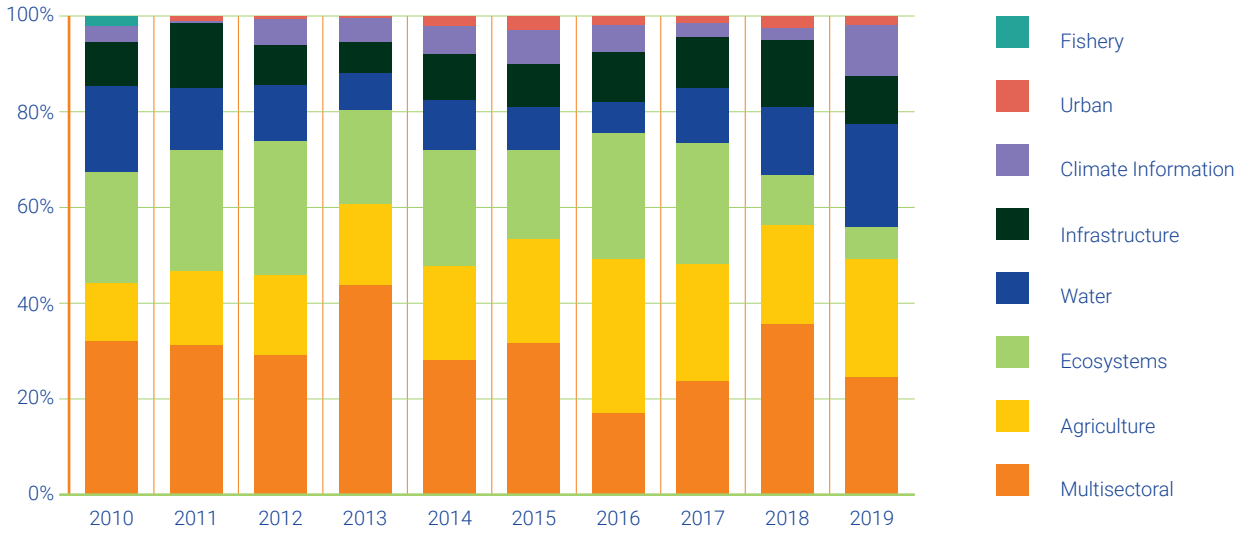
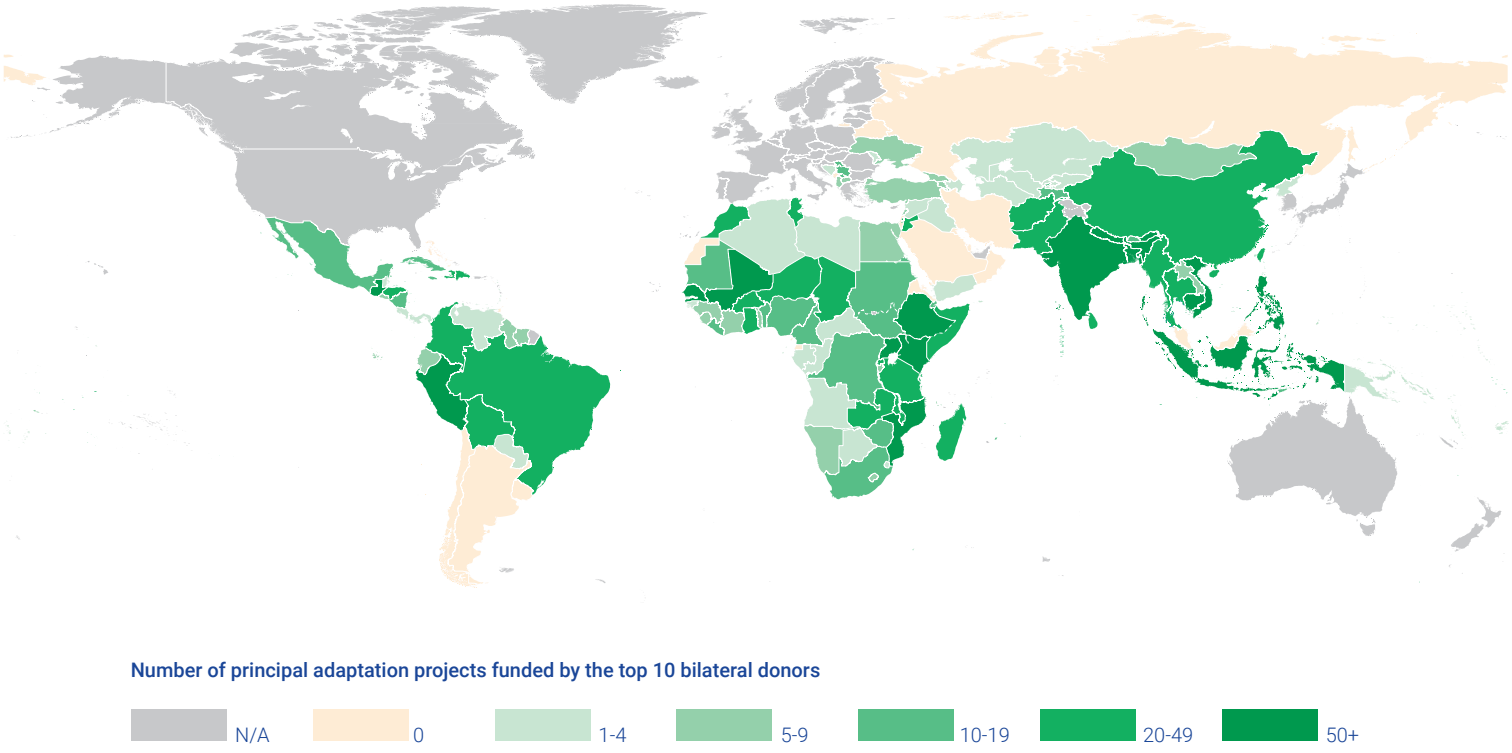
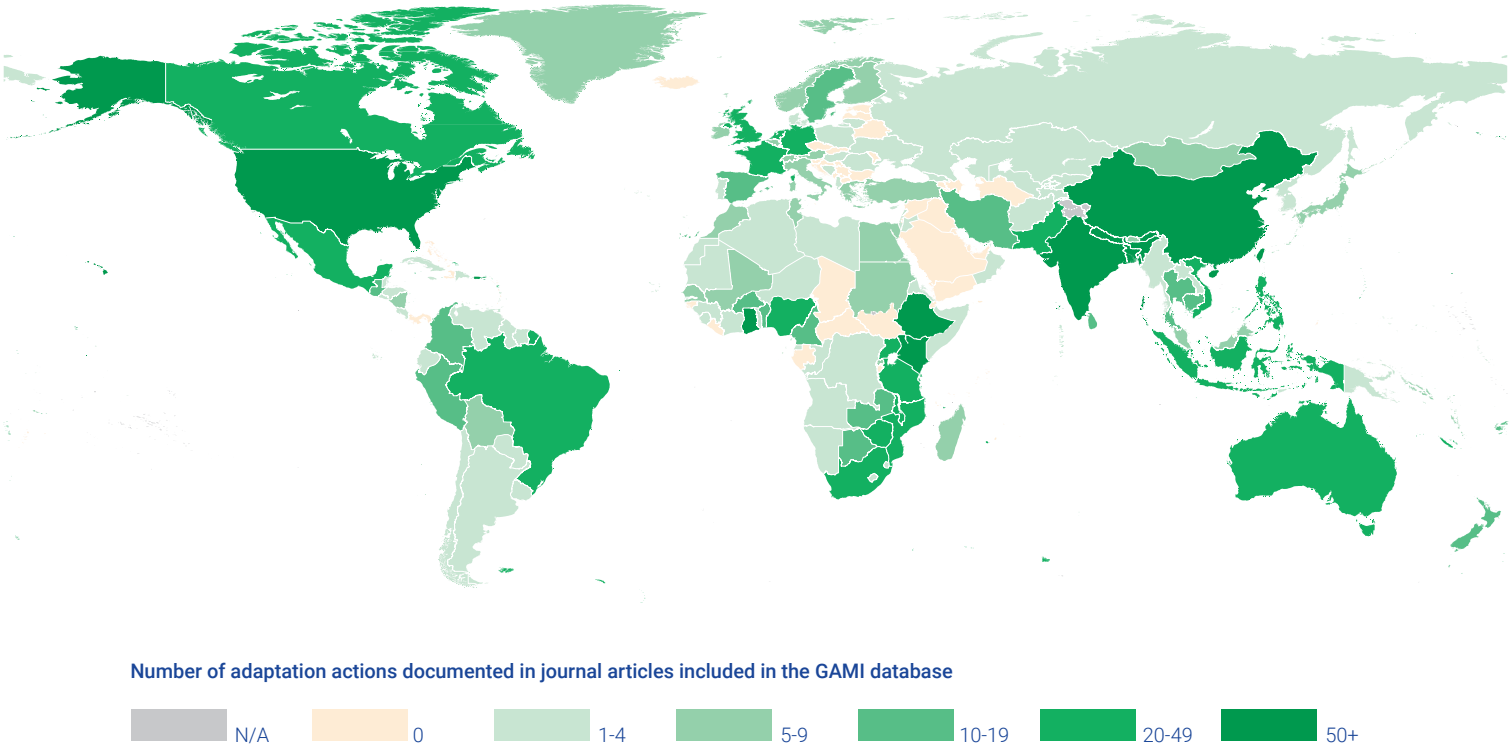


Figure 5.5 Geographic distribution of principal adaptation projects funded by the top 10 bilateral donors



Note: Countries and territories marked as N/A are either a) countries that have reported the provision of adaptation support to the OECD as part of Official Development Assistance, and thus are highly unlikely to be recipients of bilateral support for adaptation; or b) territories that are recognized as disputed by the United Nations or whose status has not yet been agreed upon.

Figure 5.6 Geographic distribution of implemented adaptation actions documented in scientific journal articles



Note: Territories marked as N/A are those that are recognized as disputed by the United Nations or whose status has not yet been agreed upon.
Source: Data provided by GAMI (Berrang-Ford *et al.* 2021).

sector accounted for less than 10 per cent of new adaptation projects in 2013, 2015 and 2016, but has steadily increased since then and reached 21 per cent in 2019. Ecosystems as the primary sector accounted for 18-25 per cent of new adaptation projects over most of the period 2010-2019, but saw a strong decrease in 2018 and 2019 to 11 per cent and 7 per cent, respectively.

Of the 2,607 principal adaptation projects, 133 projects (~5 per cent) were identified as aiming to enhance the generation and utilization of climate information as a primary objective. This is lower than was indicated in the AGR2020, which determined that 12 per cent of the 397 adaptation projects funded by the three funds serving the Paris Agreement focused on climate information. However, the AGR2020 applied a broader definition that also counted projects that had a single component related to climate information. Regarding the extent to which bilaterally funded adaptation projects promote gender equality, approximately 4 per cent of all projects in the OECD Creditor Reporting System marked as having adaptation as a principal objective are also marked as having gender equality as a principal objective. This rate is slightly lower than that found in projects of the funds serving the Paris Agreement, which the AGR2020 determined to be around 6 per cent.

Figure 5.5 shows the number of principal adaptation projects per country. The figure shows that bilaterally funded adaptation projects are unevenly distributed among countries, with the majority of projects being located in East, Southern and West Africa, South-East Asia and parts of South America. Fewer projects are found in Central Asia, the Middle East and parts of North Africa. Forty-five per cent of principal adaptation projects were located in Least Developed Countries (LDCs) while 9 per cent were located in Small Island Developing States (SIDS), demonstrating a similar – albeit slightly lower – focus on LDCs and SIDS to that found for the three funds serving the Paris Agreement by the AGR2020 (53 per cent and 14 per cent, respectively).

5.3.2 Implemented adaptation actions documented in scientific journals

GAMI identified and analysed journal articles published between January 2013 and December 2019 that describe implemented adaptation actions (Berrang-Ford *et al.* 2021). It found that only a fraction of the tens of thousands of published articles that directly address adaptation to climate change actually document implementation, a finding confirmed by another review of the adaptation literature (Sietsma *et al.* 2021). In total, GAMI identified 1,682 journal articles that describe implemented adaptation actions across the globe, although some regions and countries are associated with a far larger number of publications than others. More than 50 articles were identified for Bangladesh, China, Ethiopia, Ghana, India, Kenya, Nepal, and the United States (figure 5.6).

A comparison with the map of bilaterally funded adaptation projects (figure 5.5) shows that some areas are characterized by a low number of adaptation projects and only a few cases of implemented adaptation documented in journal articles, in particular North Africa, Eastern Europe, Central Asia, the Middle East and parts of South America. The low number of adaptation projects being documented in these regions could – in part – be exacerbated by issues such as reporting bias caused by, for example, language barriers which hinder the publication of articles in English. As a result, it cannot necessarily be concluded that adaptation actions are less frequent in these regions. However, the fact that data from both the GAMI and OECD databases provide only limited evidence that adaptation is taking place in these regions suggests that adaptation is not as common in some of these regions as elsewhere.

Further results from GAMI including sectoral composition, targeted climate hazards, targeted actors, the potential for transformative adaptation, and the methods used, are outlined in Berrang-Ford *et al.* (2021). In addition, a series of associated articles are examining various dimensions of adaptation, such as equity, health, gender and responses to specific hazards or in specific regions.[5]

5.4 Adaptation outcomes and risk reduction

The ultimate goal of adaptation is to reduce risks associated with the impacts of climate change that have not been avoided through mitigation. By reducing these risks, adaptation seeks to maintain or enhance human and ecological well-being in the face of climate change (see chapter 2).

5.4.1 Assessing adaptation performance

A review of implemented adaptation found that effectiveness is most commonly described in terms of reduced risk or vulnerability and increased well-being (Owen 2020). The framing of adaptation can influence which of these concepts (risk, vulnerability, resilience, well-being or others) are emphasized in the definition of effectiveness (Singh *et al.* 2021). Importantly, the outcomes of adaptation actions are not just either successful or unsuccessful, but can fall along a continuum from negative outcomes (referred to as "maladaptation") to effective adaptation (Schipper 2020; Tubi and Williams 2021). Figure 5.7 visualizes this continuum in general terms and by providing a tangible example of how differing adaptation outcomes could materialize in a smallholder farming context. Furthermore, adaptation outcomes are rarely consistent across different social groups, and in some cases adaptation actions can benefit certain groups while harming others (thereby leading to maladaptation). Additionally, the effectiveness of adaptation can decrease over time if climate hazards become more intense and/or more frequent.

Assessment of the extent to which adaptation interventions reduce risks associated with climate change is a critical prerequisite for continuously improving adaptation actions and avoiding maladaptation. However, a number of challenges to assessing adaptation outcomes exist, which limit its application (Bours, McGinn and Pringle 2014a). Principal among these challenges is that effectiveness is relative to the level of climate hazards (rather than an absolute value), that the composition of factors that determine risks and their relative importance can be very dynamic, and that adaptation is highly site and context specific, meaning there can be no globally standardized indicators to universally and comprehensively assess the success of adaptation interventions (Arent *et al.* 2014; Leiter and Pringle 2018). The UN Statistics Division's multi-year process[6] to identify a globally applicable and feasible set of adaptation indicators demonstrates the trade-offs, the lack of globally available data and the challenge to express local adaptation outcomes through global indicators. In addition, indicators based on national averages do not account for inequalities and differences in people's vulnerability that are crucial to determine the effectiveness and fairness of adaptation.

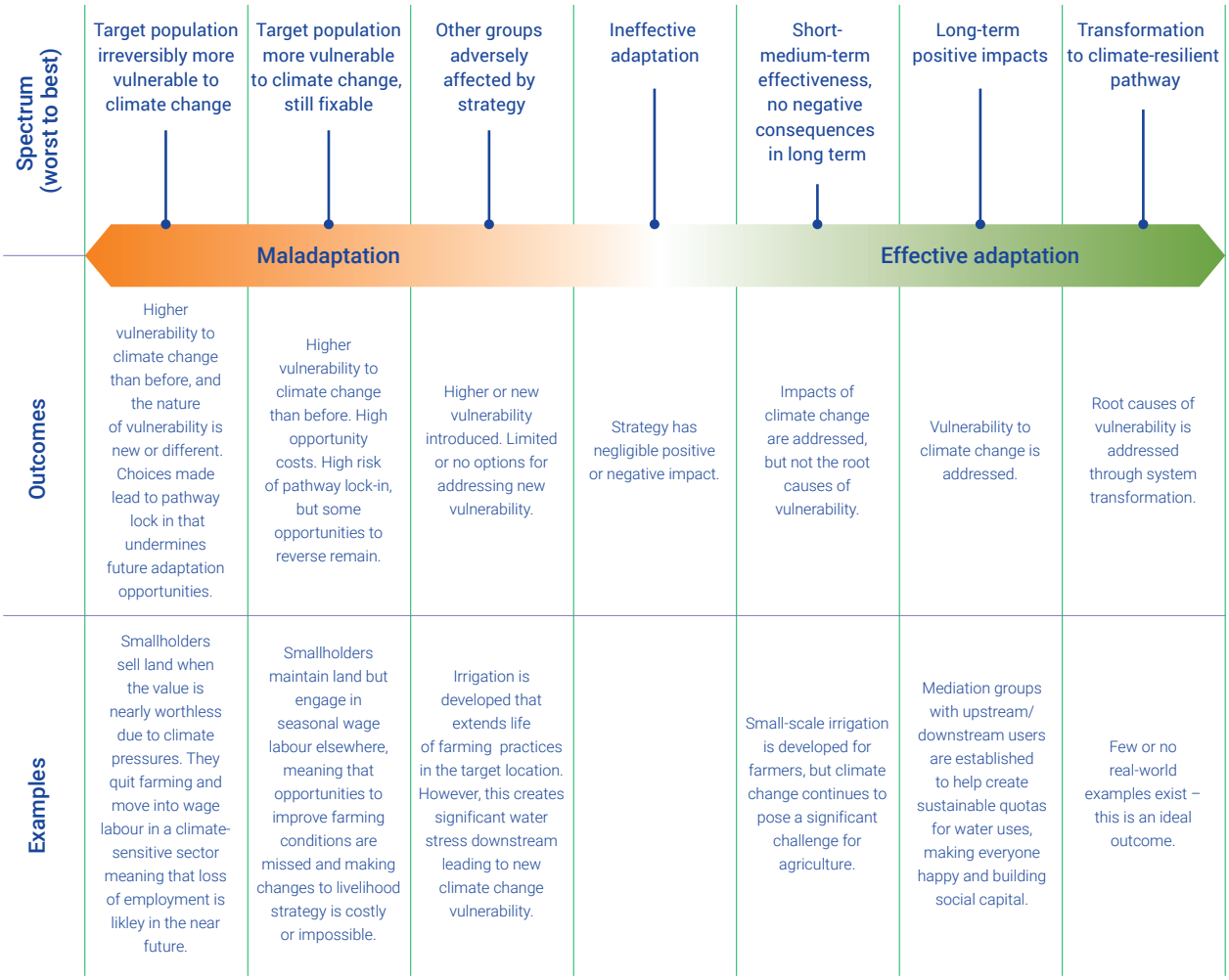
At the national and subnational level, a variety of indicators have been used to assess adaptation actions, and sector-specific assessment practices are evolving as well (Mäkinen *et al.* 2018; Leiter *et al.* 2019; Brooks *et al.* 2019; Food and Agriculture Organization [FAO] 2019; Donatti *et al.* 2020). However, adaptation indicators rely on a prior understanding of how adaptation is expected to work and what it aims to achieve. Theories of change or similar ways of outlining the intended change process from actions to outcomes can help to design adaptation interventions and to guide the formulation of suitable indicators (Bours, McGinn and Pringle 2014b; Oberlack *et al.* 2019). In this way, adaptation actions do not gain relevance through their indicators but through how they address current and future climate risks in a way that is robust and accounts for context and equity (see section 5.4.3).

To date, many monitoring and evaluation (M&E) systems of adaptation projects remain focused on easily measurable short-term outputs such as people supported, policies drafted, or assets improved, and are ill equipped to assess changes in vulnerability or risks or detect maladaptation (Eriksen *et al.* 2021). Indeed, indicators used by the three funds serving the Paris Agreement to assess portfolio-wide performance primarily measure outputs (Leiter *et al.* 2019). The way most adaptation projects and their results are currently assessed therefore limits our understanding

5 A list of associated articles is available at https://globaladaptation.github.io/results.html.

6 See https://unstats.un.org/unsd/envstats/ClimateChange_StatAndInd_global.cshtml.

Figure 5.7 A simplified continuum of adaptation outcomes, from irreversible maladaptation to transformative adaptation



Source: Adapted from Schipper (2020).

of the effectiveness of adaptation. Annex 5.B (online) discusses several approaches (from mobile-phone based household surveys and combinations of process and outcome-based data, to statistically verified resilience indicators and qualitative evaluations) that can be further explored to advance the assessment of adaptation, but there is no one-size-fits-all approach to adaptation M&E. The appropriateness of particular M&E approaches depends on the purpose of undertaking M&E and associated information needs, as well as the available resources and links to decision-making processes (Leiter 2017).

5.4.2 Global status of adaptation results

Funds serving the Paris Agreement, as well as some bilaterally supported climate funds, publish performance data that are often based on portfolio-wide standard indicators, such as the number of beneficiaries. As at June 2020, the LDCF has reached more than 16.2 million direct beneficiaries and trained 508,000 people, while the SCCF has reached over 6.4 million direct beneficiaries and trained 80,000 people (GEF 2021). As at 31 December 2020, GCF-funded adaptation projects were reported to have reached a total of 49 million direct and indirect beneficiaries (GCF 2021). Through its projects approved before 30 June 2021, AF is expecting to reach 10 million direct beneficiaries (AF 2021). While this type of data indicates a fund's reach and level of activity, it does not provide information about the actual outcomes of adaptation – i.e. to what extent the beneficiaries have become more resilient and against what level of climate risk.

Due to different calculation methods, even data using seemingly identical indicators are not currently comparable across funds (Pauw, Grüning and Menzel 2020; AF 2021). There have also been instances of double counting of beneficiaries (Binet *et al.* 2021). Furthermore, it is difficult to interpret indicators without context. For example, the indicator "Meters of coastline protected", a portfolio indicator used by AF, says little about how effective this protection is in reducing climate risk, particularly risks associated with future sea-level rise and associated hazards. Consequently,

while the data can be aggregated across projects, this does not necessarily lead to a meaningful statement about risk reduction and it leaves out who benefits. This example illustrates the limits of standard indicators, which can be useful for accountability and communication purposes, but less useful for understanding context-dependent results. A recent evaluation by the GCF Independent Evaluation Unit (IEU) (Binet *et al.* 2021) likewise found that the "depth of impact for adaptation interventions cannot be monitored with the current set of indicators". Projects could therefore employ a mix of different M&E approaches to generate multiple types of information for different target audiences and be based on theories of change developed together with stakeholders and beneficiaries (see subsection 5.4.1).

Evidence of risk reduction being achieved by adaptation actions documented in the scientific literature is also very limited. Less than 2 per cent of the articles identified by GAMI provide primary evidence of risk reduction (Berrang-Ford *et al.* 2021). It was found that many articles assumed rather than observed or empirically demonstrated risk reduction. Just 30 out of the 1,682 articles (1.8 per cent[7]) offered evidence of risk reduction, half of them through quantitative assessments, 11 through qualitative methods, and four using a combination of both methods (Berrang-Ford *et al.* 2021, Supplementary Materials 4). While this finding does not necessarily mean that the other 98 per cent did not contribute to risk reduction, it shows that quantitative or qualitative evidence of risk reduction is rare. It also highlights the limited focus given to assessing the outcomes of adaptation actions, reinforcing the need to design adaptation actions in a way that increases the chance of risk reduction being achieved, particularly for those most vulnerable to climate change.

5.4.3 Project design and factors that support or hinder risk reduction

A stakeholder-informed understanding of current and expected climate hazards and vulnerability in the respective location, how they affect the population and who is most at risk, is critically important for adaptation planning (see chapter 3). However, the 1,682 articles identified by GAMI and a meta-analysis of 34 adaptation projects show that climate risk contexts are often poorly articulated in the design of adaptation interventions (Berrang-Ford *et al.* 2021; Eriksen *et al.* 2021). Indeed, a recent evaluation of the adaptation portfolio of the GCF found that establishing the climate rationale (i.e. the explanation of a project's contribution to adaptation) is the biggest hurdle in project development (Binet *et al.* 2021). The evaluation concludes that clearer guidance is needed on what counts as adaptation and how to draft a meaningful climate rationale.

Recent research identified several factors that hinder achievement of risk reduction outcomes (Eriksen *et al.* 2021), namely:

I. poor understanding of contextual drivers of vulnerability;

II. top-down design and implementation with inadequate representation of vulnerable and marginalized groups (e.g. women and indigenous groups);

III. rebranding development activities as adaptation without considering climate risks;

IV. failing to identify criteria for adaptation success and/or allowing success to be defined implicitly by dominant groups.

The review of 34 adaptation projects found that despite intentions being stated in project documents, these often did not truly address the underlying drivers of vulnerability to climate change, particularly where these are embedded in deep-rooted economic and political structures (Eriksen *et al.* 2021). To analyse this dimension, greater attention to these drivers is essential if the positive transformation promised by many adaptation interventions is to be delivered. Furthermore, adaptation is more likely to be effective where it involves genuine and substantial participation by those it is intended to support, in planning, implementation and M&E (Buontempo *et al.* 2014; Forsyth 2018; Vincent *et al.* 2020). This finding has motivated the principles for "locally-led adaptation" spearheaded by the International Institute for Environment and Development (IIED) (Soanes *et al.* 2021). Its premise is that a participatory approach, including joint agreement on what constitutes "successful" adaptation and how it can be reached, will increase ownership and be more effective. Such "bottom-up" insights can also be combined with "top-down" climate scenarios to integrate scientific and local knowledge (Conway *et al.* 2019). Finally, progressively higher levels of warming and associated increases in climate risks also need to be considered, given that current NDCs are projected to substantially breach the temperature goals of the Paris Agreement (UNFCCC 2021).

5.5 Outlook and recommendations

Despite the growing number of adaptation projects, the lack of knowledge about their outcomes and the increasing concern over the way adaptation projects are currently planned and implemented – and the implications this has for their effectiveness – is a call for action. This section outlines the main recommendations to improve adaptation design, implementation and assessment.

7 The AGR2020 reported this figure as "less than 3.5%" (58 out of the 1,682 articles), but a re-analysis of these 58 articles in 2021 revealed that some actually did not provide sufficient evidence, leaving just 30 articles (see Berrang-Ford *et al.* 2021, Supplementary Materials 2).

Main recommendations:

1. Ensure that planning is risk focused and clearly explains how adaptation is expected to take place. A prerequisite for achieving risk reduction is that projects are grounded in an inclusive understanding of climate risks and vulnerability and that it is clearly elaborated how their activities address climate risks. As identified by the evaluation of GCF's adaptation portfolio and by the analysis of GAMI's database of 1,682 articles, there is a need to substantiate how objectives will be achieved. Rather than just adding some vague resilience targets or indicators that mostly represent business as usual, project proposals need to specify how adaptation is envisaged to achieve its objectives. To facilitate this change, better guidance is needed on how to design adaptation projects. The associated development and approval processes also need to be modified accordingly, including project templates which currently pay too little attention to adaptation mechanisms.

2. Ensure that planning is inclusive and context informed. To understand the risk context of locally implemented adaptation actions and develop an appropriate theory of change, genuine, substantial and sustained inclusion of the vulnerable and marginalized must be ensured. Such an approach can also help to prevent maladaptation since social exclusion of certain groups (e.g. women or indigenous peoples) during project development can leave important sources of risk unaddressed (Forsyth 2018). The principles for locally led adaptation can be used to support a participatory approach (Soanes *et al.* 2021).

3. Facilitate the assessment of adaptation outcomes and communicate the results. There needs to be a stronger focus on assessing whether the adaptation mechanism works as intended and whether the intended outcomes – and not just the outputs – are being achieved. This could involve applying complementary adaptation-specific assessments in addition to common project monitoring arrangements and accountability-focused indicators (Leiter 2018). This change would require commitment and adequate resourcing. The results should be made publicly available and be easily accessible. The same applies to project evaluations which often remain internal documents, thereby preventing opportunities for learning.

4. Validate outcome indicators and use multiple sources. Indicators that are chosen to represent concepts like resilience, vulnerability or adaptive capacity need to be justified on the basis of empirical evidence (i.e. how they measure the respective concept needs to be demonstrable). However, in practice they are often chosen on the basis of data availability or ease of measurement. To better measure risk reduction, indicators need to be grounded in a well informed understanding of contexts and potential future risks. Surveys and interviews with relevant actors can yield valuable insights that quantitative indicators cannot capture. This approach is also usually cheaper than gathering new quantitative data.

5. Promote reflective monitoring. Suitable approaches to monitoring, evaluation and learning need to be applied to actively support decision-making rather than simply serving as a once-a-year accountability tool. Beyond indicators, the monitoring system needs to be able to detect unintended consequences including maladaptation in order to support adjustments to actions as necessary. Monitoring should therefore take a reflective approach that involves active sharing of experiences as implementation unfolds. As such, it may include multiple types of information to meet the needs of different users (Faulkner, Ayers and Huq 2015).

6. Plan for higher-end impacts. The extreme events experienced throughout 2021, many of them record breaking, underscore the need to consider higher-end climate scenarios and to plan with sufficient safety margins (e.g. not relying on the lower bound of estimated sea-level rise). This requires enhanced adaptation ambition to address impacts that might fall outside the range of previously modelled or anticipated impacts. More than anything else, these events underscore the urgent need to decarbonize the global economy much faster than NDCs currently foresee (UNEP 2021b). This is the only way to avoid escalating climate risks and to prevent the adaptation gap from widening further.

References

Chapter 5

Adaptation Fund (2021). *Annual Performance Report for the Fiscal Year 2021*. www.adaptation-fund.org/wp-content/uploads/2021/10/AFB.EFC_.28.3_Annual-Performance-Report-for-Fiscal-Year-2021.pdf.

Arent, D.J., Tol, R.S.J., Faust, E., Hella, J.P., Kumar, S., Strzepek, K.M. *et al.* (2014). Key economic sectors and services. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R. and White, L.L. (eds.). Cambridge and New York, NY: Cambridge University Press, 659-708.

Berrang-Ford, L., Siders, A.R., Lesnikowski, A., Fischer, A.P., Callaghan, M., Haddaway, N.R. *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.

Bours, D., McGinn, C. and Pringle, P. (2014a). Guidance note 1: Twelve reasons why climate change adaptation M&E is challenging. www.ukcip.org.uk/wp-content/PDFs/MandE-Guidance-Note1.pdf.

---------- (2014b). Guidance note 3: Theory of Change approach to climate change adaptation programming. www.ukcip.org.uk/wp-content/PDFs/MandE-Guidance-Note3.pdf.

Brooks, N., Anderson, S., Aragon, I., Smith, B., Kajumba, T., Beauchamp, E. *et al.* (2019). Framing and tracking 21st century climate adaptation. IIED Working Paper. London: International Institute for Environment and Development. https://pubs.iied.org/sites/default/files/pdfs/migrate/10202IIED.pdf.

Binet, S., De Bruijn, M., Horikoshi, D., Kim, R., Lee, B., Markrich, M. *et al.* (2021). *Independent evaluation of the adaptation portfolio and approach of the Green Climate Fund*. Evaluation Report No. 9. Songdo, South Korea: Green Climate Fund Independent Evaluation Unit. https://ieu.greenclimate.fund/evaluation/adapt2021.

Buontempo, C., Hewitt, C.D., Doblas-Reyes, F.J. and Dessai, S. (2014). Climate service development, delivery and use in Europe at monthly to inter-annual timescales. *Climate Risk Management* 6, 1-5. https://doi.org/10.1016/j.crm.2014.10.002.

Conway, D., Nicholls, R.J., Brown, S., Tebboth, M.G.L., Adger, W.N., Ahmad, B. *et al.* (2019). The need for bottom-up assessments of climate risks and adaptation in climate-sensitive regions. *Nature Climate Change* 9, 503-511. https://doi.org/10.1038/s41558-019-0502-0.

Deutsche Gesellschaft für Internationale Zusammenarbeit (2021). Tool for Assessing Adaptation in the NDCs (TAAN). https://taan-adaptationdata.org/. Accessed 15 October 2021.

Donatti, C. I., Harvey, C.A., Hole, D., Panfil, S.N. and Schurman, H. (2020). Indicators to measure the climate change adaptation outcomes of ecosystem-based adaptation. *Climatic Change* 158, 413-433. https://doi.org/10.1007/s10584-019-02565-9.

Eriksen, S., Schipper, E.L.F., Scoville-Simonds, M., Vincent, K., Adam, H.N., Brooks, N. *et al.* (2021). Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance? *World Development* 141. https://doi.org/10.1016/j.worlddev.2020.105383.

Faulkner, L., Ayers, J. and Huq, S. (2015). Meaningful measurement for community-based adaptation. *New Directions for Evaluation* 147, 89-104. https://doi.org/10.1002/ev.20133.

Food and Agriculture Organization (2019). *Operational guidelines for the design, implementation and harmonization of monitoring and evaluation systems for climate-smart agriculture*. Rome. www.fao.org/documents/card/en/c/ca6077en/.

Forsyth, T. (2018). Is resilience to climate change socially inclusive? Investigating theories of change processes in Myanmar. *World Development* 111, 13-26. https://doi.org/10.1016/j.worlddev.2018.06.023.

Global Environment Facility (2021). FY20 Annual Monitoring Review of the Least Developed Countries Fund and the Special Climate Change Fund. www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF_LDCF.SCCF_.30_04_FY20%20Annual%20Monitoring%20Review%20of%20the%20Least%20Developed%20Countries%20Fund%20and%20the%20Special%20Climate%20Change%20Fund.pdf.

Green Climate Fund (2021). Annual portfolio performance report (2020). www.greenclimate.fund/sites/default/files/document/gcf-b30-inf09.pdf.

Leiter, T. (2017). The Adaptation M&E Navigator. A decision support tool for the selection of suitable approaches to monitor and evaluate adaptation to climate change. In *Evaluating Climate Change Action for Sustainable Development*. Uitto, J., Puri, J. and Van den Berg, R.D. (eds.). Cham: Springer International Publishing. Chapter 18. 327-341. https://doi.org/10.1007/978-3-319-43702-6_18.

---------- (2018). Assessing results of climate change adaptation projects in practice: learning from German Technical Development Cooperation. In *Adaptation metrics: Perspectives on measuring, aggregating and comparing adaptation results*. Christiansen, L., Martinez, G. and Naswa, P. (eds.). Copenhagen: United Nations Environment Programme Technical University of Denmark Partnership. 138-155.

---------- (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://doi.org/10.1016/j.envsci.2021.08.017.

Leiter, T., Olhoff, A., Al Azar, R., Barmby, V., Bours, D., Clement, V.W.C. *et al.* (2019). *Adaptation metrics: Current landscape and evolving practices*. Background paper for the Global Commission on Adaptation. Rotterdam and Washington, D.C. https://cdn.gca.org/assets/2019-09/AdaptationMetrics.pdf.

Leiter, T. and Pringle, P. (2018). Pitfalls and potential of measuring climate change adaptation through adaptation metrics. In *Adaptation metrics: Perspectives on measuring, aggregating and comparing adaptation results*. Christiansen, L., Martinez, G. and Naswa, P. (eds.). Copenhagen: United Nations Environment Programme Technical University of Denmark Partnership. 29-48.

Mäkinen, K., Prutsch, A., Karali, E., Leitner, M., Völler, S., Lyytimäki, J. *et al.* (2018). Indicators for adaptation to climate change at national level - Lessons from emerging practice in Europe. European Topic Centre on Climate Change impacts, Vulnerability and Adaptation (ETC/CCA) Technical Paper 2018/03. www.eionet.europa.eu/etcs/etc-cca/products/etc-cca-reports/tp_3-2018.

Oberlack, C., Breu, T., Giger, M., Harari, N., Herweg, K., Mathez-Stiefel, S.L. *et al.* (2019). Theories of change in sustainability science: Understanding how change happens. *GAIA - Ecological Perspectives on Science and Society* 28(2), 106-111. https://doi.org/10.14512/gaia.28.2.8.

Organisation for Economic Co-operation and Development (2016). *OECD DAC Rio Markers for Climate: Handbook*. www.oecd.org/dac/environment-development/Revised%20climate%20marker%20handbook_FINAL.pdf.

Owen, G. (2020). What makes climate change adaptation effective? A systematic review of the literature. *Global Environmental Change* 62. https://doi.org/10.1016/j.gloenvcha.2020.102071.

Pauw, W.P., Grüning, C. and Menzel, C. (2020). Number of beneficiaries as an indicator for adaptation: do the numbers add up? GCF Monitor Edition 2. Frankfurt School-United Nations Environment Programme Collaboration Centre for Climate & Sustainable Energy Finance. www.fs-unep-centre.org/wp-content/uploads/2020/04/GCFMonitor-edition2-final.pdf.

Schipper, E.L.F. (2020). Maladaptation: When Adaptation to Climate Change Goes Very Wrong. *One Earth* 3(4), 409-414. https://doi.org/10.1016/j.oneear.2020.09.014.

Sietsma, A.J., Ford, J.D., Callaghan, M.W. and Minx, J.C. (2021). Progress in climate change adaptation research. *Environmental Research Letters* 16(5). https://doi.org/10.1088/1748-9326/abf7f3.

Singh, C., Iyer, S., New, M.G., Few, R., Kuchimanchi, B., Segnon, A.C. *et al.* (2021). Interrogating 'effectiveness' in climate change adaptation: 11 guiding principles for adaptation research and practice. *Climate and Development*. https://doi.org/10.1080/17565529.2021.1964937.

Soanes, M., Bahadur, A.V., Shakya, C., Smith, B., Patel, S., Coger, T. *et al.* (2021). *Principles for locally led adaptation*. London: International Institute for Environment and Development.

Tubi, A. and Williams, J. (2021). Beyond binary outcomes in climate adaptation: The illustrative case of desalination. Wiley Interdisciplinary Reviews: *Climate Change* 12(2), e695. https://doi.org/10.1002/wcc.695.

United Nations Environment Programme (2017). *The Adaptation Gap Report 2017*. Nairobi. www.unep.org/resources/adaptation-gap-report-2017.

---------- (2021a). *The Adaptation Gap Report 2020*. Nairobi. www.unep.org/resources/adaptation-gap-report-2020.

---------- (2021b). *Emissions Gap Report 2021*. Nairobi. www.unep.org/resources/emissions-gap-report-2021.

United Nations Framework Convention on Climate Change (2021). *Nationally determined contributions under the Paris Agreement. Synthesis report by the secretariat*. Glasgow. FCCC/PA/CMA/2021/8.

Vincent, K., Conway, D., Dougill, A.J., Pardoe, J., Archer, E., Bhave, A.G. *et al.* (2020). Re-balancing climate services to inform climate-resilient planning – A conceptual framework and illustrations from sub-Saharan Africa. *Climate Risk Management* 29. https://doi.org/10.1016/j.crm.2020.100242.