K4D Knowledge, evidence and learning for development

Metrics and indicators to assess adaptation

Roz Price
Institute of Development Studies
8 March 2022

Question

Provide a mapping of climate adaptation metrics / measurement approaches currently in use across multiple sites and governance levels. Also provide information on the Global Goal on Adaptation (GGA) and tracking progress on climate change adaptation.

Contents

1. Summary

As adaptation implementation grows there is a need to examine the outcomes of adaptation for effectiveness, suitability, justice/ equity, as well as synergies and trade-offs with mitigation and other societal goals (e.g. maladaptation) (New et al., 2022). The field of climate change adaptation metrics is complex and fast-changing. Given the highly contextual nature of adaptation (i.e. that it can take many different forms in a large diversity of settings) and the array of applied definitions of adaptation and "success", there is no single global set of adaptation metrics and indicators or definition of adaptation success.

There is a burgeoning literature on the Global Goal on Adaptation (GGA), how to measure it and adaptation metrics. However, the landscape is scattered and the subject is very complex, because adaptation itself is complex – taking place in different locations, at different scales, in highly context-specific circumstances, across sectors, and being closely intertwined with development outcomes. Climate impacts and the effects of adaptation measures themselves spill across national borders, although adaptation is still treated as a largely domestic issue despite the global rhetoric of the GGA. This makes an aggregate global goal extremely technically challenging and tracing the plethora of existing indicators and metrics difficult. Furthermore, there is relatively few specific literature directly on the topic of global measurement of adaptation. This rapid review provides information on some of the metrics and measurement approaches in use across national and sub-national government levels. It gives a brief discussion of the issues around measuring the GGA, flags some key resources in this area and also touches on some initiatives and guidance aimed at helping users to select metrics (e.g. the International Platform on Adaptation Metrics (IPAM) and the Global Adaptation Mapping Initiative (GAMI)). This is not a systematic review and given the time limitations and the number of adaptation metrics approaches in use, it is only able to provide a small snapshot of current research.

There are a number of challenges, issues and debates with developing comparative metrics and these are also touched upon in this rapid review. A lack of common definitions and standards for metrics hinder effective comparisons; and practical and conceptual difficulties (e.g. aggregation, externalities, breadth vs. depth of data) developing composite, aggregable metrics that can support cross-sectoral, national overviews help explain the absence of suitable adaptation metrics (IPAM, 2021: 5). Further challenges include competing objectives and definitions of adaptation and the focus of previous adaptation assessments on processes and outputs (e.g. policies and plans) rather than outcomes (i.e. risk reduction). Challenges for monitoring and evaluation of adaptation include long time horizons, complexity (tangling of climate hazards with various social and economic systems), unavailability of data, and uncertainty (Bours, McGinn & Pringle, 2014). Clarity in defining metrics and objectives is key in trying to overcome issues (IPAM, 2021). A variety of approaches and data sources have been utilised in the literature to explore adaptation progress, including systematic reviews of observed adaptation, formal communications by Parties to the UNFCCC, and project documents to international funding agencies; these each contribute additional knowledge, but also demonstrates limitations, so that there is no single 'best' assessment approach and further work is needed (New et al., 2022).

There are some key papers on adaptation metrics that this rapid review heavily draws on and it is recommended these are consulted for deeper and more detailed discussions and examples. These include: Adaptation Committee, 2021; Christiansen, Martinez and Naswa, 2018; Leiter et al., 2019; New et al., 2022; and UNEP, 2021; 2017.

2. Assessing adaptation and the Global Goal on Adaptation (GGA)

Global Goal on Adaptation (GGA)

Adaptation actions are taking place across every world region and across a wide variety of sectors, but little evidence exists of their outcomes in terms of climate risk reduction (high confidence – New et al., 2022: 3030). To advance adaptation and bring attention to its progress, needs and shortfalls the Global Goal on Adaptation (GGA) was outlined in the Paris Agreement (see Box 1); the Paris Agreement also encourages countries to engage in monitoring, evaluating and learning (MEL) from adaptation plans, policies and actions (Pringle, Thomas & Strachan, 2021: 3). It is expected that aggregated global assessments of adaptation will complement place-specific assessments and help answer key questions of climate policy such as around what progress is being made and where are the gaps (UNEP, 2017; Adaptation Committee, 2021; New et al., 2022). However, methodologies for the global stocktake in relation to the GGA although being investigated have not yet been fully developed, with few scientific studies exploring this (UNFCCC, 2019; Craft & Fisher, 2018). (New et al., 2022: 3034).

Going into the UN Climate Change Conference in Glasgow in November 2021 (COP26), little progress had been made in defining and operationalising the GGA. In recognition of the need to strengthen action on adaptation, parties at COP26 agreed to launch the 2 year Glasgow-Sharm el Sheikh Work Programme on the GGA (The GlaSS). Objectives of this work programme can be found in Box 1 and include to “Enhance the understanding of the global goal on adaptation.” “Contribute to reviewing the overall progress made in achieving the global goal on adaptation” and “Facilitate the establishment of robust, nationally appropriate systems for monitoring and evaluating adaptation actions” (UK Government, 2021: 6). However, how global adaptation progress and “success” can be measured meaningfully is still a contentious point with many complexities and limitations, varying views and no clear answer.

Within the GGA there are three internationally agreed targets: enhancing adaptive capacity; strengthening resilience; and reducing vulnerability (see Box 1). However, there are no universally agreed definitions of these terms and these are often used inconsistently and interchangeably; furthermore, these targets are over-lapping and interlinked, further complicating measurement (Craft & Fisher, 2018). This means “there is no consensus on a single framework that can universally accommodate all conceptualisations of adaptation” (Beauchamp, da Silva Bernardo & del Pilar Bueno, 2021: 2). Another key aspect of effectively operationalising the GGA will be “striking a balance between its “global” purpose, whilst providing sufficient flexibility for countries to describe their own adaptation objectives and progress” (Pringle, Thomas & Strachan, 2021: 3). Wilkinson and Dupar (2021: 4) argue that “for national adaptation needs and progress to be meaningfully represented in a GGA, a common framework is needed for (a) measuring climate risks in critical sectors; (b) identifying and prioritising adaptation options; (c) developing an investment and financing plan; and (d) setting targets and measuring progress.” The framework of the GGA will potentially influence what type of adaptation action will be prioritised in the future or be “counted” (Beauchamp, da Silva Bernardo & del Pilar Bueno, 2021). Beauchamp, da Silva Bernardo & del Pilar Bueno (2021) further suggest that instead of searching for metrics or an “unhealthy focus on indicators,” a focus on equitable processes and systems that can reflect the context-specific nature of adaptation may be more productive

(Beauchamp et al., 2021: 2). Currently, there is no consensus on how adaptation progress at the global level can be tracked (New et al., 2022: 3034).

Box 1: The GGA in the Paris Agreement and at COP26

Article 7 of the Paris Agreement established the Global Goal of *"enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate response in the context of the temperature goal"* and confirmed that the Global Stocktake (GST) will review the overall progress in achieving this goal in 2023.

Source: https://unfccc.int/sites/default/files/english_paris_agreement.pdf

At COP26, the GGA work programme objectives were set out as to:

(a) Enable the full and sustained implementation of the Paris Agreement, towards achieving the global goal on adaptation, with a view to enhancing adaptation action and support;

(b) Enhance understanding of the global goal on adaptation, including of the methodologies, indicators, data and metrics, needs and support needed for assessing progress towards it;

(c) Contribute to reviewing the overall progress made in achieving the global goal on adaptation as part of the global stocktake referred to in Article 7, paragraph 14, and Article 14 of the Paris Agreement with a view to informing the first and subsequent global stocktakes;

(d) Enhance national planning and implementation of adaptation actions through the process to formulate and implement national adaptation plans and through nationally determined contributions and adaptation communications;

(e) Enable Parties to better communicate their adaptation priorities, implementation and support needs, plans and actions, including through adaptation communications and nationally determined contributions;

(f) Facilitate the establishment of robust, nationally appropriate systems for monitoring and evaluating adaptation actions;

(g) Strengthen implementation of adaptation actions in vulnerable developing countries;

(h) Enhance understanding of how communication and reporting instruments established under the Convention and the Paris Agreement related to adaptation can complement each other in order to avoid duplication of efforts;

Source: https://unfccc.int/sites/default/files/resource/AC_report_CMA_decision_GGA.pdf

Adaptation M&E, metrics and indicators

The field of adaptation monitoring and evaluation (M&E) has continued to progress since the 2015 Paris Agreement, specifically an appreciation of the challenges and opportunities presented when developing adaptation metrics. A burgeoning literature base is developing, looking at the global, national and local levels. National Adaptation Planning (NAP) documents and processes in countries have also been increasing, triggering an interest in developing national level M&E systems and frameworks (Pringle, Thomas & Strachan, 2021: 4). Although still limited, there is an increasing number of systematic reviews to assess emerging knowledge and gaps in the

huge and rapidly expanding volume of research into climate change adaptation – these help to take stock of insights from empirical research on adaptation progress, complementing efforts to track adaptation on the ground (e.g. Berrang-Ford et al., 2021).

A key recent publication on the GGA was the Adaptation Committee's technical paper on *Approaches to reviewing the overall progress made in achieving the global goal on adaptation* (Adaptation Committee, 2021). This outlines the myriad of challenges in measuring adaptation at the global level when adaptation action is inherently national and local, including the wide range of definitions for key concepts, and the large gap between theory and practice on the ground in relation to the GGA. It highlights the issues experienced by adaptation monitoring and evaluation practitioners in recent years and reflects on approaches which could be of use in the context of the GGA.

Measuring and assessing adaptation effectiveness is notoriously difficult, with most attempts focusing on short-term results and outputs that rely on easily quantifiable indicators and provide little information on the actual effectiveness of adaptation (outcomes and impacts) (New et al., 2022: 3032; Leiter et al., 2019). Both adaptation and resilience are complex to measure and require multiple metrics for different actors, purposes and time-horizons (UNFCCC, 2019: 9). The recently released Contribution of Working Group II to the Sixth Assessment Report (AR6 WGII) of the Intergovernmental Panel on Climate Change (IPCC) includes a chapter on decision making options for managing risk in adaptation (Chapter 17, New et al., 2022). This chapter also explores M&E of adaptation, highlighting how it can be conducted for various purposes and in a wide variety of contexts (ranging from the local to the global) and that these factors determine the suitability of particular approaches (New et al., 2022: 3031). Many different frameworks and approaches exist for M&E of adaptation and resilience, including sector-specific ones (Schipper & Langston, 2015; New et al., 2022: 3031). But much of this guidance is aimed at the local, project level rather than at the national or cross-sectoral levels or that can be applied at different scales, and with a focus on processes and outputs rather than achieved outcomes (New et al., 2022: 3032). The AR6 WGII report finds that "multiple complementary approaches combined with higher frequency data collection produce a more elaborate picture of the effects of adaptation and resilience responses" (New et al., 2022: 3032; Jones, 2019a, 2019b).

There is no one-size fits all approach to adaptation and resilience measurement, and no set of all-purpose and globally applicable standard indicators that could comprehensively measure adaptation (high confidence) (New et al., 2022: 3032; Leiter & Pringle, 2018) (see Box 2 for a brief discussion of definitions for indicators and metrics). There is also "an unrealistic expectation of what indicators can accomplish" according to the literature reviewed, and alternative methods exist that also provide insights into adaptation progress. With the complexities and limitations related to measuring adaptation many global assessments, such as the Sustainable Development Goals (SDGs), have reverted to easily quantifiable proxies (such as 'number of countries with a plan' under SDG 13), but these simplistic metrics do not reveal whether action is taking place or is effective (UNEP, 2021).

Indices (the combination of multiple indicators into a single score) to compare countries' e.g. vulnerability are widely used but have large weaknesses and limitations that limit their value for global measurements, with discrepancies between different country rankings and being highly influenced by their composition (e.g. data, indicator selection, weighting) (New et al., 2022: 3032; Leiter et al., 2019: 10). Key limitations of indices are that their results are sensitive to the chosen

methodology and that the aggregated index score hides the underlying factors which caused the change year on year (Leiter et al., 2019: 10).

Box 2: Definitions of indicators and metrics

There are various definitions of indicators and metrics in the M&E literature, with terms often used interchangeably. This rapid review does not prescript to a certain definition, but provides the below as indicative definitions of how the landscape of indicators and metrics for adaptation success can be viewed.

Indicator: A quality or trait that suggests ("indicates") effectiveness, progress, or success.

Metric: A variable that can be measured (if quantifiable) or tracked (if qualitative) that represents the indicator.

Source: Arnott, Moser & Goodrich, 2016: 384

Challenges in assessing adaptation

There are a number of key reports related to adaptation metrics (Adaptation Committee, 2021; Christiansen, Martinez & Naswa, 2018; UNEP 2021, 2017). The UNFCCC's Adaptation Committee in particular has done significant work on adaptation metrics and the GGA. The recommendations for COP26 on the GGA from the Committee's annual report covering November 2020 to September 2021 provide a good summary of what is needed for assessing adaptation progress and the challenges (see Box 3). Another potentially seminal report on adaptation metrics will be that of the Working Group II of the IPCC and the UNFCCC's Adaptation Committee, who have been tasked with preparing a "'technical paper on assessment of adaptation needs and their application, as well as the related gaps, good practices, lessons learned and guidelines' (CMA/2018/: 31)" (Wilkinson & Dupar, 2021: 6) for publication by November 2022.

There are a number of major challenges and issues with developing comparative adaptation metrics and indicators. An important point is that "adaptation has no common reference metrics in the same way that tonnes of GHGs or radiative forcing values are for mitigation" (IPCC, 2014: 853; Leiter & Pringle, 2018). Adaptation progress assessments therefore have to specify what exactly they're measuring and how (New et al., 2022: 3034). Furthermore, climate change effects can be different on different communities in the same location due to e.g. differential human vulnerability, and adaptation can mean different things to different people (Thomas et al., 2019; New et al., 2022: 3034). There is also the issue of measuring what "can" be measured (e.g. results and outputs), rather than what "should" be measured (e.g. outcomes and effectiveness), especially as adaptation is long term (Araos et al., 2021). Hence, determining the collective appropriateness and effectiveness of adaptation responses is different from simple aggregates of national and sub-national information (UNEP, 2017). Another key issue is balancing comparability and aggregation with the need to retain context-specific detail of adaptation. The general lack of knowledge on adaptation progress is associated with further measurement challenges, including how to account for changing effectiveness with changing climate risk levels over time (New et al., 2022: 3034). Another limitation is the availability of consistent data on

adaptation (quantitative or qualitative), which is needed for a global assessment, with globally available yet generic data versus more detailed yet patchy data regionally or locally (New et al., 2022: 3036). Craft and Fisher (2018) identify four main challenges to designing a meaningful assessment for the GGA. Namely: designing a system that can aggregate results; managing the dual mandate of reviewing collective progress and informing the enhancement of national level actions; methodological challenges in evaluating adaptation; and political challenges around measurement in the climate regime.

Aggregating metrics to give a collective assessment presents a number of issues, including: indicator selection, the comparability and quality of data sources, different objectives and framings for adaptation, and the additionality of adaptation actions (Bours, McGinn & Pringle, 2014; Christiansen, Martinez & Naswa, 2018; UNEP, 2017). There continues to be a gap between practice and theoretical approaches to aggregation, as noted by Berrang-Ford et al. (2019), who review existing adaptation assessment frameworks and conclude that no frameworks currently meet the challenge of aggregation needed for the GGA. Leiter (2015) highlights how there are often limited connections between project and programme M&E information on adaptation and national-level adaptation M&E. This is a major limitation as adaptation takes place at multiple scales, so combining data from these different national and sub-national levels is needed to form “a complete picture of the adaptation progress” (Leiter, 2015: 117). Leiter (2015) identifies three ways that adaptation results can be linked across scales in M&E systems: (i) standardised indicators as used in global climate funds such as the Adaptation Fund and the Global Environment Facility (aggregation); (ii) common themes with different indicators at different levels (i.e. not standardised) as planned in the Mexico and South African adaptation M&E systems; and (iii) informal links and synthesis of results across scales as used in Norway and Germany. The three avenues are not mutually exclusive and can be combined to offset each other’s limitations.

The AR6 WGII also highlights the need to keep away from a simplistic dichotomy of adaptation interventions as being either successful or maladaptive, but instead should be considered as two ends of a continuum of risk management strategies. Local context specificities will determine the positive and/or negative outcomes of adaptation (New et al., 2022: 3023).

Box 3: Adaptation Committee recommendations on the GGA for COP26

The Adaptation Committee has produced a number of reports on adaptation metrics. In the Report of the Adaptation Committee (AC) that covers November 2020 to September 2021, in considering approaches to reviewing overall progress made in achieving the GGA, the Committee put forward recommendations for consideration by the Conference of the Parties and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (at COP26), and the flexible workplan of the Adaptation Committee for 2022–2024 (full list of recommendations can be found in UNFCCC, 2021: 18, para 86). A selection of these recommendations include:

(a) Take note of the **methodological, empirical, conceptual and political challenges identified in the technical paper of the AC** on approaches to reviewing the overall progress made in achieving the global goal on adaptation and consider ways of addressing and prioritizing further understanding of the existing methodologies, conceptual and data gaps, and trade-offs[…];

(b) Emphasize that the approach to reviewing overall progress made in achieving the global goal on adaptation will **manage various trade-offs** between key criteria for assessing adaptation progress, such as between aggregability and sensitivity to national context; between aggregability and coherence; and between feasibility of reviewing overall progress on adaptation and aggregability and the ability to conduct longitudinal assessments;

(c) Emphasize that the approach to reviewing overall progress made in achieving the global goal on adaptation must also satisfy the dual mandate of the global stocktake of assessing collective progress on adaptation and informing the update and enhancement of national-level adaptation actions;

(d) Recognize that **understanding progress on adaptation requires functioning monitoring and evaluation systems at the subnational and/or national level**, and encourage Parties to use existing monitoring and evaluation tools suited to their national context;

(e) Recognize that, in order to understand progress on adaptation, adaptation action undertaken must be reported[…];

(f) Recognize that **combining various approaches can generate a more holistic picture** of adaptation progress and help to balance the strengths and weaknesses of the different approaches;

(g) Consider using **a basket of approaches** in the process of assessing overall progress in achieving the global goal on adaptation, informed by the relevant technical paper of the AC, taking into account the challenges, limitations and advantages of each approach;

(h) Strongly encourage Parties to prepare and submit an adaptation communication as soon as possible[…]

Source: UNFCCC, 2021: 18, para 86

Lack of evidence on adaptation outcomes

Evidence on the adaptation outcomes (risk reduction) of projects remains very limited. Singh et al. (2021) highlight that the evidence is mixed on what "effective adaptation" looks like and how it can be supported. They argue that how adaptation is understood is key to how effective adaptation will be framed, summarising eleven articulations of adaptation effectiveness based on an extensive review of the research and practice literatures. This is important to consider in the measurement of the GGA, as there are very different interpretations of adaptation effectiveness arising from different epistemological and disciplinary entry points. They conclude "how effectiveness is framed will significantly impact adaptation implementation and outcomes" (Singh et al., 2021: 1). They apply the 11 different frames to empirical cases, showing that when viewed from different frames the evaluation of adaptation progress changed. Thus illustrating "how definitions of [effective adaptation] and their associated metrics shape what we assess as effective and calls for using combinations of [effective adaptation] frames when tracking adaptation outcomes" (Singh et al., 2021: 9).

Araos et al.'s (2021) global assessment of how equity is integrated in planning and implementation of adaptation responses utilises the Global Adaptation Mapping Initiative (GAMI) database (see section below on GAMI). Their study finds a lack of existing peer-reviewed empirical research on adaptation actions, and specifically that attention to equity is not equally incorporated into adaptation research across geographic regions, topical sectors, or marginalised groups. Most papers lack details that "could answer more complex questions about the quality of outcomes, specifically in terms of procedural and distributive justice, the extent to which marginalized groups influence the planning process, and whether their vulnerability is reduced" (Araos et al., 2021: 9). Another systemic global review of evidence on human adaptation to climate change using the GAMI database by Berrang-Ford et al. (2021: 992) also found that the vast majority of the 1,682 papers reviewed "lacked detailed accounting of how and to what extent responses lower climate risk, as the authors often assumed or implied risk reduction" and that the majority of papers focused on a single sector. Despite some limitations to the study (e.g. some evidence may be in grey literature), Berrang-Ford et al. (2021) argue that this highlights the inadequacy of the current methods and evidence base available to critically assess and report on the effectiveness of adaptation responses. Furthermore, the role of adaptation interventions in reducing vulnerability in developing countries has been called into question (Eriksen et al., 2021: 12), with calls for "the next generation of adaptation measures to move from incremental and technical adaptation to transformation, where adaptation is seen as a social change process…Such adaptation requires paying close attention to the paradigms we are in and addressing the underlying causes of vulnerability and climate change." In particular, the politics of framing (who defines adaptation practices and success and for whom, where, why) and of scale within adaptation interventions need to be explicitly tackled, as "adaptation interventions are imbued with the exercise of power in participation, definition, scale and knowledge, often embodying a skewed politics that contradicts the very goal of vulnerability reduction" (Eriksen et al., 2021: 9).

The limitations discussed, the lack of data and the importance of context make comparative assessments of adaptation across nations, regions or responses challenging. Key components of research design necessary for adaptation tracking research to produce rigorous, comparable and usable insights about adaptation across nations and sectors include: (i) a consistent and operational conceptualisation of adaptation, (ii) comparable units of analysis, (iii) comprehensive

datasets on adaptation action, and (iv) coherence with the understanding of what constitutes adaptation (also known as the 4Cs of adaptation tracking) (Ford & Berrang-Ford, 2015). For comparative adaptation progress assessments transparency and reflectiveness on how adaptation and effectiveness are defined and measured is also key – with clarity of concepts and explanatory variables (New et al., 2022: 3034).

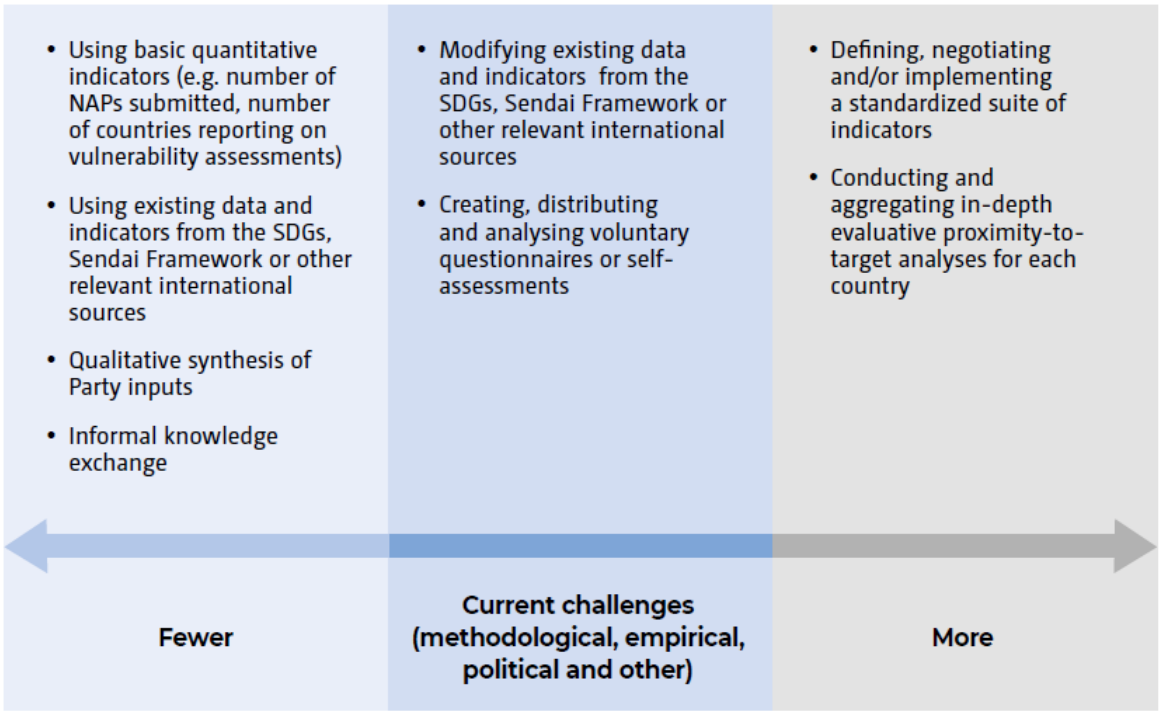
No common set of Indicators and metrics for adaptation

As explored above, indicators and metrics have important limitations when employed to measure complex embedded social change processes like adaptation, as they cannot explain how or why change did or did not happen. Some key limitations include: metrics that are appropriate in measuring the results of adaptation at the local or project level may not be appropriate at the national or international (aggregate) level; different specific metrics are often used in different sectors; and the context-specific nature of adaptation (including specific local economic, environmental or social contexts) could make it necessary to use different metrics even for activities at the same scale and in the same sector (Christiansen, Martinez & Naswa, 2018). Hence, the context-dependence of adaptation outcomes and a lack of common definitions and standards for metrics hinder effective comparisons; and practical and conceptual difficulties developing composite, aggregable metrics that can support cross-sectoral, national overviews help explain the absence of suitable adaptation metrics (IPAM, 2021: 5). Arnott, Moser and Goodrich (2016), for example, undertook a systematic review of adaptation indicators and metrics, with a focus on approaches developed for cities anywhere and by US cities in particular. Their stocktaking reveals a hugely broad landscape of approaches, contexts, and ultimate purposes, with “a heterogeneity that cuts across geographic scale, sector, and domain and seems to suggest little coherence at this time” (Arnott, Moser & Goodrich, 2016: 389). Further challenges include competing objectives and definitions of adaptation, and different stakeholder needs and decision-making objectives (IPAM, 2021: 5). It is also very difficult to define impact indicators that show actual progress towards increased resilience and common metrics for success are lacking (Leiter & Pringle, 2018).

Given the range of ways adaptation to climate change can occur (at multiple spatial and temporal scales and sectors), “adaptation does not have a common reference metric to measure success [and]…Instead, successful adaptation needs to be defined in a particular context” (Leiter, 2015: 118). Furthermore, establishing the exact progress of adaptation is more difficult than traditional development indicators as adaptation is not an outcome in itself (i.e. “in order to assess adaptation progress, proxies for measuring ‘reduced vulnerability’ or ‘increased resilience’ will be required” (Bours, McGinn, & Pringle, 2014: 5)). Hence, the choice of adaptation indicators that appropriately frame and assess progress is key and the subject of much debate. The Adaptation Committee (2021) argues that a standardised approach to assess adaptation progress carries the risk of masking both the sensitivities of national contexts in terms of exposure and vulnerability to climate change, and the divergence of approaches to monitor, evaluate and report on adaptation action. Araos et al. (2021: 2) agrees that “there is no single database that documents adaptation responses across the world, and there is no standardized method for conducting such a global-scale analysis.” Furthermore, the application of differing approaches shows that there is no single ‘best’ approach or data source to assess global progress on adaptation (News et al., 2022: 3036).

Discussions around the GGA assessment have moved away from top-down indices and globally imposed indicators, but there is a difficult need to balance methodological consistency and robustness with a flexible, bottom-up approach (Pringle, Thomas & Strachan, 2021: 9). It is increasingly acknowledged that multiple sources of information complement each other and new approaches for tracking adaptation progress are beginning to emerge that allow for different types of information (qualitative and quantitative, evaluative and descriptive, scientifically-based and traditional knowledge systems) (Adaptation Committee, 2021; Leiter et al., 2019). The Adaptation Committee (2021) draws attention to the breadth of approaches to assessing adaptation progress and the challenges they face, summarising them as a spectrum of general approaches from those with fewer to those with more current challenges (e.g. methodological, empirical, political, etc.) (see Figure 1).

Figure 1: Spectrum of approaches to assessing adaptation progress and magnitude of associated challenges



Source: Adaptation Committee, 2021: 64 reproduced under CC BY-NC-SA 4.0

The need to include both qualitative and quantitative approaches and employ mixed methods to ensure a nuanced and holistic assessment of the adaptation progress was reflected in the decision text on the GGA from COP26 (see Box 3) (Pringle, Thomas & Strachan, 2021: 7). Pringle, Thomas and Strachan (2021: 8) argue that "It can be read as a tacit acknowledgement that the context-specificity of adaptation means that the GGA cannot be distilled into a small number of globally applicable, quantifiable goals and still retain relevance and utility." Using a broad combination of qualitative, quantitative, and binary indicators, including process-based and outcome-based indicators, has been suggested to help overcome the complexities and uncertainties inherent in climate change (Bours, McGinn, & Pringle, 2014; Leiter, 2015). UNEP's

Adaptation Gap Report 2021 concludes with similar findings that there are “difficulties in tracking transformational adaptation processes, partly because data collection on such future processes has not really begun in the scientific and policymaking communities” (UNEP, 2021: 70). It calls for the “scaling up of efforts to develop methods that combine metrics or indicators on resilience (grounded in empirical studies and recognizing the contextual nature of resilience and adaptation); adaptation performance in terms of implementation; and the effects on actual risk reduction now and in the future (in relation to measuring “successful adaptation” and the risk of maladaptation)” (UNEP, 2021: 70). New approaches to allow the combination of different types of information at multiple scales is an emerging challenge (UNEP, 2021: 70). According to Berrang-Ford et al. (2019) combining different approaches and integrating data on climate risk levels, policy measures, implemented actions and their effects on climate risk reduction is currently regarded the most robust approach and provide the most comprehensive picture of global adaptation progress.

National Adaptation M&E Systems

A Grantham Research Institute policy brief outlines findings from a global review of national laws and policies on climate change adaptation (Nachmany, Byrnes & Surminski, 2019). It finds that, at the time of the review, at least 170 countries address adaptation in executive policies and more than 120 countries have at least one framework document that addresses climate change adaptation. Tracking national adaptation plans implementation is key for understanding their effectiveness, and can support assessing the success of adaptation and the risk of maladaptation (New et al., 2022: 3033). It can also inform both national and international reporting on adaptation (Craft & Fisher, 2018; UNFCCC, 2019).

A recent systematic review by Leiter (2021) explores M&E systems of national climate change adaptation plans (NAPs), producing a comprehensive inventory of 63 countries’ NAP M&E systems. The study determines the extent of NAP M&E involvement globally and countries’ respective status compared to a baseline from UNEP’s 2017 Adaptation Gap Report, only counting evidence of M&E having actually been undertaken rather than *intentions* for NAP M&E. It finds “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” (Leiter, 2021: 179). However, over 60% of countries that adopted a NAP do not systematically assess its implementation, supporting calls for greater attention to assessment of adaptation planning implementation and effectiveness. Out of the 70 countries that have adopted a NAP, it was found that 11 have published both a progress report and completed an evaluation of their NAP, namely Belgium, Cambodia, Chile, France, Germany, Mexico, the Netherlands, South Korea, Spain, Switzerland and the UK. However, the 23 countries that have reported on implementation progress have done so in very different ways and without convergence to common metrics, underscoring the lack of common practices of similar metrics or approaches that could form the basis for cross-country comparative assessment.

There are no universally accepted global adaptation MEL systems (Adaptation Committee, 2019). Countries use a wide range of diverse and country-specific systems and metrics to track national adaptation progress and monitor the implementation and results of national adaptation strategies, policies and plans, often coordinated with reporting under other international agendas (Rai, Smith & Brooks, 2019: 31; UNFCCC, 2019). There were some “early movers” in relation to the development of national adaptation M&E systems including Cambodia, Columbia, France,

Germany, Kenya, Morocco, Mozambique, the Philippines, South Africa and the UK (Leiter & Olivier, 2016). These countries, and others, can provide lessons and experiences for other countries. The importance of learning is increasingly being recognised and considered in M&E systems. Leiter and Pringle (2018: 42) argue that "deliberately designing M&E to facilitate learning may lead to important insights into progress with adaptation and is a much needed and complementary addition to the use of indicators for accountability purposes."

There are different approaches and frameworks that countries have utilised to help develop M&E systems, some have used more than one approach. According to Smith et al. (2019: 5), Kenya, Mozambique and Cambodia used IIED's Tracking Adaptation and Measuring Development (TAMD) framework to assess institutional preparedness and capacity to confront long-term adaptation issues. Ethiopia, Nepal, Senegal and Mali are also using TAMD and the holistic approach to adaptation MEL based on the theory of change from the Building resilience and adaptation to climate extremes and disasters (BRACED) programme to address shifting baselines by contextualising climate data. Cambodia, the Philippines and Morocco are investing in or harnessing existing national M&E systems and databases to deal with operational issues around financing M&E by building on their existing systems (Smith et al., 2019: 5). Coger, Corry, and Gregorowski (2021: 3) recommend that MEL of locally led adaptation requires a long-term systemic shift from traditional MEL to MEL that is locally led, context-aware, and itself adaptive, balancing asymmetries in power and accountability.

Examples of country M&E systems and metrics in operation (most of which have undertaken an evaluation of the implementation of the national adaptation plan or strategy) include:

- **Cambodia:** Overall strategy for climate change response in the Cambodia Climate Change Strategic Plan (CCCSP 2014 – 2023). In alignment with CCCSP, key line ministries have developed sectoral Climate Change Action Plans (CCAP) (GIZ, 2017). The Cambodian M&E framework is indicator-based and operates at national as well as sub-national levels with all key climate sensitive sectors taken into account. It adopts a twin-track approach measuring, on the one hand, how well the national institutions are in managing climate risks – through institutional readiness indicators using scorecards – and, on the other hand, how successful climate interventions are in reducing vulnerability or lowering carbon emissions – through impact indicators. The baseline results reflect the position of Cambodia in 2014. The core set of indicators of the national framework are produced and analysed annually. A commune database is the main channel for accessing local data. Next steps include harmonisation of national and sub-national M&E frameworks (GIZ, 2017). A mid-term review was carried out in 2019 (Garcia & Chey, 2019) and concludes that the M&E framework has a robust theory of change and appropriate approach with good baselines. However, there are issues including: readiness and impact indicators are not fully aligned, the temporal scope of milestones is problematic, some milestones are not pertinent or vague (Garcia & Chey, 2019).
- **Germany:** Combined approach to linking information across scales through synthesising available evaluation results and reporting them alongside national standardised indicators (Leiter, 2015). The German Adaptation Strategy (DAS) deals with impacts of climate change on nature and society, outlining preliminary options for adaptation to climate change in 15 action fields. An indicator-based monitoring system has been established to track developments in climate change impacts and the adaptation process on the basis of existing monitoring data. The first indicator-based

monitoring report on DAS was published in May 2015 as part of the first progress report on DAS. The report will be updated every four years. Regular and systematic evaluation of the national adaptation strategy is also planned, to evaluate adaptation work in Germany on the strategic and operational level as well as the targets achieved (van Rüth & Schönthaler, 2018). The most recent monitoring report was released in 2019. In total, the DAS Monitoring Indicator System comprises, since redevelopment, 105 monitoring indicators, 56 of which describe climate change impacts (impact indica tors), while 44 describe adaptation measures or activities and conditions to support the adaptation process (response indicators). In addition, there are 5 monitoring indicators which span several action areas (Inter-ministerial Working Group on Adaptation to Climate Change, 2019). The evaluation revolves around five central questions that assess e.g. the implementation status of Germany's Adaptation Action Plan II, to what extent adaptation has been mainstreamed at the federal government level etc. The questions were answered through document analyses, interviews, a survey on implementation status, and indicator analysis (Adaptation Committee, 2021).

- **Mexico:** Mexico General Climate Change Law (2012-18) provides a policy framing for adaptation M&E. In Mexico, the state level governments are autonomous entities in policy setting, institutional arrangements and decision making on Climate Change. By Law they are obliged to develop their state programs on climate change and should consider nationally proposed guidelines on 'Minimum Elements.' The state of Veracruz has been a pioneer for establishing climate change policy and legal instruments such as the Veracruz Program of Climate Change (PVCC) and the State Law for Mitigation and Adaptation of the Effects of Climate Change. The MRV and M&E system for the Sectorial Agendas on CC was complemented with the Indicator System for Adaptation on CC for the State of Veracruz (SI: Adapt-Ver). Both systems operate on a subnational state level; the aggregation level is horizontally and they are linked with regard to the adaptation axis. The MRV and M&E system is composed of 19 key sectorial agendas, meanwhile the SI: Adapt-Ver complements information on adaptation for the state observing six categories. The SI: Adapt-Ver has a rather qualitative character and is primarily based on people's perceptions. No result or impact indicators were considered due to the lack of information or data that could provide a baseline. The evaluation is conducted through a set of key questions asking for adaptation advances in the state level, also for evidence of existing tools and policy instruments targeted to reduce vulnerability and to facilitate adaptation processes, as well as on social and governmental capacities (GIZ, 2017).
- **Norway:** Norway's initial approach to assessing its adaptation progress did not rely on indicators or a formal M&E system but made use of existing systems in place for tracking progress and underscored the importance of continuous learning in adaptation. The process made use of a large-scale knowledge-exchange process that included both informal means of gathering information and learning about adaptation progress, such as stakeholder dialogues and network support, as well as formal means, such as research and regular quantitative surveys of municipalities. The results were then fed into national vulnerability and adaptation assessments that assessed the country's progress on adaptation. This approach meant that reporting burdens placed on municipalities were reduced, it is also flexible and more responsive, and avoids putting in place a rigid, sequential process for assessing progress and learning. In a UNFCCC national communication in 2018, Norway noted that a national system for M&E of adaptation is

under way; therefore, this approach may change in the future (Adaptation Committee, 2021: 55).

- **Philippines:** Partly draws on data from subnational levels but main focus is on a national plan. The National Climate Change Action Plan (NCCAP) centres around seven strategic priorities and is the policy foundation for a results-based M&E system (RBMES). RBMES has been developed with outputs, outcomes and indicators defined for every strategic priority. The prioritization of indicators considered a number of criteria including data availability and coherence with sectoral performance indicators in order to build on, rather than duplicate, existing M&E systems. The implementation occurs in a phased approach initially starting with key output indicators and moving to outcome indicators as adaptation actions unfold (Leiter, 2015). Adaptation M&E is led by the Climate Change Commission (CCC), and the system is designed for learning from adaptation activities. An inter-agency M&E technical working group (TWG) was also established to set up the M&E system and help with its implementation, and there is also evidence of a number of different government agencies working together, through a well-defined coordination mechanism. The RBMES is well elaborated and has many strong features (such as, the longer timeframes for adaptation impacts are acknowledged and there is provision for evaluation of output-outcome causalities, and evaluation of near final impacts, as well implementation monitoring up to 2028). Development and climate change reporting are closely linked, and indicators in the RBMES have been cross-referenced with the Philippine Development Plan (PDP) Results Matrices and the performance indicators and major final outputs of relevant sectoral agencies (Smith, 2019).
- **South Africa:** Established a National Climate Change Response Monitoring and Evaluation System, which consists of five primary components: monitoring, evaluation, guidance, outputs, and feedback, learning, and review. The system includes three building blocks for adaptation, namely, climate information; climate risks, impacts, and vulnerability; and adaptation response measures. Nine crosscutting and cross-sectoral "desired adaptation outcomes" were developed to complement these building blocks. Together, these outcomes paint a picture of a more climate-resilient South Africa against which progress can be assessed. Six of these desired outcomes capture the inputs necessary to enable effective adaptation (e.g. capacity building, education, and awareness programmes for adaptation), and the remaining three capture the impacts of adaptation interventions (e.g. secure food, water, and energy supplies for all citizens). According to South Africa's latest biennial update report, a "traffic light" scoring approach has been proposed to assess the progress made towards the desired adaptation outcomes. It would aggregate information provided by different stakeholders and present it graphically. Over time, comparing these summaries is expected to shed light on the effectiveness of adaptation interventions and progress made. As part of the outputs component, the results of the evaluation process contribute to fulfilling South Africa's reporting obligations under the UNFCCC, including national communications and biennial update reports (Adaptation Committee, 2021: 48).
- **St. Lucia:** Has designed a "simple" and "ready-to-use" M&E system to track progress towards its NAP and the core elements of its broader climate change adaptation policy; it does not require the use of additional government resources. It is built in part on the foundation laid by the Pilot Program for Climate Resilience (PPCR), which collected information since 2012 to monitor the implementation of its projects in the country. The new system will work by collecting information through simple questionnaires on

measures that contribute to the implementation of the NAP or other adaptation initiatives. Questionnaires are distributed to members of the country's national climate change committee and agency representatives, and solicit descriptive information on elements such as whether sectoral strategies were elaborated, major projects and programmes that integrate adaptation, whether funding was secured for implementing the NAP or sectoral plan, whether adaptation-related partnerships were established etc. (whether not initiated, initiated, ongoing, or completed). Based on the completed questionnaires, St. Lucia's Department of Sustainable Development will complete a monitoring template that aggregates the information. As needed, the questionnaires will be complemented by individual or focus group interviews (Adaptation Committee, 2021: 55-56).

- **UK:** The UK Climate Change Act requires a regular five-yearly Climate Change Risk Assessment (CCRA). A separate, dedicated Adaptation Committee and secretariat exists within the CCC to conduct its assessments of adaptation progress and to advise the Government on the CCRA. To assess progress in adaptation in England, the Adaptation Committee has since 2010 used an evaluation method based on a two-part framework: (a) Indicator framework: the Committee collects indicators to assess trends in risk factors: hazard, vulnerability and exposure. They also collect indicators to assess trends in adaptation action, and impacts. (b) Decision making analysis: They assess the extent to which planning for climate change is taking place, including whether climate-sensitive plans and policies are adequately considering the risks and opportunities from climate change. This two-dimensional framework is used to assign a score to the progress currently being made in addressing each identified adaptation priority, with higher scores denoting better progress. The CCC uses a similar process to provide advice on adaptation progress to the UK's devolved administrations (CCC, 2020).

Given that adaptation is occurring across multiple scales, strengthening linkages between M&E systems across administrative levels and spatial scales could facilitate countries' implementation of multiple agendas and use of the M&E results (Adaptation Committee, 2019). However, reviews of national adaptation M&E systems by Hammill et al. (2014) indicates that issues of scale and cross-scale dynamics are seldom considered (Leiter, 2015) and approaches primarily focus on monitoring implementation rather than assessing outcomes. Empirical evidence remains limited on the quality and effectiveness of these M&E systems to facilitate "successful" adaptation action (New et al., 2022: 3033).

There is particularly a need to promote synergy between reporting requirements for the GGA and other international agendas (2030 Agenda for Sustainable Development and Sendai Framework) that already have defined universal indicators (UNFCCC, 2019). There is potential for improving connectivity across policy theme via M&E and adaptation metrics. Leiter and Pringle (2018: 40) highlight that "If the connections between these policy themes are explored more comprehensively, there is the potential to develop synergistic metrics that can inform decision-making nationally and below. A number of frameworks have been developed in recent years to help design adaptation MEL systems at the national level. For example, Brooks et al. (2019) propose a framework that is aligned with the principles enshrined in Article 7 of the Paris Agreement and the adaptation-related areas of the Enhanced Transparency Framework (EFT), and also to facilitate coherent global reporting.

3. Initiatives aimed at helping the selection of adaptation metrics

There are a number of initiatives and approaches aimed at help with the selection of adaptation metrics, which may help to provide progress insights to inform assessments towards the GGA and the global stocktake. This section highlights a small selection.

The Global Adaptation Mapping Initiative (GAMI)

A large international research collaboration, the Global Adaptation Mapping Initiative[1], has systematically tracked and synthesised the scientific literature on implemented adaptation published since 2013 (results have been published in a number of journal articles including Araos et al., 2021; Berrang-Ford et al., 2021). A total of 1,682 articles were included in the final GAMI dataset, which were then coded for 70 variables. The results were provided to author teams leading the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report (AR6), Working Group II.

International Platform on Adaptation Metrics (IPAM)

The aim of IPAM is to serve as an international reference platform for adaptation metrics, bringing together common metrics to monitor, evaluate, and foster adaptation and co-developing new metrics.[2] IPAM was launched in 2020 as the culmination of adaptation metrics convenings launched by the Moroccan Presidency of Conference of Parties to the UN Framework Conventions on Climate Change (COP22). IPAM structures its work in dedicated sector-oriented committees such as agriculture, cities, and water (IPAM, 2021: 2).

As part of their work, IPAM have introduced the Adaptation Metrics Mapping and Evaluation (AMME) Framework. AMME aims to collate and support interventions focused on adaptation metrics evaluation, providing a rational procedure and "practical guidance for mapping and evaluating available metrics and identifying the potential for developing new metrics" (IPAM, 2021: 5). The AMME Framework outlines five aspects "common" to all adaptation interventions, namely:

- purpose,
- stakeholder engagement, participation and communication strategies,
- stakeholder competencies and capacities,
- data and information, and,
- evaluation and good practice.

Each of these common aspects is viewed through three lenses which provide a focus on key metrics issues central to all interventions:

[1] See https://globaladaptation.github.io/index.html [accessed 01/03/2022] – also see under "Publications" for numerous sub-topics and associated articles.

[2] See https://adaptationmetrics.org/ [accessed 01/03/2022]

- stakeholders and their needs,
- a 'whole system' perspective, and,
- how metrics support decision making processes.

The implementation of the AMME Framework is undertaken in four steps – each with their own action checklists – and supported by a matrix which maps the coverage of existing metrics in relation to the mapping evaluation scope (see IPAM, 2021: 5).

RegionsAdapt

In relation to horizontal cooperation in adaptation, the RegionsAdapt initiative supports the monitoring, evaluation and reporting of adaptation plans and policies at the state and regional level (Setzer et al., 2020). After being a part of the initiative for four years members are expected to provide evidence of action taken to address the gaps identified in their adaptation plans or strategies and report their progress via the CDP States and Regions questionnaire. This phase coincided with the second round of higher ambition climate pledges (2020) under the Paris Agreement and is designed with the intent to provide data on the evaluation of adaptation action taken by members (Setzer et al., 2020).

Other global reviews of adaptation policies

There have also been a number of global reviews of adaptation policies published, as previously discussed. There was recently the soft launch of the NAP Global Network's NAP Trends platform, which shares the latest information and trends in NAPs to make it easy to access for the adaptation community. It is based on systematic reviews of NAP documents submitted to NAP Central, the portal for NAPs communicated to the UNFCCC.[3]

[3] Dedicated landing page not yet launched, but information can be found here https://napglobalnetwork.org/event/preview-of-nap-trends/

4. Examples of metrics and frameworks

In the absence of a global consensus on concepts and methodologies, practitioners in the field have developed de facto approaches and methodologies while implementing national and project-specific monitoring and evaluation systems (Christiansen, Martinez & Naswa, 2018). For illustrative purposes only, brief summaries for a selection of metrics have been provided in the table below. These metrics were chosen to provide an indication of the array of metrics out there, the different levels and sectors covered. See Adaptation Committee (2021); Schipper and Langston (2015); Coger, Corry and Gregorowski (2021); Leiter et al. (2019) for further examples and information.

Name & organisation	Level	Examples	Description	Lessons	Sources
Tracking Adaptation and Measuring Development (TAMD) - IIED	National & sub-national	Uganda	TAMD is a 'twin track' framework that evaluates adaptation success as a combination of how widely and how well countries or institutions manage climate risks (Track 1) and how successful adaptation interventions are in reducing climate vulnerability and in keeping development on course (Track 2). TAMD uses score cards to measure climate risk management effectiveness under Track 1 and bottom-up adaptation/development indicators to measure development performance in Track 2. The link between Track 1 and Track 2 is measured through a theory of change, also developed in a participatory process. The aim is to generate bespoke frameworks for	The key success factors and lessons from this process included using evidence from the bottom up and building consensus through participation. Building knowledge and skills as they moved along, coordinating and harmonising different processes and linking climate change and development indicators were also key. Having conducive country policy frameworks and the good working relationship between ACCRA with government secured cooperation throughout the process. Another important success factor was the partnership approach. The	Link Schipper & Langston (2015) Kajumba, Karani and Fisher (2016) Brooks et al. (2014)

			individual countries tailored to specific contexts. TAMD's dual approach can track adaptation at all levels and from all sources, from initiatives involving several countries, various interventions in a single country, and down to local projects. The framework focuses on climate specificity alongside livelihood improvements and other development focuses. TAMD was used in Uganda by ACCRA with eight ministries to collect indicators from five districts. The indicators were aligned to sectors and divided into outputs and outcomes through a highly consultative process that involved ministries, departments and agencies of government, local governments, urban authorities and civil society organisations.	connections between ACCRA, IIED, FTF, FAO, Care International in Uganda and key government ministries made the process fully participatory, and ensured it was owned by all stakeholders at both local government and national levels. Collaborating in this way gave a wider view and allowed cost-sharing of all the processes from community to national level.	
Devolved Climate Finance mechanism – DCF Alliance	Sub-national & National	Kenya Mali Senegal Tanzania	The Devolved Climate Finance (DCF) Alliance has worked in Kenya, Tanzania, Mali and Senegal to test and refine a devolved climate finance and planning mechanism. They have established institutions that enable communities to identify and oversee resilience-building investments, using bespoke planning tools that	Lessons learned from testing adaptation techniques at the village level are collated through wide community consultations designed to represent diverse social groups and people often marginalized in decision-	DCF Alliance (2019). Coger, Corry & Gregorowski (2021)

			incorporate valuable local knowledge and recognise the different ways climate change affects women, men and marginalised groups. The mechanism draws upon climate information services to enhance planning, and on monitoring and evaluation methods to support learning. The DCF MEL system is based on the TAMD framework and cantered on adaptive and flexible management across local and national levels. It is intended to strengthen existing monitoring, reporting, and verification processes in devolved government financing and planning processes. MEL systems continue to be a work in progress. Examples of specific innovations include the following: • Institutional scorecards assess the scope and quality of climate risk management processes and activities at the institutional level. • Household surveys seek to better understand changes in individual and community resilience. • Community-developed theories of change (ToCs) at the investment level	making, particularly women and young people. Innovations in planning, MEL tools and delivery of climate information services will require further development so as to be fully effective and to ensure continuation of efforts to fully integrate them into sub national and local government authorities (LGAs) processes. More advanced tools require technical expertise and nominated resources to be implemented, taking LGAs beyond their usual activities. Similarly, while LGAs recognise the need to develop MEL systems, implementing the TAMD framework in full has proved difficult to integrate. In order to embed the resilience and MEL tools that support the evidence base upon which the DCF mechanism's success rests, they need to be further simplified and to remain cost effective for actors to deploy and analyse them as part of	Link

			explicitly link the investments to expected resilience outcomes In Tanzania in 2014, adaptation planning committees (APCs) were established to build trust between donors and local stakeholders. APCs at the ward or communal level had the autonomy to establish budget priorities, while regional APCs would improve recommendations without vetoing local budget priorities. This mechanism improved the rigor of the resilience planning and ensured that local actors' needs were addressed while reassuring donors through a collaborative investment oversight process.	their national development data and statistics systems.	
Subjective evaluations of resilience (e.g. Subjectively Evaluated Resilience Score (SERS) approach) - Building Resilience and Adaptation and Climate to Extremes and Disasters (BRACED) programme	Sub-national	-	There are a number of different ways to run a subjective evaluation of resilience. Here the example of BRACED's Subjectively Evaluated Resilience Score (SERS) is used. SERS is a self-assessed questionnaire module that focuses on household resilience. It works by asking individuals to answer a range of questions about their household's resilience. Each question targets a specific resilience-related capacity,	Pros: - They capture bottom-up insights from those on the ground experiencing shocks and stresses. - They help reduce the burden of choosing hundreds of proxy indicators. Instead, people are asked to consider the factors that contribute to	Jones (2019a). Jones (2019b)

			with answers standardised using a Likert scale. Questions are designed to be cognitively simple, helping ensure that respondents clearly understand each question and can provide a quick and reasoned self-assessment. It is a small survey module that can be placed in any household survey and typically takes roughly three to five minutes (with a preamble and nine short agree/disagree scale questions). Answers are numerically converted (Strongly disagree=1, Strongly agree=5) and an individual's answers are then tallied up and used to compute an overall resilience score for each household. Final score can be computed in a number of ways but the simplest is to generate an equally weighted average of each of the resilience capacity questions. Lastly, the resilience score is standardised using a min-max normalisation, transforming the results in a score that ranges from 0 (not at all resilient) to 1 (fully resilient). Can be used for anything an objective evaluation can be used for, e.g.: understanding resilience on the	their own resilience and self-evaluate accordingly. - They are often much shorter than traditional objective approaches. Not only does this mean that surveys are cheaper and quicker to administer, but also it opens up new possibilities for resilience data collection – including the option of administering them via mobile phone surveys. - Can also be combined with other objective approaches where people's perceptions are factored in alongside a list of objective indicators. The SERS approach, for example, is designed to fit within (or be adapted to) most household-level resilience frameworks. Cons: - Difficulties in comparing across groups. - Personality traits and cognitive biases have to be considered. But many of	

			ground; comparing the resilience of different groups; tracking changes in resilience over time; and evaluating the effectiveness of resilience-building interventions. Subjective evaluations start from the premise that people have a valid understanding of their own ability to deal with current and future risks. They therefore seek to factor them into the measurement process directly. To capture these insights, subjective approaches rely heavily on people's own perceptions, judgements and preferences. Guidance and learning recommends SERS questions focus on overall resilience rather than hazard-specific resilience. They also recommend evaluators using the SERS approach seek to collect panel data to allow for more accurate comparisons over time (as well as across groups). Evidence from applying SERS in Kenya, Myanmar and Uganda (through BRACED) shows that, regardless of the combination of SERS capacity questions used the outcomes and results tend to be similar.	these issues can be addressed using careful survey design. - The use of subjective methods in the field of resilience is in its relative infancy and more needs to be done to understand the strengths and weaknesses of this new tool.	

The Global Adaptation Progress tracker (GAP-Track) - IDDRI & AFD	Global & National	Mauritius Senegal	GAP-Track aims to explore innovative and complementary ways of assessing global progress on adaptation to climate change. The GAP-Track leads three workstreams: the development of the methodological protocol; policy engagement through the support of a Steering Committee convening policy-makers, decision-makers and practitioners on adaptation from worldwide organizations; case studies to shed light on application of the approach, lessons learnt and opportunities for upscaling. Its methodology relies on an expert judgement exercise using a questionnaire matrix and scoring system for Representative Adaptation Challenges (e.g. coastal adaptation). The approach promotes cross scale applicability, flexibility, technical robustness of results and openness to a variety of resources and knowledge. Two- case studies are carried out for the pilot phase in 2021 focusing on coastal adaptation progress in Mauritius Island and Senegal. The new framework was inspired by previous work at IDDRI and activities	Pros: Structures a framing of adaptation at multiple scales using a common language informed by the question matrix. Supports regional to national and local stakeholders (adaptation planning and monitoring and evaluation systems), as well as possibly UNFCCC mechanisms, for example, towards enhanced structuring of the next generation of Adaptation Communications (e.g., organized by the six overarching questions of the GAP-Track framing). Given its cross-country entry point, the GAP-Track could support international cooperation on climate adaptation, in relation with the emerging challenges raised by transboundary climate risks. Some important lessons were learned from the pilot phase in terms of the question matrix, the	Link 1 Link 2

			carried out by other partners, including the UK Climate Change Committee.	case study results, methodological emerging questions, the selection of the experts, and potential and limitations for a broader application.	
C40's Climate Change Adaptation Monitoring, Evaluation and Reporting (CCA MER) Framework – C40 cities	Sub-national	Quito (Ecuador) Johannesburg (South Africa) Austin (USA).	C40 Cities network developed a monitoring, evaluation, and reporting framework to help guide the cities in the network as they seek to develop their own systems for assessing adaptation progress. The objectives of this framework include facilitating learning across cities, encouraging participation and engagement in inclusive climate action, informing decision making, enhancing transparency and accountability, and helping to make the case for adaptation actions. In this framework, comparability across cities is recognised as a potentially worthwhile endeavour, but this is secondary to the primary purpose of helping city practitioners design a system appropriate for their local circumstances that helps them advance towards the objectives outlined above. Accordingly, the	The three pilot cities (Quito, Austin and Johannesburg) confirmed the importance of ensuring that the MER framework reflects cities' priorities, institutional structures and capacities. Capacity and resources remain key challenges for cities to overcome, both in the implementation of the adaptation plans and in the monitoring of progress and achievements.	C40 Cities, Ramboll Foundation, Ramboll. (2019).

			framework includes a set of indicators from which city practitioners can select or tailor to their particular context as appropriate; where multiple cities make use of the same indicator, these results can be compared relatively easily across contexts. Indeed, the framework notes that "[w]idespread adoption of these indicators could enable benchmarking and standardisation of climate adaptation reporting among the world's cities, helping to build a more comprehensive picture of urban progress on climate adaptation" but that "unavoidable differences in data and methods at participating cities' disposal" will continue to render comparing findings difficult. Initial interviews were conducted with C40 cities engaged in adaptation monitoring to collect the lessons learned and explore the different approaches used. The framework was trialled in three pilot cities. As part of this project, materials and templates have been developed to support cities in developing their CCA MER. Cities are strongly encouraged		

			to adapt the materials to their individual context.		
Tracking Adaptation in the Agriculture Sector (TAAS) framework - FAO	National	Malawi Mozambique Zambia (UNFCCC, 2019 - no further info found on these pilots)	Framework and methodology to track progress in adapting agricultural sectors to the impacts of climate change. The target audience includes national decision-makers, planners, development partners, research institutions and practitioners working on climate change adaptation. Focuses on socio-economics, production, policies, and natural resources associated with agricultural adaptation. The 112 indicators presented for monitoring adaptation in the agriculture sector capture the links between adaptation processes and their outcomes, including effects on food security and nutrition. They are based partly on indicators previously defined by FAO, UNDRR and the UNFCCC and are grouped under four categories: natural resources; agricultural production systems; socioeconomics, and institutions and policy. These four major categories of indicators cut across the key entry points for adaptation. Four subcategories have been defined for	Pros: - In order not to impose unnecessary demands on countries' data collection and reporting efforts, the indicative list of indicators takes account of ongoing national efforts for reporting to major international mechanisms (including the SDGs and Sendai Framework for Disaster Risk Reduction) and existing data from various sources. - The choice of indicators depends on users' needs and the relevance and availability of data. Cons: - It is difficult to 'attribute' the results of tracking frameworks to the adaptation intervention in question. To address this	FAO (2017) UNFCCC (2019)

			each of the four main categories of indicators, bringing the total number of indicator subcategories to sixteen. It proposes an indicative list of process- and outcome-based indicators relevant to agriculture, for context-specific adaptation tracking. The methodology includes a scoring procedure, whereby indicators are given scores from 0 to 10, converted from raw quantitative and qualitative data. The scoring system matches the six levels of adaptation progress: very low, low, moderate, high and very high.	obstacle of attribution, a 'baseline' can be developed. However, baseline situations can change, especially with climate change - Data for indicator frameworks can be expensive to collect	

5. References

Adaptation Committee. (2021). Approaches to reviewing the overall progress made in achieving the global goal on adaptation: Technical Paper. Bonn: UNFCCC. https://unfccc.int/documents/309030

Araos, M., Jagannathan, K., Shukla, R., Ajibade, I., de Perez, E. C., Davis, K., ... & GAMI Team. (2021). Equity in human adaptation-related responses: A systematic global review. *One Earth*, *4*(10), 1454-1467. https://doi.org/10.1016/j.oneear.2021.09.001

Arnott, J. C., Moser, S. C., & Goodrich, K. A. (2016). Evaluation that counts: A review of climate change adaptation indicators & metrics using lessons from effective evaluation and science-practice interaction. *Environmental Science & Policy*, *66*, 383-392. https://doi.org/10.1016/j.envsci.2016.06.017

Beauchamp, E., da Silva Bernardo, C. & del Pilar Bueno, M. (2021). *Progressing the Global Goal on Adaptation — key issues*. IIED Briefing. London: The International Institute for Environment and Development (IIED). https://pubs.iied.org/sites/default/files/pdfs/2021-01/17773IIED.pdf

Berrang-Ford, L., Siders, A. R., Lesnikowski, A., Fischer, A. P., Callaghan, M. W., Haddaway, N. R., ... & Abu, T. Z. (2021). A systematic global stocktake of evidence on human adaptation to climate change. *Nature climate change*, 11, 989-1000. https://doi.org/10.1038/s41558-021-01170-y

Berrang-Ford, L., Biesbroek, R., Ford, J.D., Lesnikowski, A., Tanabe, A., Wang, F.M., Chen, C., Hsu, A., Hellmann, J.J., Pringle, P. & Grecequet, M. (2019). Tracking global climate change adaptation among governments. *Nature Climate Change*, *9*(6), 440-449.

Bours, D., McGinn, C., & Pringle, P. (2014). *Selecting indicators for climate change adaptation programming*. Phnom Penh, Cambodia: SEA Change CoP, and Oxford, United Kingdom: UKCIP. https://www.betterevaluation.org/sites/default/files/2014%2001%20SEA%20Change%20UKCIP%20GN2%20Selecting%20indicators%20for%20CCA_0.pdf

Brooks, N. et al. (2019). Framing and tracking 21st century climate adaptation: monitoring, evaluation and learning for Paris, the SDGs and beyond. IIED Working Paper. https://pubs.iied.org/sites/default/files/pdfs/migrate/10202IIED.pdf

Brooks, N. et al. (2014). Tracking Adaptation and Measuring Development: a step-by-step guide. London: International Institute for Environment and Development (IIED). https://pubs.iied.org/sites/default/files/pdfs/migrate/10100IIED.pdf

Christiansen, L., Martinez, G. & Naswa, P. (eds.) (2018). Adaptation metrics: perspectives on measuring, aggregating and comparing adaptation results. Copenhagen: UNEP DTU Partnership. https://unepdtu.org/publications/adaptation-metrics-perspectives-on-measuring-aggregating-and-comparing-adaptation-results/

C40 Cities, Ramboll Foundation, Ramboll. (2019). Measuring Progress in Urban Climate Change Adaptation: Monitoring - Evaluating - Reporting Framework. New York: C40 Cities. https://c40-production-images.s3.amazonaws.com/other_uploads/images/2154_20190228_MER_Framework_Final.original.pdf?1553033351

Climate Change Committee (CCC). (2020). Assessing progress in preparing for climate change in the UK. CCC Insights Briefing 7. https://www.theccc.org.uk/wp-

content/uploads/2020/10/CCC-Insights-Briefing-7-Assessing-progress-preparing-for-climate-change.pdf

Coger, T., S. Corry, & R. Gregorowski. (2021). “Reshaping Monitoring, Evaluation, and Learning for Locally Led Adaptation.” Working Paper. Washington, DC: World Resources Institute. https://doi.org/10.46830/wriwp.20.00060.

Craft, B., & Fisher, S. (2018). Measuring the adaptation goal in the global stocktake of the Paris Agreement. *Climate Policy*, *18*(9), 1203-1209. https://doi.org/10.1080/14693062.2018.1485546

DCF Alliance. (2019). The Devolved Climate Finance mechanisms: Principles, implementations and lessons from four semi-arid countries. The DCF Alliance, working paper. https://pubs.iied.org/G04424/

Eriksen, S., Schipper, E. L. F., Scoville-Simonds, M., Vincent, K., Adam, H. N., Brooks, N., ... & West, J. J. (2021). Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance?. *World Development*, *141*, 105383. https://doi.org/10.1016/j.worlddev.2020.105383

FAO. (2017). Tracking adaptation in agricultural sectors: Climate change adaptation indicators. Rome: FAO. https://www.fao.org/3/i8145e/i8145e.pdf

Ford, J.D. & Berrang-Ford, L. (2016). The 4Cs of adaptation tracking: consistency, comparability, comprehensiveness, coherency. *Mitigation and Adaptation Strategies for Global Change,* 21, 839–859. https://doi.org/10.1007/s11027-014-9627-7

Garcia, J. & Chey, T. (2019). Mid-term review of Cambodia Climate Change Strategic Plan, 2014-2023. Draft Evaluation Report. https://ncsd.moe.gov.kh/sites/default/files/2019-08/CCCSP%20MTR_Final%20Evaluation%20Report_final_cleared.pdf

GIZ. (2017). Factsheets of national adaptation monitoring and evaluation systems. https://www.adaptationcommunity.net/monitoring-evaluation/national-level-adaptation/examples-of-national-me-systems/

Hammill, A., Dekens, J., Olivier, J., Leiter, T., & Klockemann, L. (2014). Monitoring and evaluating adaptation at aggregated levels: a comparative analysis of ten systems. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. https://www.adaptationcommunity.net/download/me/me-guides-manuals-reports/GIZ_2014-Comparative_analysis_of_national_adaptation_M&E.pdf

International Platform on Adaptation Metrics (IPAM). (2021). AMME Framework: Adaptation Metrics Mapping Evaluation. V1.1. Rabat, Morocco. https://adaptationmetrics.org/sites/AMME-Framework.pdf

Jones, L. (2019a). A how-to guide for subjective evaluations of resilience. Resilience Intel No. 1. BRACED. http://www.braced.org/contentAsset/raw-data/acced4f3-6bb6-4595-abc4-3b29dc438968/attachmentFile

Jones, L. (2019b). ‘Resilience isn’t the same for all: Comparing subjective and objective approaches to resilience measurement’. *Wiley Interdisciplinary Reviews: Climate Change* 10(1): e552. https://doi.org/10.1002/wcc.552

Kajumba, T C, Karani, I and Fisher, S (2016). *A bottom-up approach: Identifying national standard climate change indicators for Uganda*. London: IIED. http://pubs.iied.org/10158IIED

Inter-ministerial Working Group on Adaptation to Climate Change. (2019). *2019 Monitoring Report on the German Strategy for Adaptation to Climate Change*. Dessau-Roßlau: Umweltbundesamt (German Environment Agency). https://www.umweltbundesamt.de/sites/default/files/medien/421/publikationen/das_2019_monitoring_report_bf.pdf

IPCC. (2014). *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., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp. https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-PartA_FINAL.pdf

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

Leiter, T., Olhoff, A., Al Aza, R., Barmby, V., Bours, D., Clemen, V. W. C., ... & Jacobs, H. (2019). Adaptation Metrics. Current Landscape and Evolving Practices. Background Paper for the Global Commission on Adaptation. Rotterdam and Washington, DC. https://gca.org/reports/adaptation-metrics-current-landscape-and-evolving-practices/

Leiter, T. & Olivier, J. (2016). *Country-specific monitoring and evaluation of adaptation*, Climate Change Policy Brief, Eschborn: GIZ. https://www.adaptationcommunity.net/download/me/national-level-me(2)/giz2016-en-cc-policy-brief-country-spec-monitoring.pdf

Leiter, T. (2015). Linking monitoring and evaluation of adaptation to climate change across scales: Avenues and practical approaches. In D. Bours, C. McGinn, & P. Pringle (Eds.), *Monitoring and evaluation of climate change adaptation: A review of the landscape. New Directions for Evaluation, 147*, 117–127. https://doi.org/10.1002/ev.20135

Nachmany, M., Byrnes, R. & Surminski, S. (2019). National laws and policies on climate change adaptation: a global review. Policy brief. London: Grantham Research Institute on Climate Change and the Environment, and Leeds: Centre for Climate Change Economics and Policy. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2019/12/National-laws-and-policies-on-climate-change-adaptation_A-global-review.pdf

New, M., D. Reckien, D. Viner, C. Adler, S.-M. Cheong, C. Conde, A. Constable, E. Coughlan de Perez, A. Lammel, R. Mechler, B. Orlove, and W. Solecki, (2022). Chapter 17: Decision Making Options for Managing Risk. In: *Climate Change 2022: Impacts, Adaptation, and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_FinalDraft_FullReport.pdf

Pringle, P., Thomas, A. & Strachan, E. (2021). What next for the Global Goal on Adaptation? Climate Analytics. https://climateanalytics.org/publications/2021/what-next-for-the-global-goal-on-adaptation/

Schipper, E.L.F. & Langston, L. (2015). *A comparative overview of resilience measurement frameworks. Analyzing Indicators and Approaches.* ODI working Paper 422. London:

Overseas Development Institute. https://odi.org/en/publications/a-comparative-overview-of-resilience-measurement-frameworks-analysing-indicators-and-approaches/

Setzer, J., Sainz de Murieta, E., Galarraga, I., Rei, F., & Pinho, M. (2020). Transnationalization of climate adaptation by regional governments and the RegionsAdapt initiative. *Global Sustainability, 3*, E10. https://doi.org/10.1017/sus.2020.6

Singh, C., Iyer, S., New, M.G., Few, R., Kuchimanchi, B., Segnon. A.C. & Morchain, D. (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

Smith, B. (2019). How the Philippines' national M&E system integrates climate and development. IIED. https://www.iied.org/how-philippines-national-me-system-integrates-climate-development

Smith, B., Rai, N., D'Errico, S., Argon, I. & Brooks, N. (2019). Monitoring and evaluation of adaptation – an introduction. Adaptation Briefings. Berlin: GIZ. https://www.adaptationcommunity.net/publications/monitoring-and-evaluation-of-adaptation-an-introduction-adaptation-briefings/

Thomas, K., Hardy, R. D., Lazrus, H., Mendez, M., Orlove, B., Rivera-Collazo, I., ... & Winthrop, R. (2019). Explaining differential vulnerability to climate change: A social science review. *Wiley Interdisciplinary Reviews: Climate Change*, 10(2), e565. https://doi.org/10.1002/wcc.565

UK Government. (2021). COP26: The Negotiations Explained. https://ukcop26.org/wp-content/uploads/2021/11/COP26-Negotiations-Explained.pdf

UNEP. (2021). *Adaptation Gap Report 2021: The gathering storm – Adapting to climate change in a post-pandemic world*. Nairobi: UNEP. https://www.unep.org/resources/adaptation-gap-report-2021

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

UNFCCC. (2021). Report of the Adaptation Committee. FCCC/SB/2021/6. https://unfccc.int/sites/default/files/resource/sb2021_06E.pdf

UNFCCC. (2019). Methods and approaches for assessing adaptation, adaptation co-benefits and resilience: Workshop report by the secretariat. FCCC/SB/2019/1. https://unfccc.int/sites/default/files/resource/sb2019_01E.pdf

van Rüth, P. & Schönthaler, K. (2018). Setting up a national monitoring system for climate change impacts and adaptation. In Christiansen, L., Martinez, G. and Naswa, P. (eds.). *Adaptation metrics: Perspectives on measuring, aggregating and comparing adaptation results Adaptation*, Copenhagen: UNEP DTU Partnership. 97-111. https://resilientcities2018.iclei.org/wp-content/uploads/UDP_Perspectives-Adaptation-Metrics-WEB.pdf

Leiter, T. & Pringle, P. (2018). Pitfalls and potential of measuring climate change adaptation through adaptation metrics. In Christiansen, L., Martinez, G. and Naswa, P. (eds.). *Adaptation metrics: Perspectives on measuring, aggregating and comparing adaptation results Adaptation*, Copenhagen: UNEP DTU Partnership. 29-47. https://resilientcities2018.iclei.org/wp-content/uploads/UDP_Perspectives-Adaptation-Metrics-WEB.pdf

Wilkinson, E. & Dupar, M. (2021). Technical paper: The Global Goal on Adaptation: a SIDS Perspective. ODI and AOSIS for the Climate Ambition Support Alliance (CASA). https://casaclimate.org/wp-content/uploads/2021/10/CASA_Technical-paper_GGA-for-SIDS.pdf

Acknowledgements

We thank the following experts who voluntarily provided suggestions for relevant literature or other advice to the author to support the preparation of this report. The content of the report does not necessarily reflect the opinions of any of the experts consulted.

- Emilie Beauchamp, IIED
- Professor James Ford, University of Leeds
- Karl Schultz, International Platform on Adaptation Metrics (IPAM)
- Lars Otto Naess, IDS
- Timo Leiter, LSE

Suggested citation

Price, R.A. (2022). *Metrics and indicators to assess adaptation.* K4D Helpdesk Report 1101. Institute of Development Studies. DOI: 10.19088/K4D.2022.050

About this report

This report is based on nine days of desk-based research. The K4D research helpdesk provides rapid syntheses of a selection of recent relevant literature and international expert thinking in response to specific questions relating to international development. For any enquiries, contact helpdesk@k4d.info.

K4D services are provided by a consortium of leading organisations working in international development, led by the Institute of Development Studies (IDS), with the Education Development Trust, Itad, University of Leeds Nuffield Centre for International Health and Development, Liverpool School of Tropical Medicine (LSTM), University of Birmingham International Development Department (IDD) and the University of Manchester Humanitarian and Conflict Response Institute (HCRI).