REPORT

Using Climate Risk Assessment to Measure Adaptation Success at the National Level

Preliminary lessons from 12 countries

NAP Global Network

July 2023
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SUGGESTED CITATION

Dekens, J. (2023, July). *Using climate risk assessment to measure adaptation success at the national level: Preliminary lessons from 12 countries* (NAP Global Network report). International Institute for Sustainable Development. https://napglobalnetwork.org/resource/climate-risk-assessment-measure-adaptation-success/

ABOUT THE NAP GLOBAL NETWORK

The NAP Global Network was created in 2014 to support developing countries in advancing their NAP processes, and help accelerate adaptation efforts around the world. To achieve this, the Network facilitates South–South peer learning and exchange, supports national-level action on NAP formulation and implementation, and generates, synthesizes, and shares knowledge. The Network's members include individual participants from more than 155 countries involved in developing and implementing National Adaptation Plans. Financial support for the Network has been provided by Austria, Canada, Germany, Ireland, the United Kingdom and the United States. The Secretariat is hosted by the International Institute for Sustainable Development (IISD). For more information, visit www.napglobalnetwork.org.

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ACKNOWLEDGEMENTS

This report was prepared with financial assistance from Ireland's Department of Foreign Affairs. The views expressed herein do not necessarily represent those of the NAP Global Network's funders or members.

The author would like to thank IISD colleagues Emilie Beauchamp, Jo-Ellen Parry, Anne Hammill, and Christian Ledwell for their valuable inputs to the report's content. We also want to express gratitude to the following individuals for taking the time to share their valuable insights regarding national climate risk assessments in their countries: Megan Bickle, Kasanda Bunda, Wolfgang Lexer, Joseph Mbinji, Karoliina Pilli-Sihvola, Bimal Raj Regmi, Inke Schauser, and Åsa Sjöström. Finally, we would like to thank John van Mossel for undertaking the interviews and conducting an initial analysis of the results.

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1
Introduction

Since its inception in 2015, the National Adaptation Plan (NAP) Global Network has received an increasing number of requests from developing countries for technical support related to the development or revision of climate change risk assessments (CRAs) and monitoring, evaluation, and learning (MEL) systems for NAP processes.

The NAP process was formally established under the United Nations Framework Convention on Climate Change (UNFCCC) in 2010. This domestic process enables countries to establish the systems and capacities needed to ensure that climate adaptation is systematically integrated into a country's decision-making process rather than treated as a separate, ad hoc exercise (Hammill et al., 2019). The ultimate objective of the NAP process is to achieve climate-resilient development.

Countries have shown interest in CRAs as part of their NAP processes. While most have already conducted some form of CRA, a detailed and up-to-date understanding of which regions, ecosystems, economic sectors, and populations are most vulnerable to climate impacts—and why—is still missing in many countries.

In addition, as countries are moving from planning to implementing their national adaptation priorities, they increasingly need to track progress, understand the impacts of their interventions, and report for accountability and learning purposes.

Interestingly, limited attention has been given—both theoretically and in practice—to the link between CRAs and the MEL of national adaptation until now. CRAs have been primarily designed to inform the development and updating of adaptation policies and interventions. This role should remain an important priority to ensure that NAP documents, and NAP processes more broadly, are evidence-based. CRAs must inform the development of NAPs by identifying adaptation measures that respond to current and future risks and vulnerabilities.

In addition, CRAs can also contribute to the MEL of NAP processes in different ways. For example, CRAs can identify priority actions that should be tracked in countries' MEL systems. They can also help measure changes in risk and vulnerability over time, and this information can then be used as a basis for assessing the success of adaptation measures.

As countries are still struggling to understand if and how adaptation measures are reducing risks and vulnerabilities to climate change, this report explores the potential for CRAs to be used as a tool for assessing adaptation effectiveness. The report expands on the implications of this approach for designing or updating CRAs and MEL systems for NAP processes.

This report has been prepared primarily to inform governments involved in the NAP process and development partners who are supporting countries with their NAP processes to ensure that they do not miss an opportunity to link national CRAs with the evaluation of adaptation effectiveness.

In line with the latest definition in the Intergovernmental Panel on Climate Change (IPCC) *Sixth Assessment Report* (Ara Begum et al., 2022), we use CRA as an umbrella term that refers to the assessment of climate change impacts, vulnerability, risks, and/or adaptation (or resilience), recognizing that countries focus on different elements of CRAs using a variety of approaches, depending on their needs and priorities.

The analysis focuses specifically on assessments conducted at the aggregated level to inform national climate adaptation planning (i.e., national CRAs) instead of focusing on CRAs conducted at sub-national, project, or program levels.

The findings in this report are preliminary, based on key informant interviews with 12 countries and a non-exhaustive literature review.

In Section 2, we clarify the theoretical role of CRAs in measuring adaptation effectiveness. Then, in Section 3, we provide an overview of the process used for conducting the analysis. Results are presented in Sections 4, 5, and 6. We conclude by distilling some lessons learned and recommendations in Sections 7 and 8.

2
The Theoretical Case for Using National CRAs to Assess Climate Adaptation Effectiveness

There is no international consensus on what successful adaptation looks like since it depends on each country's context, priorities, and expected outcomes. But ultimately, effective adaptation should enhance adaptive capacities, strengthen resilience, and reduce climate risk and vulnerability across sectors, social groups, and ecosystems (UNFCCC, 2021). Therefore, understanding the nature and drivers of climate risk and vulnerability is essential to measuring adaptation effectiveness (New et al., 2022).

Yet, limited information is available on how CRAs can be used to measure the effectiveness of adaptation actions at the national and sub-national levels. Few references point to the links between CRA and MEL for adaptation (Department of Environment, Forestry and Fisheries, 2020; Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, et al., 2014; European Environment Agency [EEA], 2022; Hammill & Dekens, 2013; New et al., 2022).

The GIZ-commissioned *The Vulnerability Sourcebook* (GIZ et al., 2014), which was further updated in 2017 to incorporate the IPCC *Fifth Assessment Report*'s risk concept (GIZ & EURAC, 2017), is most relevant from a theoretical viewpoint. The sourcebook offers a standardized approach to conducting regular climate change vulnerability assessments at the national or local level. The framework posits that regularly conducting standardized vulnerability assessments at defined intervals is one way to monitor and evaluate adaptation.

There are two overall assumptions on the link between CRAs and the evaluation of adaptation underlying the literature reviewed. First, successful adaptation should reduce risks and vulnerabilities (and enhance resilience). Second, CRA can be repeated and compared to a baseline vulnerability assessment by using the same approach to identify changes in overall vulnerability and its components or key indicators (GIZ et al., 2014). Two aspects of the relationships between CRAs and the effectiveness of adaptation underpin this second assumption: periodicity and standardization. These elements are further described below.

PERIODICITY

To assess adaptation effectiveness, CRAs should ideally be repeated periodically to account for changes in the risk and vulnerability context—including changes in societies' norms, values, and knowledge of risk and vulnerability. The lack of updated risk and vulnerability data and information may lead to ineffective planning and investments, as well as maladaptation.

In addition, periodic CRAs can create longitudinal assessments. Longitudinal approaches to CRAs refer to assessments repeated over time that focus on the same unit (e.g., a group of the population, a community, a sector, a region, an ecosystem) and on variables or observations of the same nature to track changes through time—although using an identical approach is not a requirement (Fawcett et al., 2017; White & Arzi, 2005). So far, there has been limited use of longitudinal approaches to CRAs to document changes in risk and vulnerability over the long term, including at the community level, stemming in part from its resource-intensiveness (Fawcett et al., 2017). Repeated CRAs, however, can build on existing frameworks, approaches, and data sources, making them less resource-intensive over time (GIZ, EURAC & Adelphi, 2014).

Finally, periodic CRAs can include the identification of a baseline CRA. A baseline describes the state of climate risk, vulnerability, and preparedness level at a specific time against which subsequent contexts can be compared. This baseline information can help to determine (Spearman & McGray, 2011):

- indicators' reference values for comparing risk and vulnerability conditions before, during, and after the implementation of adaptation interventions, thereby pointing to their success, and
- a reference point for adaptation "targets" as specific goals for adaptation interventions.

It is important to note that baselines can often be temporary because the risk and vulnerability context is dynamic and can change over time (with or without investing in adaptation). The presence of "moving" or "shifting" baselines means that some or all the information collected in the initial or previous assessment may no longer be an appropriate basis for assessing the impacts of adaptation interventions due to changes in the risk and vulnerability contexts (Spearman & McGray, 2011).

STANDARDIZATION

If a country wants to track and compare changes in risk, vulnerability, and level of preparedness over time, it must be able to replicate the CRAs using the same conceptual framing and methods applied in the initial or previous CRAs, including the same unit of analysis (e.g., the same sector or region). This requires documenting the CRA process used for the baseline assessment in a detailed and transparent manner so it can be repeated later.

Taken together, these elements—periodicity and standardization—are expected to support the *monitoring* of the risk and vulnerability context by clarifying if risk and vulnerability to climate change have changed between the assessments, for whom, and within which sector, region, or ecosystem, depending on the focus of the analysis. This information can then offer a basis for *evaluating* the effectiveness of adaptation measures, in terms of understanding their impact and adequacy, by exploring the following questions:

- Why have risk, exposure, and vulnerability changed (or not)?
- Have adaptation interventions *contributed* to the changes (or not)? How? What does it mean for the effectiveness of these adaptation actions and in what context/region/sector or for which specific groups within the population? Note that exploring the contributing role of planned adaptation actions poses methodological challenges since there are many other factors beyond the implementation of adaptation measures that may explain changes in risk, exposure, and vulnerability over time (such as income growth due to a stronger economy).
- Are the adaptation targets ambitious enough to keep up with the evolving risk and vulnerability contexts?
- Are the adaptation priorities and the adaptation targets still relevant? Are they responding to the needs of society's most marginalized groups and the ecosystems that are most at risk?

In this analysis, we focus on two key aspects of the relationship between CRAs and assessing the effectiveness of adaptation actions—periodicity and standardization—because the literature indicates that these two elements are important for CRAs to measure the effectiveness of adaptation, and we want to explore this claim. The central question that guides this review is: **Does the repetition of national CRAs over time help to assess adaptation effectiveness, and does it require using a standardized approach to CRAs?**

In Section 4, we investigate countries' experiences with repeating national CRAs over time to assess adaptation effectiveness, and in Section 5, we look at the extent to which that repetition requires a standardized approach to CRAs. But before that, the next section looks more closely at the countries included in this review and the research process.

3
Snapshot of the Research Process

Twelve focus countries that have undertaken, or plan to undertake, regular national CRAs as part of NAP processes were selected for this study: Austria, Finland, Germany, Nepal, New Zealand, Peru, Rwanda, South Africa, Sweden, the United Kingdom, the United States, and Zambia.

Since few countries from the Global South have conducted repeated national CRAs, we also included countries from the Global North. Efforts were made to ensure geographical diversity across Africa, Asia, Europe, and Latin America.

The approach used in gathering information for this brief combined desk-based research and key informant interviews. First, we reviewed key documents related to national CRAs available in English in the selected countries. Then, 13 key informants, primarily senior government officials responsible for national CRAs, were interviewed remotely on a one-to-one basis in April and May 2022. We conducted follow-up email correspondence with most interviewees in May 2023 to update and validate the analysis. Results and lessons based on these country case studies are captured in this report.

Table 1 summarizes national CRAs in the context of NAP processes in the 12 country case studies reviewed under this report. Since NAP documents are often another key milestone in countries' NAP processes, the table also indicates when countries released their NAP document(s) as an indicator of the status of the development of the NAP process in each country.

In this report, NAP documents refer to the development of a national adaptation strategy and/or of a national action plan or program. Indeed, various European countries tend to develop both, while the trend in developing countries is to develop a single document that combines high-level adaptation priorities and an action plan.

Of the 12 countries reviewed, 10 have completed one or more CRAs *and* NAP documents. Two countries either have a first NAP document with no national CRA completed (South Africa) or have done one national CRA but have not completed a first NAP document (Zambia). Most NAP documents were published after the national CRAs had been completed.

The next section describes the reviewed countries' practical experience in regularly assessing climate risk and vulnerability over time.

Table 1. Overview of periodic national CRAs in 12 countries as of May 2023

Country	# of national CRA completed	Year of national CRA completion	NAP document
Austria	**2**	2012, 2016, [2023, forthcoming]	2012, 2017
Finland	**3**	2006, 2013, 2018	2005, 2014
Germany	**3**	2005, 2015, 2021	2008, 2011, 2015, 2020
Nepal	**2**	2009, 2021	2021
New Zealand	**1**	2020	2022
Peru	**1**	2020	2021
Rwanda	**2**	2015, 2018	2011, 2022[1]
South Africa	**0**	Under development	2020
Sweden	**2**	2007, 2015	Sectoral and regional adaptation plans, which need to consider the 2018 National Strategy for Climate Change Adaptation
United Kingdom	**3**	2012, 2017, 2022	2013, 2018, [2023, forthcoming]
United States	**4**	2000, 2009, 2014, 2018, [2023, forthcoming]	2011
Zambia	**1**	2020	Forthcoming in 2023

[1] The Rwanda Green Growth and Climate Resilience national strategy identifies mitigation and climate adaptation priorities. At the time of this review, this is Rwanda's NAP document, although the government did not officially submit it to the UNFCCC.

4
Repeating National CRAs Over Time

The main driver for repeating national CRAs over time is to improve countries' understanding of risks and vulnerabilities.

The review found that most countries have repeated their national CRAs to improve their understanding of current and future climate risks and vulnerabilities and inform national adaptation planning—in particular, the identification of adaptation priorities. Countries want to update their evidence base to inform emerging policy and science.

Specifically, countries want to improve their understanding of new types of risks posed by climate change, which had been ignored or overlooked in the past. For example, various countries, such as New Zealand and the United Kingdom, mentioned the need to take a more systemic approach to understanding risk and vulnerability. There is a growing focus on understanding "cascading" or "systemic" risks—that is, how risks are connected and can have interacting and cascading effects beyond a specific sector and geographical region of focus. Some countries—like Sweden—want to consider international, cross-border impacts in areas such as trade, immigration, and conflict. Finland is shifting its focus from understanding climate risk to understanding vulnerability, including "systemic vulnerability," by taking a cross-sectoral and regional approach. These considerations align with priorities identified in the IPCC *Sixth Assessment Report* (New et al., 2022), highlighting the importance of integrated risk management and the need to account for interacting and compounding climate risks.

Related to this, most countries noted the importance of repeated CRAs in collecting more localized and context-specific information at the sectoral and sub-national levels, including for specific social groups. New Zealand and the United States, for example, noted the importance of diversifying the knowledge sources in their CRA processes, with a focus on Indigenous Knowledge. Nepal noted the importance of combining scientific and local knowledge and using participatory and inclusive processes in CRA.

The importance of engaging diverse actors in CRA processes is increasingly recognized as critical to understanding and addressing cross-sectoral, systemic risks and vulnerabilities (Brown & Berry, 2022). For example, a key objective of Germany's third national CRAs in 2021 was to provide a "balanced perspective, a consensus statement, inclusive of the views of all 25 involved authorities to provide a firm foundation for recommendations on adaptation actions" (Germany Federal Environment Agency representative, personal communication, May 2022). In the case of Nepal, its second national CRA involved consultations across government and non-government actors. The analysis was reviewed and validated by provincial climate change coordinating committees; selective local governments and community-based organizations; 12 thematic groups, each headed

by a thematic minister; and an interministerial climate change coordinating committee (Oxford Policy Management representative, personal communication, May 2022).

Many countries are moving toward aligning the frequency and timing of national CRAs with their adaptation policy cycle.

Countries have different levels of experience with undertaking periodic national CRAs. The countries selected can be grouped into three broad categories based on the start and number of national CRAs developed (see Table 1). The first wave of "early movers" includes five countries (Finland, Germany, Nepal, Sweden, and the United States). These countries developed their first national CRAs in the early 1990s and 2000s. Since then, they have completed between two and four national CRAs and have gained more than a decade—in some cases, two decades—of experience in periodically undertaking national CRAs. In the mid-2010s and after the formal establishment of the NAP process under the UNFCCC in 2010, Austria, Rwanda, and the United Kingdom initiated their first national CRAs and have since completed two or three assessments. More recently, in the early 2020s and after the 2015 Paris Agreement, four countries (New Zealand, Peru, South Africa, and Zambia) completed or are completing their first national CRAs but do not have experience with repeating these yet.

Despite the diversity of experience with repeating national CRAs among the countries studied, all have or are in the process of having a policy or legal mandate to carry out—and sometimes repeat—CRAs. The historical frequency of repeating national CRAs ranges from 3 years (Rwanda) to 12

years (Nepal). But the analysis indicates that there is a growing consensus across countries that the required frequency for repeating or updating national CRAs should be every 5 years or so to align it with most countries' adaptation policy cycle and global climate commitments—a trend that was already documented in a review of national CRAs across Europe (EEA, 2018).

Three countries (Germany, the United Kingdom, and New Zealand) have a policy or legal mandate that explicitly links their CRA with the development and revision of their NAP process. Under its 2008 national Strategy for Adaptation to Climate Change, Germany assesses future climate risks and adaptation needs every 6 years to inform its NAP document. In the United Kingdom, the government is required by the 2008 Climate Change Act to prepare and publish a national Climate Change Risk Assessment (CCRA) and a NAP for England in response to the CCRA every 5 years. In New Zealand, the Climate Change Response (Zero Carbon) Amendment Act, passed in 2019, brought references to vulnerability and adaptation for the first time into its national climate legislation. The amended act sets up a system—inspired by the United Kingdom—with regular planning and reporting cycles for both the CRA and NAP components. It sets out a 6-year cycle for renewal of the CRA and for revision of the NAP, with reports on NAP implementation required every 2 years.

A new vision of national CRAs as a continuous learning process—rather than a report produced at a single decision point in the NAP process—is emerging.

CRAs are iterative learning exercises as part of a bigger iterative learning process—i.e., adaptation. Increasingly, CRAs tend to be seen as part of a learning and trial-and-error process that should provide and gain information throughout the NAP process from the planning to the implementation and MEL phases. This approach echoes the recommendation from the Adaptation Research Alliance (2021) to rethink the CRA process to make it more useful, in particular by considering "CRAs as an iterative M, E & L process, which allows tracking of risk reduction over time as a result of adaptation interventions" (p. 7).

In the United States, the approach used to undertake national CRAs is based on the voluntary contribution of thousands of academic authors to synthesize existing information. But new approaches are being discussed, such as undertaking a different assessment each year on a specific theme or using a decentralized approach with states or a group of states by region responsible for doing their own assessments while the federal level is responsible for consolidating results into a national assessment (White House Office of Science and Technology Policy, US Global Change Research Program representative, personal communication, May 2022)

Sweden overhauled its CRA approach in 2015 following a 2-year review of its practices. Its new approach to assessing risks and vulnerabilities is based on continuous assessment and reporting at multiple levels in the country. The government issued an Ordinance in 2019 (Swedish Meteorology and Hydrology Institute [SMHI], 2019), which set out the legal obligation for all national sectoral agencies and regional administrations to regularly conduct CRAs and report on adaptation progress. These agencies and regional administrations must prepare vulnerability analyses and action plans with targets, evaluate their work, and report annually on progress. This

information informs the development of annual progress reports prepared by the SMHI, which coordinates climate adaptation at the national level. It also informs the 5-year progress report of the National Expert Council for Adaptation, an independent advisory council appointed by the government (Swedish Expert Council on Adaptation, 2022). The approach is expected to evolve, with some trial-and-error (SMHI representative, personal communication, May 2022)

Finland also noted its aim for a more continuous, up-to-date (online) CRA instead of developing snapshots, prepared and published as PDFs every 5–10 years (Ministry of Agriculture and Forestry of Finland representative, personal communication, May 2023).

This new vision of national CRAs is aligned with Brown and Berry's (2022) call to shift the emphasis from considering national CRAs as isolated products produced every few years toward a continuing reflexive process. In this process, a new understanding of risks and vulnerabilities informs the work of key actors as much as the needs of key actors involved in the NAP process call for new and up-to-date information on climate risks and vulnerabilities to inform their decisions.

In sum, in the selected countries of focus, there is an increased commitment to undertaking periodic national CRAs that are aligned with their adaptation policy cycles in order to improve the understanding of the vulnerability and risk contexts. National CRAs are starting to evolve toward continual learning processes.

5
Using a Standardized Approach to National CRAs

Some countries (i.e., Germany, South Africa, and Sweden)[2] have developed common but flexible frameworks to guide repeated CRAs, mostly across geographical scales.

These frameworks tend to clarify key definitions, steps, and tools used in the CRAs. They sometimes include reporting templates to support data and information quality and coherence, as well as, whenever possible, data aggregation and comparison. At the time of this review, experience with rolling out these frameworks is still limited in scope and to replication across geographies instead of different time scales.[3]

Germany has not used an identical approach for each of its CRAs because the methodology and knowledge about climate risks are still developing. For example, its 2021 CRA covered more climate impacts than the previous assessment and included an analysis of adaptative capacity, which was very limited in the 2015 assessment (Kahlenborn et al., 2021). However, as aspects of the methodology used for each CRA remained consistent, it was possible to compare some of the data collected. For example, Germany's 2015 and 2021 CRAs both use "climate impact chains" to understand the complex cause-and-effect relationships in climate change impacts and risks in a specific context (Kahlenborn et al., 2021).

South Africa released a National Climate Risk and Vulnerability Assessment Framework in 2020 (see: Department of Environment, Forestry and Fisheries, 2020) with the objective of measuring the change in risk and vulnerability across geographies and over time in order to assess the impacts of adaptation interventions. The document includes a general section on "how to use the assessment for M&E" in line with GIZ's *The Vulnerability Sourcebook* (GIZ et al., 2014). The framework sets out a standardized yet non-prescriptive approach to supporting all government and non-government actors in submitting CRAs on a continuous basis. The data

[2] See Buth et al., 2017 (Germany) and Department of Environment, Forestry and Fisheries, 2020 (South Africa).

[3] Three countries in the Pacific region (Kiribati, Tuvalu, and Solomon Islands) have developed a common framework—the Integrated Vulnerability Assessment (IVA) for undertaking national CRAs. In each country, a standardized approach for collecting and analyzing vulnerability data at the community level has been developed and rolled out at the sub-national level. The information collected is analyzed in "island IVA reports" and stored in an online national IVA database with the aim of informing sub-national- and national-level climate adaptation planning and MEL. At the time of this review, countries have been replicating the approach across different islands since 2012 in Kiribati and 2017 in Solomon Islands and Tuvalu. But repetition of the assessments over time has not yet been done.

and information collected through the CRAs are expected to be centralized in a National Climate Change Information System. At the time of this review, no repeated standardized CRAs to assess adaptation effectiveness had been done yet in South Africa. CRAs had been developed for five sectors and for the largest cities of the country, and the government aims to continue to develop guidance to facilitate the use and rollout of this framework (South Africa Directorate of Climate Change Adaptation under the Department of Fisheries, Forestry and Environment representative, personal communication, May 2022).

Similarly, Sweden has decentralized the preparation of CRAs to sectoral ministries and sub-national levels of government. These ministries are expected to either integrate climate risks in their existing risk assessments or conduct standalone CRAs. Between 2019 and 2021, 32 sectoral CRAs and 21 regional CRAs were prepared by relevant authorities to inform sectoral and regional adaptation plans (EEA, 2022). The reporting cycle started in 2020, assisted by the SMHI. While the SMHI has not developed an overall common framework for undertaking these CRAs, it has established an online reporting mechanism, which includes a standardized reporting format and questions to increase coherence in the system. The SMHI must also report on progress annually based on the reports it received from the national sectoral agencies and regional administrations. SMHI has been working on identifying both quantitative and qualitative indicators that would be drawn from the CRAs to support reporting on adaptation by all sectoral ministries and sub-national government agencies. The objective is to use these to answer priority questions—including "Is vulnerability decreasing?"—while recognizing that extensive work remains to be done given the methodological challenges (SMHI representative, personal communication, May 2022).

In another example, Austria's federal states mostly conduct their own CRA analyses as part of their regional adaptation policy processes. But the federal government and the state governments agree to use the same national climate scenarios, which are financed jointly at the federal and state levels (Austria Environment Agency representative, personal communication, May 2023). This requirement supports coherence across geographical scales.

As demonstrated through these experiences, not all elements of a CRA approach may need to be standardized to support MEL over time. Rather, some key elements and questions may be used to facilitate comparison and reporting.

The objectives and approaches of national CRAs are often—substantially—updated each time they are undertaken, making standardization challenging or unlikely.

The review reveals that the objectives and approaches for undertaking national CRAs change over time for at least three main reasons.

First, developing a comprehensive assessment process perceived as useful and a model for future assessments is difficult and takes time for most countries. As noted earlier, countries want to integrate new information and knowledge, such as new climate and socio-economic scenarios or a new definition of vulnerability. They also want to address the gaps and lessons learned from previous CRAs. Some countries noted their constant effort to increase the usefulness of the CRAs to more users by considering the latest available science, evidence, and information. In general, according to the experts interviewed in the context of this analysis, it often takes most countries a few attempts to build consensus around a robust CRA process and its results, and the consensus is likely to be reached when the CRA approach is perceived as salient, credible, and legitimate. For example, in the United States, the third CRA is seen as a model in terms of the content of its chapters, its layout, and the guidance provided to the authors (White House Office of Science and Technology Policy, US Global Change Research Program representative, personal communication, May 2022).

Second, changes to the initial or previous CRAs can also reflect new priorities and needs—sometimes triggered by a change in government policy and leadership. Initially, the main purpose of a first national CRA may be to raise awareness of the impacts of climate change and the urgency of acting. Then, the focus may shift to collecting new and more nuanced evidence to inform decision-making. This shift often requires modifying the approach used in previous CRAs to increase key actors' engagement and, in some cases, to decentralize the development of CRAs to sectoral ministries and sub-national levels of government—as illustrated by the approaches taken in Sweden and New Zealand.

Elsewhere, such as in Austria, it is felt that frequent comprehensive national CRAs (as opposed to gradual and cumulative incorporation of new knowledge on risks) are not needed because climate signals and trends at the national level are rather clear. Instead, CRAs need to address more targeted knowledge gaps linked to specific aspects, such as the renewal of municipal

infrastructure. While Austria updates its knowledge base on CRA following the 5-year cycle of its NAP review and revision, the Austrian climate research community—through the Austrian Panel on Climate Change—has published a comprehensive, IPCC-style *Austrian Assessment Report 2014* (an update is scheduled for 2025) and regularly issues thematic special assessment reports (Kromp-Kolb et al., 2014). These thematic reports cover topics such as extreme natural hazard events in the Austrian Alps, health and demography, tourism, and social impacts. These assessments are not directly linked to the national adaptation strategy process but represent an important information source for revising the country's NAP (Austria Environment Agency representative, personal communication, May 2023).

Third, changes may also respond to the resources available for a new CRA. Most countries acknowledge that the repeating CRAs require significant resources, which are not always available. Here again, an alternative is to carry out CRAs on more targeted themes to address critically important sectors or areas, such as specific infrastructure, groundwater sources, shorelines, cities, or food production. For example, in the United Kingdom, the first CRA offered a new analysis of all risks using a standardized approach, while the second and third CRAs were based on a synthesis of existing information supported by targeted new research (and the inclusion of new climate projections for the third CRA) (Watkiss & Betts, 2021).

As noted in South Africa's *National Climate Risk & Vulnerability Assessment Framework* (Department of Environment, Forestry and Fisheries, 2020), instead of repeating the entire same assessment over time, a more practical approach might be to only repeat specific components of the assessment based on countries' evolving needs and resources. These periodic standardized components of the CRAs can then be used to inform the MEL of the national adaptation process.

6
Measuring the Effectiveness of NAP Processes

A few countries—in particular, Germany and the United Kingdom—have started to use results from periodic national CRAs as a basis to evaluate their NAP process, in particular, to answer the question, "Is vulnerability to climate change reducing at the national level?"

Germany developed a methodology for evaluating its national adaptation strategy (see Kind et al., 2019) that was then used to create its first evaluation report published in 2019. The approach to evaluation aims to understand, among other things, to what extent Germany's strategy for national adaptation contributes to reducing climate change vulnerability. A two-step process has been developed (Kind et al., 2019). First, to assess how risk and vulnerability has changed over time, it proposes to look at changes in indicators of climate change impacts and adaptation responses, which are tracked every 4 years in monitoring reports, and to compare them against results from previous national climate risk assessments according to key areas and/or regions. Second, to explore the role of the national adaptation strategy in reducing risk and vulnerability, it proposes combining different sources, including assessments by experts, indicators from the monitoring reports, and results from scientific studies. This indicates that, in Germany, the national CRA is one tool among others to help evaluate the impacts of adaptation priorities (see more information in Box 1).

In the United Kingdom, the 2022 CRA, which is based on an independent assessment conducted by the British Climate Change Committee in 2021, also evaluated the potential of current national climate adaptation policies to address current and future climate risks. In particular, the aim was to document changes in the risk context and adaptation since the 2017 and 2012 CRAs, as well as the potential benefit from adaptation actions taken since the completion of these past assessments (Watkiss & Betts, 2021). This documentation was done by reviewing evidence from the existing literature combined with bespoke research. The Climate Change Committee also reviews progress in adapting to climate change every 2 years.

Some other countries (New Zealand, South Africa, and Sweden) are also planning to explore how to use national CRAs to evaluate their NAP processes. For example, to help the Climate Change Commission assess the NAP's effectiveness in reducing risk, the New Zealand Ministry for the Environment plans to regularly assess the preparedness of certain organizations, including policy developers and service providers. The results of the 2020 National Climate Change Risk

Assessment will be used as a baseline for assessing the effectiveness of future actions. A first evaluation of the NAP's implementation progress and effectiveness is planned for 2024 (New Zealand Ministry for Environment representative, personal communication, May 2022).

Box 1. Germany's national CRA is one tool among others to help evaluate the effectiveness of national adaptation priorities

In Germany, the repeated national CRAs are largely focused on understanding future climate risk and adaptation needs. For example, the 2021 CRA assessed the effectiveness of adaptation measures prioritized in the 2020 NAP document against future risks and identified climate impacts with a very urgent need for action. It concluded that between 2020 and 2030, the adaptation measures identified in the 2020 NAP document would not be sufficient to address future risks (Kahlenborn et al., 2021).

Results from the CRAs also serve as a basis for identifying indicators of climate risks to track changes in the risk and vulnerability context over time. So, in addition to producing a CRA report every 6 years, the government releases a monitoring report on its national Strategy for Adaptation to Climate Change every 4 years. In total, more than 100 climate change impacts and adaptation response indicators were tracked in 2019, allowing for statistical trend analysis for things such as changes in heat exposure, changes in species composition due to temperature rise, and changes in considerations of climate change in landscape programs and framework plans (Interministerial Working Group on Adaptation to Climate Change, 2019).

The CRA and the monitoring report serve as a basis for (a) identifying a list of adaptation priorities in the country's national adaptation strategy and (b) evaluating the effectiveness of adaptation priorities, which is captured in an evaluation report produced every 4 years.

Despite progress in some countries, measuring the effectiveness of adaptation measures remains a methodological challenge.

Germany's first evaluation report, published in 2019, noted that—with few exceptions[4]—the assessment of a change in risk and vulnerability could not be provided for the first evaluation (and possibly the subsequent ones). This was mostly due to (a) the short period between the identification and implementation of the measures contained in the national adaptation strategy, (b) the time required for most adaptation measures to effectively reduce risks, and (c) the lack of available impact assessments of adaptation measures (Gaus et al., 2019).

There are also limitations with respect to the indicator systems that are being used within existing MEL systems. In the United Kingdom, according to its Climate Change Committee (CCC, 2021), "Most currently available indicators measure progress towards policy targets or legal

[4] For example, where the effect of adaptation measures is directly visible, such as the impact of natural infrastructure in reducing heat in cities.

requirements. They are not necessarily aligned with the measurements needed to identify tangible reductions in climate risk or improvement of resilience" (p. 49). The CCC's 2023 progress report further highlights challenges related to the lack of datasets (CCC, 2023a).

Finally, the lack of linkages between successive national CRAs may also be a deterrent to assessing the effectiveness of adaptation measures. In the United Kingdom, for example, Watkiss and Betts (2021) noted a missed opportunity to measure progress over time in one component of the country's repeated CRAs—adaptive capacity. A survey of the level of organizational and structural capacity in different sectors was undertaken as part of the 2012 CRA but was neither repeated in the 2017 CRA nor included in the 2021 independent CRA. Watkiss and Betts (2021) further noted that "while an adaptive management process is inherent in the CCRA and NAP process due to the five-year repeat cycle, operationalising this in practice is very challenging at the national scale. … Looking forward, it would be useful to maximize the linkages between successive CCRAs to try and encourage a more formal iterative approach into national risk assessment" (p. 24).

Early movers—Germany and the United Kingdom—are noting the need for stronger coherence and alignment between national CRAs and the adaptation priorities identified in NAP documents.

Germany's first evaluation report highlights the need

> to ensure that the climate impacts identified in the vulnerability analysis, for which there is already a high necessity for action now, are adequately addressed. The allocation of the measures of [Germany's second NAP document] to these climate impacts reveals a very uneven distribution, and only two of the eleven climate impacts have been addressed by more than four measures (Gaus et al., 2019, p. 46).

The evaluation further recommends ensuring a more systematic selection of adaptation priorities in the national adaptation strategy to respond to the needs identified in the CRA. It also notes that stronger connections across all key strategic documents of Germany's NAP process (including the national CRA and monitoring report) are important. At a minimum, it may involve cross-referencing the documents and avoiding contradictions in their content.

In its third NAP progress review released in 2023, the British CCC recommends improving how we measure and monitor adaptation in the United Kingdom. The committee observed that the second NAP covering the period 2018–2023 did not address all the climate risks identified in the second CRA, such as climate risks outside of the United Kingdom: "Of the 56 risks and opportunities identified in the second [CRA], 21 did not have any related actions in NAP2, including 13 in the 'more urgent' categories" (CCC, 2023a, p. 34). The country is working to strengthen these linkages as part of updating its NAP document, due in 2023.

The following section offers some lessons to advance thinking on the links between national CRAs and the evaluation of national adaptation efforts.

7
Lessons Learned on Linking National CRAs With the Evaluation of NAP Processes

In this analysis, we wanted to explore the potential for national CRAs to support the evaluation of adaptation efforts. To do so, we reviewed the experience of 12 countries where national climate change risk and/or vulnerability assessments have been, or are intended to be, repeated at regular intervals as part of NAP processes. We studied if these countries were using periodical national CRAs to assess adaptation effectiveness and the extent to which this process required a standardized approach to CRAs. The following lessons are distilled from the analysis:

Conducting periodic CRAs is essential for expanding and updating the knowledge base needed for effective, evidence-based NAPs.

Regularly assessing climate risk and vulnerability (whether using a longitudinal or standardized approach or not) must remain an important priority to ensure that new or updated NAPs are evidence-based. Countries that have repeated national CRAs over time have gained significant new knowledge on current and anticipated climate risk and vulnerability, and this knowledge is essential to inform the development and revision of adaptation policies and interventions to achieve climate-resilient development. Of the 10 countries surveyed that have completed one or more national CRAs and NAP documents, seven countries (Austria, Finland, Germany, Nepal, New Zealand, Peru, the United Kingdom, and Sweden) have indicated that their national CRAs were used to develop or update their NAPs. The completed CRAs primarily informed the selection of adaptation priorities that respond to the risks and vulnerabilities identified.

The limited experience with using CRAs to inform the evaluation of NAP processes is likely partly because it is still relatively early days for both national CRAs (and their repeat/update) and for the MEL of national adaptation.

Over the past decade, countries have advanced with the development and use of both national CRAs and MEL systems for national adaptation. The review indicates that countries are taking steps toward a more coherent and policy-relevant approach to conducting CRAs in the context of NAPs, such as by establishing policies and legal mandates. Up to now, however, countries are mostly reporting on progress in implementing adaptation action but not on the impacts of these interventions. Now that countries have more experience with their CRAs and MEL systems for national adaptation, it is time to create strong linkages between them.

Repeating CRAs over time using a fully standardized approach to track changes in risk and vulnerability context may not be feasible or desirable.

In general, the idea of using a fully standardized approach to repeat national CRAs over time appears outdated, given what we now know about adaptation. Given the level of changes that are inherent to any climate adaptation planning process, including between two CRAs, replicating the identical approach used for establishing the initial or previous assessment over time may not be realistic. It can even be counterproductive as it may prevent countries from applying and learning about new approaches and integrating new information—for example, as related to systemic risks. This conclusion echoes findings from the status of reported national adaptation actions in Europe in 2021, that "Across Member States, the systematic updating of comprehensive national assessments at regular intervals is the exception rather than the rule. Overall, … the prevailing mode of enhancing the knowledge base on climate risks is incremental and cumulative rather than periodic, systematic, and comprehensive" (EEA, 2022, p. 28).

8
Four Considerations for Countries Interested in Linking National CRAs With the Evaluation of NAP Processes

More discussion is needed within governments on how to practically align their CRAs with the MEL of their NAP process so the two processes can inform each other, especially considering that these two activities are often coordinated by the same government agency in each country. Going forward, we have identified four avenues for countries interested in strengthening the links between their CRAs and MEL activities for national adaptation.

Be explicit about how the national CRA will contribute to the MEL of your country's NAP process.

For example, CRAs can identify priority adaptation actions that should be tracked in countries' MEL systems and measure changes in vulnerability over time, which can help to assess the effectiveness of the NAP's implementation. Countries should explicitly clarify these links and address their implications for the design or revision of CRAs, priority adaptation actions, and MEL systems, ideally early in the development of the NAP process. For example, the approach used for the national CRA—whether it is more quantitative or qualitative—should inform the approach used for the MEL of national adaptation or vice-versa, depending on the sequencing of activities in the country (Department of Environment, Forestry and Fisheries, 2020).

Ensure that CRAs and the NAP document—two important milestones in the planning phase of the NAP process—are informing and building on one another.

Regardless of which activity between national CRA and NAP documents countries prioritize, NAP documents should address the climate risks identified in the CRA. Similarly, CRAs should address the data and knowledge gaps identified in NAP documents. Both should be regularly updated based on new information and learning as part of the iterative nature of the NAP process. Importantly, strong links between the CRAs and the NAP document in the development phase of NAPs will likely facilitate links between CRAs and the MEL of national adaptation. The quality of a NAP document could be assessed in part based on how it addresses the needs and gaps identified in a national CRA. Similarly, the quality of CRAs may be assessed in part based on their capacity to

respond to the priorities and needs identified in a NAP document and based on the approach used for the MEL of the NAP.

Clarify how national adaptation priorities are expected to reduce climate risk and vulnerability in the short and long terms.

This approach could help to reinforce the link between national CRAs and NAPs. It requires the identification of well-defined adaptation objectives, targets, and outcomes—possibly by using an explicit Theory of Change for each national adaptation priority theme, sector, region, or a combination thereof, depending on the country's approach to its NAP process. The Theory of Change would highlight how these priorities and the associated sequence of adaptation measures (or "adaptation pathways") are expected to reduce climate risks and vulnerabilities at the national level. This process could clarify how countries think that change will happen, including what success looks like, for whom, and how to get there. It would also shed light on the country's assumptions about risks, vulnerabilities, and adaptation and the underpinning values, interests, and different ways of knowing.

Clarifying how national adaptation priorities are expected to reduce climate risk and vulnerability requires engaging with diverse actors to ensure that different needs, priorities, and values are considered. New et al. (2022) comment on the challenges of using CRAs to measure adaptation effectiveness: "as adaptation can occur in multiple forms and target multiple temporal and spatial scales, the engagement of a diversity of stakeholders is vital to understanding how responses enable adaptation and adaptation success across vulnerable groups" (p. 2620).

Consider the possibility of repeatedly using the same approach for some but not all components of a previous national CRA.

To support the comparison of results over time, CRAs should follow a standardized approach. However, they also need to be flexible enough to integrate new elements when needed. For example, parts of the reporting template could be standardized to ensure that some issues are being continuously tracked despite changes in approaches and the addition of new questions. Similarly, a core section can be standardized to collect data from the same variables over time while the rest of the CRAs adapt to emerging needs and trends.

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This project is undertaken with the financial support of:
Ce projet a été réalisé avec l'appui financier de :

In partnership with Canada

UKaid from the British people

Federal Ministry for Economic Cooperation and Development

An Roinn Gnóthaí Eachtracha
Department of Foreign Affairs

Secretariat hosted by:
Secrétariat hébergé par :

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