

# CGE Training Materials for Vulnerability and Adaptation Assessment

## Chapter 2 Vulnerability and Adaptation Frameworks

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## 2.1. Introduction

Assessments of vulnerability to climate change and adaptation have been conducted over the years to synthesize and present the state of knowledge of how society and nature may be affected by climate change and what can be done to reduce vulnerability through adaptation. Assessments have typically been conducted to inform decision makers and the public about the consequences of climate change and options for addressing it.

The climate change impact assessment field is crowded with various frameworks and tools, so selecting an approach to conducting a vulnerability and adaptation (V&A) assessment can seem daunting and overwhelming. This chapter is written not to tell the reader the single correct approach to take – there is no single right approach for all users and circumstances – but to help the user understand the field and make intelligent choices.

It can be useful to bear in mind that no one can give a reliable forecast of climate change impacts (akin to next week’s weather forecast). Instead, decision makers, stakeholders and others need an understanding of the potential consequences of climate change so that they can make more informed decisions about the management of greenhouse gas (GHG) emissions and climate-sensitive resources and investments.

It may also be helpful to consider that the V&A sections of a country’s national communication provide an opportunity to identify the most important vulnerabilities to climate change that the country faces and to identify where adaptation may be most needed and what types of adaptation may be most appropriate. To be clear, a V&A description does not have to address the specifics of each possible adaptation actions, but the V&A sections of the national communication can serve to inform other Parties, stakeholders and the public about priorities for adaptation.

This chapter is intended to help readers appropriately structure V&A assessments to meet objectives (i.e. how to provide appropriate information for the users of the assessments) within budget and time constraints. The chapter discusses the following topics:

- Similarities and differences among impact assessments, vulnerability and adaptation assessments
- How to get started conducting an assessment
- Choices among V&A frameworks

### 2.1.1. Different types of assessment

A key decision to be made at the start of the process for prepare the national communication is what sort of assessment to apply: impact, vulnerability or adaptation. Some of the terms used in this document, in particular “impact assessment,” have different meanings across the climate change and assessment literature, but for the purposes of this document, the following definitions are used:

- **Impact assessment:** is the simplest assessment. It is defined here as being an estimate of the effect of a change in climate, assuming no adaptation. For example,

an impact framework would estimate how much land and property would be inundated if the sea level rose by a metre, assuming no adaptation. Note that many assessments of climate change only address climate change impacts, such as how much land may be inundated by sea level rise, or how much run-off of freshwater would change. An impact assessment can include an analysis of the impacts of change on societal or environmental conditions (such as changes in population, income or land use). It is critical to understand that an impact assessment is not a vulnerability assessment;

- **Vulnerability assessment:** includes analysis of climate change impacts but also accounts for 'autonomous adaptation' (i.e. what adaptations we can reasonably expect entities affected by climate change to make without formal planning). For example, in response to sea level rise, coastal communities might build sea walls or dunes, elevate structures or move settlements to higher locations. The capacity to adapt, whether autonomously or through a formal or proactive process, is a component of vulnerability. Vulnerability assessments, particularly those conducted roughly in the 20th century (e.g. Watson, Zinyowera and Moss, 1996), tended to examine the potential consequences of GHG emissions. However, some GHGs persist in the atmosphere for decades so the consequences of climate change are more severe further from the present. Vulnerability assessments that emphasizing a full assessment of GHG emissions may estimate climate change impacts a century or so into the future (see box 2-1; definitions of terms);
- **Adaptation assessment:** examines what can be done now or in the near future to anticipate the impacts of climate change and reduce vulnerability. For example, an adaptation assessment of coastal areas might consider the consequences of adaptation choices, such as no change in current policy and management, restricting development in vulnerable areas, elevating structures or deciding to take defensive measures (e.g. build a seawall or dune) at appropriate times in the future. This form of assessment estimates change in impacts under the different adaptation options and, if done properly, would also consider autonomous adaptation. Adaptation assessments are often constructed to be consistent with planning horizons or the projected lifetimes of investments. This may be only a few decades, although some decisions with long lifetimes, such as long-lived infrastructure, may have longer planning horizons.

Box 2-1

**Key terms**

**Impact assessment:** examines biophysical impacts; no consideration of adaptation. This can include consideration of changes in socioeconomic and environmental conditions (see chapter 3).

**Vulnerability assessment:** includes assessment of impacts and reactive (autonomous) adaptation.

**Adaptation assessment:** examines adaptation responses including proactive and reactive.

## 2.2. Planning and conducting the vulnerability and adaptation assessment

Undertaking V&A assessments is one critical component of the national communication process. The following section provides specific guidance for planning successful V&A activities and should be considered within the overall national adaptation planning process. The guidance below is based on, but does not exactly follow *The Vulnerability Sourcebook: Concept and Guidelines for Standardized Vulnerability Assessments* (GIZ, 2014) (hereinafter referred to as the Vulnerability Sourcebook).

Key steps in planning the V&A component of a national communication are:

1. Understand the context of the assessment
2. Identify objectives, outcomes and audience
3. Determine the scope of the assessment
4. Determine the type of assessment and scenarios<sup>1</sup>
5. Prepare an implementation plan

### 2.2.1. Identify context of the assessment, objectives, outcomes and audience

A critical step for conducting a V&A assessment is to determine the objectives of the assessment. For what purpose is the assessment being written and for whom?

The Vulnerability Sourcebook suggests asking the following questions at the beginning of an assessment:

- **What processes will the assessment support or feed into?**  
Are there ongoing activities in the field of adaptation that should be taken into account when designing and implementing the vulnerability assessment?
- **What do you want to learn from the assessment? What is the information gap?**  
What are the climate change hotspots in your region? Or do you want to identify suitable adaptation measures and test whether they help reduce vulnerability?
- **What do you want to use this knowledge for?**  
Input into ongoing adaptation efforts? Planning concrete adaptation measures at the local level? Developing a national adaptation strategy, or an overview of potential sectoral climate change hotspots?
- **Who is the target audience for the results of the vulnerability assessment?**

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<sup>1</sup> This step is not in *The Vulnerability Sourcebook: Concept and Guidelines for Standardized Vulnerability Assessments* (GIZ, 2014) guidance.

Local communities, ministries and national agencies tasked with adaptation planning or decision makers at different administrative levels?

- **What outputs do you expect?**

A map of vulnerability hotspots? A ranking of vulnerable sectors? Or a narrative analysis of vulnerability and its determining factors?

V&A assessments have become complex in recent years and there are different frameworks, approaches and tools that can be applied. There is no one ideal method; the choice will depend on the circumstances.

A key choice is whether the assessment will emphasize vulnerability or adaptation (see box 2-1). This is elaborated in section 2.3. In the late twentieth century, the emphasis of climate change assessments was on understanding vulnerability (see, for example, Parry and Carter, 1998). In the twenty-first century there has been more emphasis on adaptation. With this expansion of objectives has come a wide array of frameworks for V&A. As the Intergovernmental Panel on Climate Change (IPCC) noted in its most recent assessment, “Decision-support for impacts, adaptation, and vulnerability has expanded from science-driven linear methods to a wide range of methods drawing from many disciplines” (Jones et al., 2014, p. 198).

Also important is the outcomes that are expected from the assessment. National communications inform the United Nations Framework Convention on Climate Change (UNFCCC) of a country’s vulnerabilities to climate change and can identify priorities for adaptation. A V&A assessment might also be intended to inform national adaptation planning or the development of specific adaptation options. As noted above, assessments may be structured quite differently depending on what outcomes are emphasized.

Another important decision in selecting a framework is to identify the participants who would apply the framework and the audience for using the results. The twentieth century assessments were mainly designed to be applied by researchers such as academics and consultants. More recent assessments emphasizing adaptation are intended to involve decision makers and stakeholders in the process. Earlier assessments tended to have international decision makers as a primary audience; more recent assessments have a wider range of audiences and they can include people interested in adapting to climate change at a local level.

National communications have tended to emphasize vulnerability and have tended to be written for national and international audiences. As the scope of climate assessments increases, the audiences for national assessments may also be expanding. In addition, national communications may draw on assessments done at different geographic scales (e.g. ranging from national to local) and for different audiences (ranging from international to national to local).

### 2.2.2. Determine the scope of the assessment

Scope questions should logically follow from the objectives of the assessment. The scope should include: sectors; time frame for analysis (i.e. how far in the future the analysis is conducted); and geographic scope.

- **Sectors:** A key issue is whether to focus on a single sector, multiple sectors or attempt to be comprehensive by covering all sectors. National communications generally attempt to address a range of key sectors at risk from climate change. These often include coastal resources (for countries with coastlines), water resources, agriculture, human health and natural ecosystems, the first four of which are addressed in individual chapters in this publication (chapters 5–8 respectively). Assessments have also examined potential vulnerabilities and adaptation in other sectors such as energy systems (particularly for countries heavily dependent on hydropower), tourism, forestry and fisheries. Assessments of multiple sectors that can affect each other, such as water resources and agriculture, should examine interactions between those sectors;
- **Timeframe for analysis:** How far into the future the assessment should examine (e.g. 10 years, 30 years, 100 years) often depends on the question being asked or the time frame of decisions currently being made. Studies of vulnerability alone may look many decades into the future, because decisions made now on energy systems and GHG emissions can have lifetimes of many decades (the life of the energy systems) and consequences over the same lifetime for many decades beyond emissions (because of the length of time GHGs such as carbon dioxide persist in the atmosphere). Assessments of the potential consequences of climate change that are used to help in such matters as setting goals for stabilizing climate need to look many decades into the future – to 2100 and perhaps beyond. In contrast, many adaptation decisions have a much shorter time frame of interest because planning horizons or the lifetime of many investments being made now are shorter (e.g. a few decades). It may not be of use to assess climate change impacts beyond the lifetime of these decisions. However, the lifespan of investments can go beyond planned horizons. While most adaptation decisions relate to shorter-term planning horizons and involve investments in assets with relatively short lifecycles, assessing climate change impacts beyond the lifetime of these decisions can help to ensure longer-term sustainability and avoid maladaptation;
- **Geographic scope:** Most national communications have a national scope. Some assessments may focus on particular regions of concern or include assessment of regions within countries in order to assess regional and local concerns. Assessments of countries with a large area may find it useful to include analysis of regions so as to identify key regional differences in impacts, vulnerability or adaptation. However, assessments that focus only on adaptation are often conducted at a local or regional scale, although they can be conducted at a larger scale.

There are many practical considerations that will shape the approach to V&A in national communications, including: access to resources (such as money, staff or information); availability of national and/or international expertise; and availability of time. An excellent resource kit produced by the United Nations Development Programme (UNDP) National Communications Support Programme (NCSP) provides guidance on understanding these practical issues.<sup>2</sup> Section 2 of the UNDP/NCSP

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<sup>2</sup> The resource kit, Planning the National Communications Project, is available at: <<http://www.unclearn.org/sites/default/files/inventory/undp24.pdf>>.



resource kit includes information on preparing a work plan, timeline and budget, a project inception workshop and establishing systems and processes.

### 2.2.3. Determine the type of assessment and scenarios

#### ***Type of analysis***

It is important to determine whether the audience wishes to know a wide range of potential outcomes, only the most likely outcomes, or less likely outcomes, which may have more (or substantially more) adverse outcomes than the most likely outcomes. Some audiences prefer to know what consequences of climate change or effectiveness of adaptation are most likely. As discussed in the two chapters on scenarios, it is not possible to identify the most likely outcomes for either socioeconomic or climate change scenarios, but it is possible to use scenarios in the middle of ranges or, in the case of climate models, averages of models (often referred to as ensembles). An optimization assessment such as benefit–cost analysis may take this approach. Others may prefer to address lower-probability, higher-consequence outcomes. In that case, a combination of high emissions scenarios, more pessimistic assumptions about socioeconomic conditions and more extreme climate change scenarios may be appropriate. A risk management process may need to include higher-consequence, lower-probability outcomes.

The type of analysis chosen is also linked to what type of assessment – impacts, vulnerability or adaptation – is employed. The basic options are described in section 2.1, but more information is provided in section 2.3. Assessments designed to inform readers about vulnerabilities should use a vulnerability framework. An assessment that is designed to inform the selection of adaptations should use an adaptation framework.

#### ***Use of scenarios***

As it is not possible to predict future conditions, scenarios can be used to help us to understand possible future conditions and their consequences. Note there are two major types of scenario needed:

- ***Socioeconomic scenarios***: The approach for selecting and applying socioeconomic scenarios is described in chapter 3. Future income levels, use of technology, lifestyle and other variables will affect future GHG emissions as well as the capacity of societies and natural systems to adapt to climate change (Smit et al., 2001);
- ***Climate change scenarios***: This topic is addressed in more detail in chapter 4. An important choice is the emissions scenario or representative concentration pathway (RCP) (see chapter 4) associated with the scenario. The selection of the socioeconomic scenario needs to be consistent with the selection of the emissions scenario.

Note that it is generally better to assess a wide of range of potential future conditions to better understand the potential vulnerabilities as well as the potential costs and benefits of adaptation. Indeed, it may be most important that adaptation scenarios consider a wide range of possible outcomes.

#### 2.2.4. Prepare an implementation plan

A clear, concise project implementation plan, in line with national requirements and those of the executing agency, should be developed as a component of the overall national communication implementation plan. The plan should, among other elements, contain a rationale for the selection of V&A frameworks.

The implementation plan is the opportunity to provide specific information about what tasks will be undertaken, how they will be done, by whom, what types of review are going to be done, budgets and timing. This is analogous to a work plan. The document should be realistic regarding what can be accomplished, at what cost and by when.

A good implementation plan should serve as a living document; that is, it should be regularly updated to reflect accomplishments, completion of tasks and changes in tasks, budget or timing of activities.

### 2.3. Vulnerability and adaptation frameworks

There are a number of frameworks available for V&A assessments and this section describes some established frameworks. It provides a structured approach to questions that should be considered when selecting a framework for a particular V&A context, including factors such as data availability, resource requirements and stakeholder needs (as outlined in section 2.2 above). Box 2-2 briefly describes the similarities and differences among available adaptation frameworks.

Box 2-2

#### **How different are vulnerability and adaptation frameworks?**

We refer to a general category of 'V&A frameworks' because all the frameworks address V&A to some extent; some frameworks emphasize vulnerability assessment while others focus more on adaptation. A vulnerability framework should at least incorporate the consideration of autonomous adaptation. Autonomous adaptations are the measures we expect systems or entities affected by climate change to take (whereas proactive or purposeful adaptations can be measures explicitly taken to reduce risks from climate change). For example, a farmer facing continued reductions in crop yields from a changing climate is likely to try to take some measures to reduce those losses. This may include changing planting or harvesting, adding irrigation, switching varieties, and so on, although the capacity to make changes can be limited by the access to financial resources, technology and other factors. An assessment that only estimates the impact of climate change and is not factoring in autonomous adaptation is not truly addressing vulnerability.

Adaptation assessments need to consider vulnerability to climate change. They should examine how vulnerability to climate change (including factoring in autonomous adaptation) can be reduced through adaptation measures. Whether the vulnerability analysis involves a detailed study with modelling or more qualitative assessment may depend on the needs of the assessment and time and resources available.

Box 2-2 (cont.)

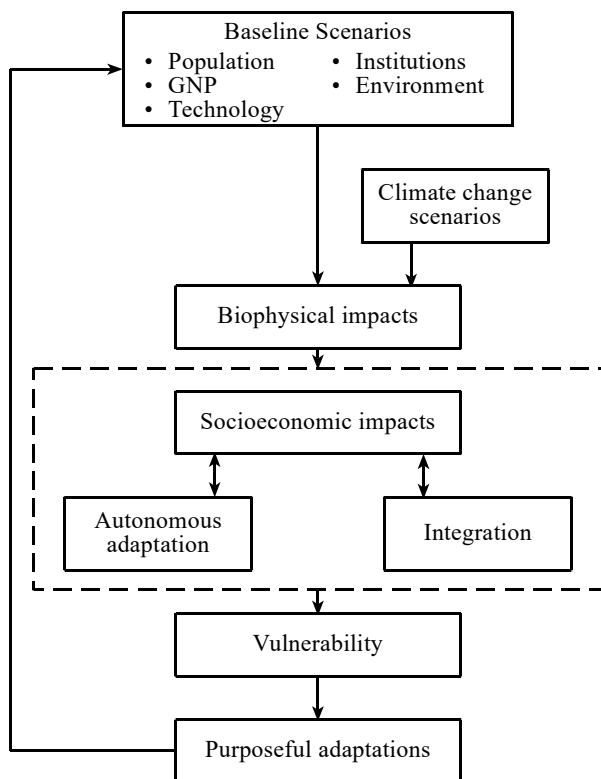
**How different are vulnerability and adaptation frameworks?**

Figures 2-1 and 2-2 are examples of V&A frameworks. Figure 2-1 is from the US Country Studies Program (based on Benioff, Guill and Lee, 1996) and is an example of what is referred to as a 'top-down' or model-driven assessment. It begins with the scenarios, which are often from models, and ends with vulnerability and then adaptation.

Figure 2-2 is from the *PROVIA Guidance on Assessing Vulnerability, Impacts and Adaptation to Climate Change* published by the Global Programme of Research on Climate Change Vulnerability, Impacts and Adaptation (PROVIA) (PROVIA, 2013) and is an example of an adaptation assessment. Note the emphasis and prominence of adaptation in contrast to the example shown in figure 2-1. Indeed scenarios and impact assessment are not mentioned in the figure – although they could be used in the appraising adaptation options box.

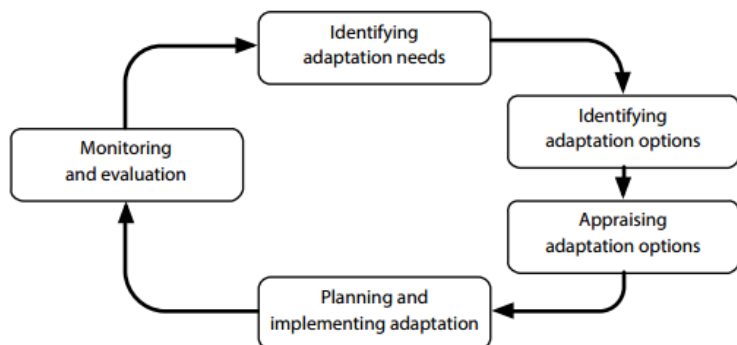
Figure 2-1

**An example of a top-down or model-driven assessment**



Box 2-2 (cont.)  
**How different are vulnerability and adaptation frameworks?**

Figure 2-2  
**An example of an adaptation assessment**



Source: PROVIA, 2013.

### 2.3.1. Current practice in vulnerability and adaptation frameworks

Current good practice suggests that it is important to critically assess the strengths and weaknesses of each framework within the particular circumstances (including the outcomes of V&A assessment planning activities outlined in the previous section). Therefore, this chapter does not state a preference for any framework, but urges Parties to consider all factors in the selection process.

Table 2-1 shows how V&A frameworks have evolved from the 1990s onwards. Often referred to as ‘first generation’, the frameworks developed in the mid-1990s focused more on understanding how significant the impacts of climate change will be in order to direct mitigation efforts. These early frameworks were based on climate scenarios generated through global climate models (GCMs; see chapter 4) and applied to models of ecological or biophysical environments in particular sectors, including those outlined in chapters 5–8.

Table 2-1  
**Established vulnerability and adaptation frameworks**

Framework	Year released	Description
Intergovernmental Panel on Climate Change – <i>Technical Guidelines for Assessing Climate Change Impacts and Adaptations</i> <a href="https://www.ipcc.ch/report/ipcc-technical-guidelines-for-assessing-climate-change-impacts-and-adaptations-2/">&lt; https://www.ipcc.ch/report/ipcc-technical-guidelines-for-assessing-climate-change-impacts-and-adaptations-2/&gt;</a>	1994	Contains examples of first generation approaches to the assessment of vulnerability and adaptation (V&A). The guidelines have an analytical emphasis and focus on identification and quantification of impacts.

Framework	Year released	Description
United Kingdom Climate Impacts Programme (UKCIP) – <i>Climate Adaptation: Risk, Uncertainty and Decision-Making</i> <a href="https://www.ukcip.org.uk/wp-content/PDFs/UKCIP-Risk-framework.pdf">https://www.ukcip.org.uk/wp-content/PDFs/UKCIP-Risk-framework.pdf</a>	2003	Provides guidance to those engaged in decision-making and policy processes. It lays out an approach to integrating climate adaptation decisions and, more generally, climate-influenced decisions into the broader context of institutional decision-making.
Australian Greenhouse Office – <i>Climate Change Impacts and Risk Management: A Guide for Business and Government</i> <a href="http://www.environment.gov.au/climate-change/adaptation/publications/climate-change-impact-risk-management">http://www.environment.gov.au/climate-change/adaptation/publications/climate-change-impact-risk-management</a>	2006	Facilitating climate risk assessment and management, aimed at local and governmental bodies and businesses.
United States Agency for International Development (USAID) – <i>Adapting to Climate Variability and Change; A Guidance Manual for Development Planning</i> <a href="http://pdf.usaid.gov/pdf_docs/PNADJ990.pdf">http://pdf.usaid.gov/pdf_docs/PNADJ990.pdf</a>	2007	Provides guidance on integrating adaptation into development projects. Guides climate risk screening and climate-proof project design, aimed at development agencies.
United Nations Development Programme (UNDP) – <i>Designing Climate Change Adaptation Initiatives: A UNDP Toolkit for Practitioners</i> <a href="https://sustainabledevelopment.un.org/content/documents/951013_Toolkit%20for%20Designing%20Climate%20Change%20Adaptation%20Initiatives.pdf">https://sustainabledevelopment.un.org/content/documents/951013_Toolkit%20for%20Designing%20Climate%20Change%20Adaptation%20Initiatives.pdf</a>	2010	Adaptation decision focus. Problem definition and adaptive solution approach.
UNDP, United Nations Environment Programme (UNEP), Global Environment Facility (GEF) – <i>Applying Climate Information for Adaptation Decision-Making</i> <a href="http://www.undp.org/content/undp/en/home/librarypage/environment-energy/low_emission_climateresilientdevelopment/applying-climate-information-for-adaptation-decision-making.html">http://www.undp.org/content/undp/en/home/librarypage/environment-energy/low_emission_climateresilientdevelopment/applying-climate-information-for-adaptation-decision-making.html</a>	2011	Provides an adaptation framework that targets experts in the climate risks and adaptation realm. It also provides some comparisons among prominent adaptation frameworks.
UNFCCC Least Developed Country Expert Group (LEG): <i>National Adaptation Plans: Technical Guidelines for the National Adaptation Plan Process</i> <a href="https://unfccc.int/topics/adaptation-and-resilience/workstreams/national-adaptation-plans-naps/guidelines-for-national-adaptation-plans-naps">https://unfccc.int/topics/adaptation-and-resilience/workstreams/national-adaptation-plans-naps/guidelines-for-national-adaptation-plans-naps</a>	2012	Provides guidance for development of National Adaptation Plans (NAPs).

Framework	Year released	Description
<p>United Nations University and UNESCO – <i>Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation</i></p> <p><a href="http://www.unesco.org/new/en/media-services/single-view/news/weathering_uncertainty_traditional_knowledge_for_climate_ch/">http://www.unesco.org/new/en/media-services/single-view/news/weathering_uncertainty_traditional_knowledge_for_climate_ch/</a></p>	2012	Explains how indigenous knowledge can be used in decision-making and V&A frameworks.
<p>Caribbean Community Climate Change Center – <i>Caribbean Climate Online Risk and Adaptation Tool (CCORAL)</i></p> <p><a href="http://ccoral.caribbeanclimate.bz/">http://ccoral.caribbeanclimate.bz/</a></p>	2013	Provides decision support to decision makers and planning agencies. It provides a searchable ‘toolbox’ with links to over 150 tools related to climate adaptation. It was created for the Caribbean region, but the screening scenario, guidance document and searchable toolbox can be used by most regions and sectors.
<p>PROVIA – <i>The PROVIA Guidance on Assessing Vulnerability, Impacts and Adaptation to Climate Change</i></p> <p><a href="https://www.unep.org/resources/agenda/provia-climate-science-adaptation-policy">https://www.unep.org/resources/agenda/provia-climate-science-adaptation-policy</a></p>	2013	Provides a framework for considering the full range of approaches to V&A assessment. It aims to help professionals, such as researchers, policymakers, sectoral planners and consultants, select the appropriate methods and tools for their particular context and adaptation situation.
<p>USAID – <i>Climate-Resilient Development: A Framework for Understanding and Addressing Climate Change</i></p> <p><a href="http://www.usaid.gov/climate/climate-resilient-development-framework">http://www.usaid.gov/climate/climate-resilient-development-framework</a></p>	2014	Provides guidance for incorporating a ‘development-first’ approach into existing planning and decision-making processes.
<p>GIZ – <i>The Vulnerability Sourcebook: Concept and Guidelines for Standardised Vulnerability Assessments</i></p> <p><a href="https://gc21.giz.de/ibt/var/app/wp342deP/1443/index.php/knowledge/vulnerability-assessment/vulnerability-sourcebook/">https://gc21.giz.de/ibt/var/app/wp342deP/1443/index.php/knowledge/vulnerability-assessment/vulnerability-sourcebook/</a></p>	2014	Provides in-depth, step-by-step instructions of how to perform vulnerability assessments. The guidelines were created for organizations involved in development planning. The guidelines can be applied to a range of sectors, geographies and spatial scales.

Over time, growing concern around the need for adaptation led to changes in thinking about V&A. This was reflected in the development of ‘second generation’ frameworks that focus on more holistic impact assessments within adaptation decision-making contexts. PROVIA (2013) is one of the most recent additions providing guidance on V&A (described in box 2-2). The PROVIA guidance suggests the following steps in conducting an adaptation assessment:

1. Identify adaptation needs;
2. Identify adaptation options;
3. Appraise adaptation options;

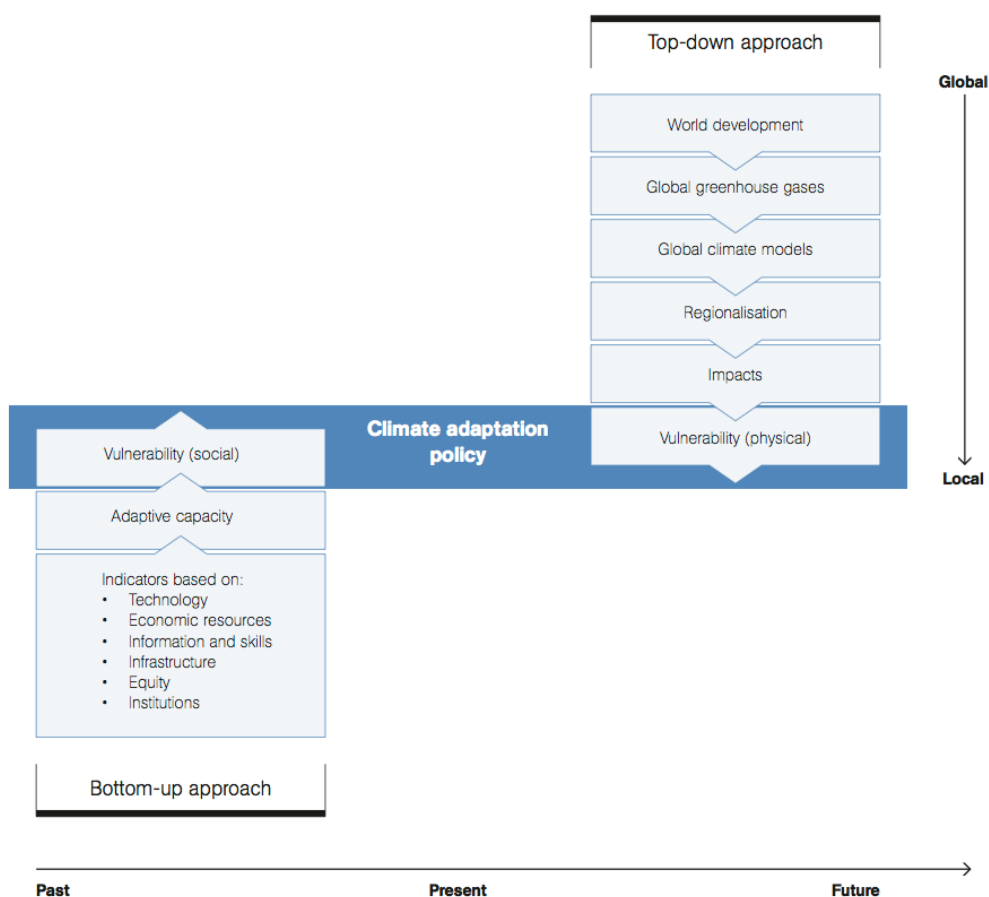
4. Plan and implement adaptations;
5. Monitor and evaluate adaptations.

Note that step 3 in that list could follow a vulnerability assessment or could be carried out with a general knowledge of climate change vulnerabilities. It is not until step 3 that a more detailed assessment of adaptation options, perhaps applying modelling, is undertaken. Some frameworks, which just address adaptation, are presented in chapter 9.

There has also been an emergence of risk-based approaches to V&A (e.g. the United Kingdom Climate Impacts Programme (UKCIP) and the Australian government. Further information on risk-based frameworks is provided in section 2.3.2. Note that the IPCC recommends the application of risk management approaches to V&A assessment (Jones et al., 2014).

It is increasingly recognized that the choice of top-down or bottom-up approaches is driven by a sense of where a V&A assessment sits in the geographic hierarchy, from individual communities (village, town or environment type) through local (municipality) and regional (state, provinces and districts), to national and then international scales (see figure 2-3).

Figure 2-3  
Features of top-down and bottom-up approaches to assessing vulnerability and adaptation



Source: UNFCCC, 2008 (refer to Module 2).

National-level V&A assessments may be carried out using particular impact-driven frameworks, which may be combined with local-scale, participatory bottom-up approaches. Local-level V&A may be undertaken using stakeholder-driven, consensus-building processes in the style of a national adaptation programme of action/national adaptation plan (NAPA/NAP) (see table 2-1), linked with additional sector-specific, localized detailed V&A assessment. Local adaptation plans for action (LAPAs) have been done (e.g. Beyers and Thakali, 2014) which, in section 2 of the citation provides a structure for carrying out LAPAs.

Consequently, top-down/bottom-up thinking enables practitioners to ‘mix and match’ V&A frameworks that apply to different geographic scales (from global to local community), while also blending adaptation and impact-focused approaches (see table 2-1).

The rest of this section briefly describes some key frameworks and tools. With the exception of the IPCC’s seven steps (described below), which is a good example of the top-down approach, the other frameworks and tools described below are notable because they are recently developed and provide either a good overview of V&A or, in the authors’ judgment, are good tools for use in assessments.

#### **IPCC seven steps (1994)**

The IPCC seven steps lay out a process for estimating impacts from climate change:<sup>3</sup>

1. Define the problem;
2. Select the method;
3. Test the method;
4. Select scenarios;
5. Assess biophysical and socioeconomic impacts;
6. Assess autonomous adjustments;
7. Evaluate adaptation strategies.

#### **GIZ**

The Vulnerability Sourcebook published by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) provides an in-depth approach to performing a vulnerability assessment. The guidelines presented in the Vulnerability Sourcebook can be applied to most sectors, geographies and spatial scales. The Vulnerability Sourcebook first provides a broad overview of the processes for V&A assessments and then outlines detailed, step-by-step instructions to perform vulnerability assessments. Each step has clearly defined tasks and resource needs.

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<sup>3</sup> Carter et al., 1994; Parry and Carter, 1998.



## **PROVIA**

PROVIA was created to enhance communication and, subsequently, cohesive research among scientists and decision makers for climate vulnerability, impacts and adaptation research. One of PROVIA's objectives is to gather and organize relevant V&A assessment methodologies into a platform to circulate among scientists and decision makers worldwide. As part of that objective, PROVIA published a guidance document, PROVIA Guidance on Assessing Vulnerability, Impacts, and Adaptation to Climate Change, which outlines an iterative approach to perform climate V&A assessments. The guidance document is purposefully broad in nature and is not designed as a stand-alone tool. Instead, the document summarizes a range of practical methodologies for each step and provides decision tools, such as decision trees, to help users select methodologies that are relevant to their sector, geography and scale. The approach used to assess adaptation is shown in figure 2-2. The guidance document is written for people who have some familiarity with climate V&A assessments, and PROVIA suggests that users involve experts for many of the steps outlined in the document.

### **2.3.2. Adaptation frameworks**

Adaptation frameworks, developed in recent years, focus on involving stakeholders and addressing adaptation needs. These frameworks also put relatively more emphasis on current concerns, such as vulnerability to climate variability and extreme events, in contrast to the longer-term perspective common with impact assessment frameworks. A limited number of adaptation frameworks and tools are described below.

#### **USAID 2014**

*Climate Resilient Development: Building Climate Resilience to Safeguard Development Gains* (USAID, 2014), released by the United States Agency for International Development (USAID) in 2014, applies an overall project cycle approach to adaptation planning, and also seeks to integrate climate change factors into all types of development assistance. The steps of the process are displayed in figure 2-4, below.

At the heart of the USAID framework is an emphasis on development. In particular, the framework relies on identifying the drivers of development (e.g. labour supply, capital, natural resources, land) that enable or support development. It then identifies the potential climate risks (which include climate change) to the drivers. The framework then calls for the identification of adaptations to reduce the key climate risks.

The emphasis on a development-first approach is in contrast to approaches that emphasize applications of climate models first or even detailed vulnerability assessments. A key first step in USAID's framework is to work with stakeholders to identify development priorities, climate risks and adaptations (Cote, Pratt and Hurley, 2014).

#### **CCORAL**

The Caribbean Community Climate Change Center created the Caribbean Climate Online Risk and Adaptation Tool (CCORAL) to provide decision support to planning organizations and agencies in the Caribbean. Instead of outlining a step-by-step process to follow, CCORAL provides an online screening exercise and guidance

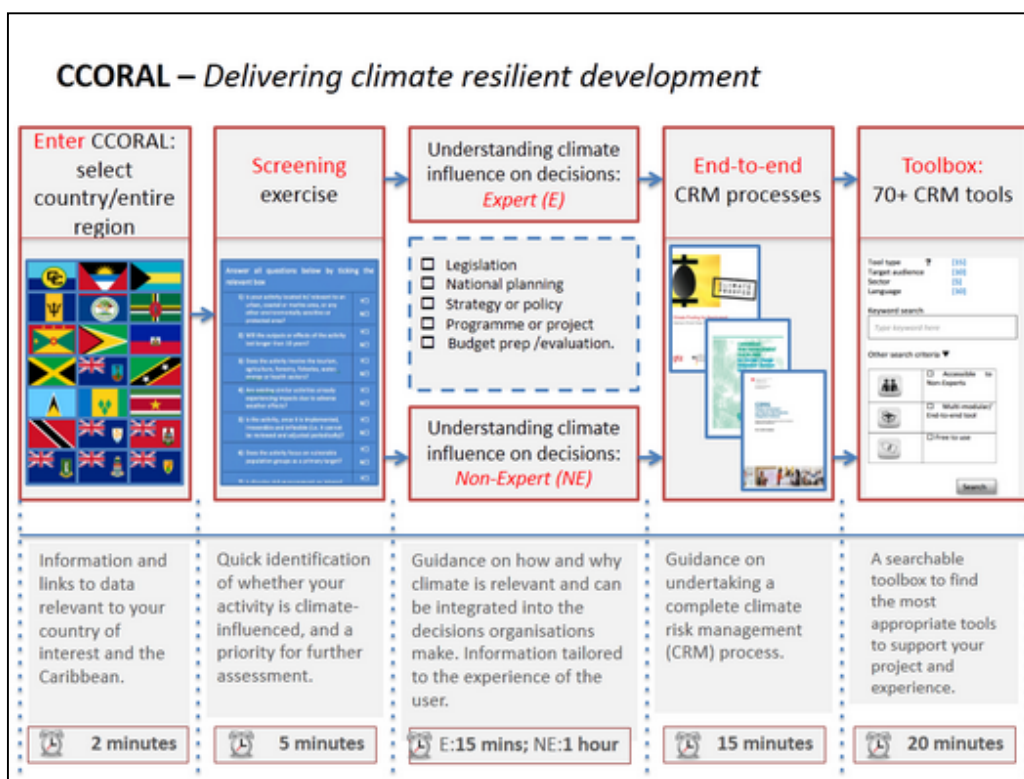
documents to help managers understand how vulnerable their system is to climate change and how climate change is relevant to their decision-making and planning processes (see figure 2-5, below). CCORAL emphasizes a risk-based approach to climate-resilient development, so three risk-based tools are highlighted to provide a searchable toolbox online. The toolbox has links to over 150 climate tools that can be searched by tool type (i.e. by vulnerability, adaptation, or risk assessment and monitoring or evaluation), by sector and by target audience. Although CCORAL was created for the Caribbean, the screening exercise, guidance documents and many of the tools in the toolbox can be applied to most sectors and geographic regions.

Figure 2-4  
The USAID Climate Resilient Development Framework



Source: USAID, 2014

Figure 2-5  
CCORAL climate adaptation tools



Source: CCORAL, Undated.

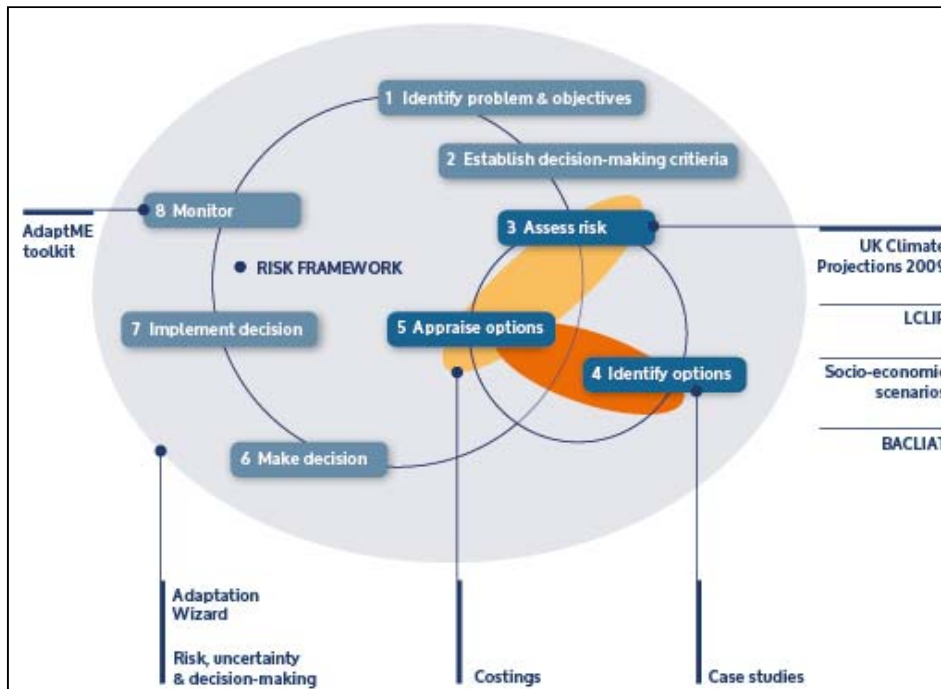
### UKCIP

UKCIP created the Adaptation Wizard for decision makers who oversee sectors that may be vulnerable to climate change. The Adaptation Wizard is a comprehensive screening tool that provides step-by-step guidance on how to perform vulnerability assessments, appraise and implement adaptation options and monitor the success of the selected adaptations (see figure 2-6, below). The framework within the Adaptation Wizard is applicable to most sectors, geographies and spatial scales. UKCIP incorporated many tools into the Adaptation Wizard to provide a comprehensive framework for decision makers.

### Risk-based frameworks

Risk management is the process of defining and analysing risks to facilitate decision-making on the appropriate course of action to minimize risk. Risk management is increasingly advocated as a valuable tool to assist in managing the risks and hazards that may occur as a result of climate change. Risk-based frameworks are used as the basis in both UKCIP and the Australian climate change adaptation planning processes. They are also widely used in the Asia-Pacific region mainly due to their adoption by the Asian Development Bank.

Figure 2-6  
UKCIP Adaptation Wizard



Source: UKCIP, 2015.

An International Standards Organisation (ISO) Standard (ISO 31000:2009, Risk Management - Principles and Guidelines)<sup>4</sup> now supports risk management approaches.

Risk-based frameworks can be applied in a number of contexts, from strategic-level screening assessments to guiding local-level, adaptive decision-making.

There are five phases in a risk assessment (shown in Figure 2-7) namely:

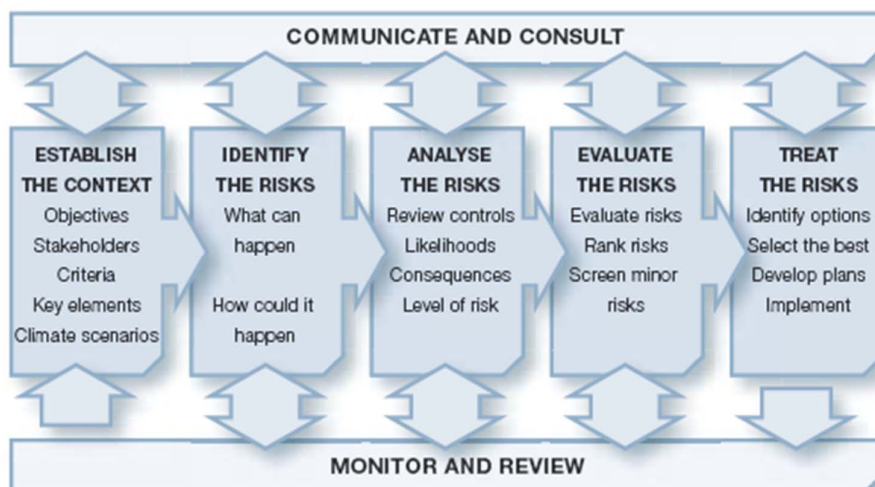
1. Establish the context;
2. Identify the risks;
3. Analyse the risks;
4. Evaluate the risks;
5. Treat the risks.

According to ISO 31000:2009, risk is defined as:

*The chance of something happening that will have an impact on objectives.*

<sup>4</sup> These guidelines are available for purchase from:  
<[http://www.iso.org/iso/catalogue\\_detail?csnumber=43170](http://www.iso.org/iso/catalogue_detail?csnumber=43170)>.

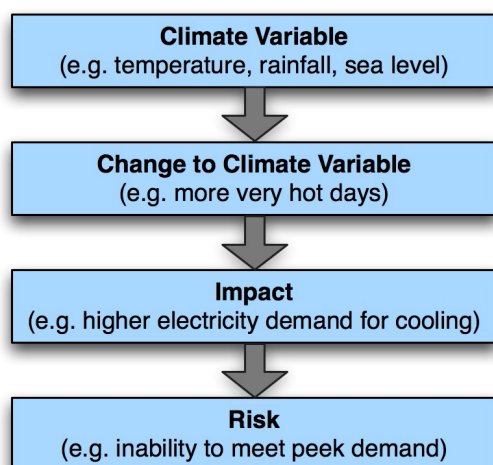
Figure 2-7  
Five steps in the risk assessment framework



Source: Based on Australian Greenhouse Office, 2006.

Consequently, a climate change risk can include positive risks (i.e. opportunities) and negative risks. Risks must also be risks 'to something', most often a risk to a management objective. This highlights a very important difference between the risk-based and impact-based frameworks described in section 2.1.1: risk-based frameworks focus on 'objectives', as shown in the definition of risk above. In practice this means that, for a clearly defined set of causal chains – from the climate variable through to the climate change in that variable – impact and risk must be developed (see figure 2-8). This approach facilitates a clear focus on what a non-Annex I Party is seeking to achieve in its V&A assessment and also enables the Party to move from the analysis of risk through to the development of an adaptation action plan.

Figure 2-8  
Links between climate change drivers and risks



Source: Modified from: Australian Greenhouse Office, 2006.



Using risk frameworks can also be beneficial in the V&A context, where there is engagement with particular sectors (such as insurance or engineering), and where there is long-standing experience of using risk assessment methodologies, but not necessarily in a climate change context.

The second national communication (SNC) of Columbia, for example, used a risk-based approach for its V&A that enabled the SNC team to “determine the risk of loss of goods, services or functionality” (Colombia, 2010, p. 57).

### **NAPAs**

The NAPA process was launched under decision 28/CP.7 of the Conference of the Parties (COP), with the objective of assisting least developed countries (LDCs) to address urgent and immediate adaptation needs.

More than 50 countries submitted proposed NAPAs as of March 2014 (UNFCCC, 2014). There are a range of NAPA guidelines and support materials prepared by the Least Developed Countries Expert Group (LEG, 2013) that discuss the objectives and structure of NAPAs and provide a framework for their preparation.

### **NAPs**

COP decision 5/CP.17 provided a new set of guidelines for the development of NAPs.

The LEG prepared guidance for the preparation of NAPs (LEG, 2012). Figure 2-9 displays the main elements in the NAP guidance.

Besides offering the guidelines, the UNFCCC and LEG have organized NAP events for countries to share information and experiences on developing NAPs, as well as databases and publications to support adaptation planning.<sup>5</sup>

While the NAP process was established for the LDCs, the principles, mandate, guidelines and related materials of the NAP process are relevant to all Parties and it is understood that all Parties are invited to implement a NAP process, taking into account their national circumstances.

### **2.3.3. Local and community frameworks**

A number of V&A frameworks that focus on the community and local levels have been developed in recent years, mainly by non-governmental organizations (NGOs), in response to a need for a bottom-up, community-driven method. Four of the most commonly used community-based frameworks in the NGO community were recently analysed by the Organisation for Economic Co-operation and Development (OECD) (OECD, 2011) and are shown in table 2-2.

The approaches outlined in table 2-2 have all been applied in numerous projects within non-Annex I countries. Each has a slightly different focus, depending on the target audience and the development context. However, they all have a focus on assessing

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<sup>5</sup> See < <https://unfccc.int/topics/adaptation-and-resilience/workstreams/national-adaptation-plans> >.

potential climate change impacts and responses by concentrating initially on present-day climate hazards, through a vulnerability-driven approach. A comparison between the processes of the four approaches to community-level V&A is shown in table 2-3.

Figure 2-9  
Main elements in the guidance for developing national adaptation plans

<p><b>ELEMENT A. LAY THE GROUNDWORK AND ADDRESS GAPS</b></p> <ol style="list-style-type: none"> <li>1. Initiating and launching of the NAP process</li> <li>2. Stocktaking: identifying available information on climate change impacts, vulnerability and adaptation and assessing gaps and needs of the enabling environment for the NAP process</li> <li>3. Addressing capacity gaps and weaknesses in undertaking the NAP process</li> <li>4. Comprehensively and iteratively assessing development needs and climate vulnerabilities</li> </ol>
<p><b>ELEMENT B. PREPARATORY ELEMENTS</b></p> <ol style="list-style-type: none"> <li>1. Analysing current climate and future climate change scenarios</li> <li>2. Assessing climate vulnerabilities and identifying adaptation options at the sector, subnational, national and other appropriate levels</li> <li>3. Reviewing and appraising adaptation options</li> <li>4. Compiling and communicating national adaptation plans</li> <li>5. Integrating climate change adaptation into national and subnational development and sectoral planning</li> </ol>
<p><b>ELEMENT C. IMPLEMENTATION STRATEGIES</b></p> <ol style="list-style-type: none"> <li>1. Prioritizing climate change adaptation in national planning</li> <li>2. Developing a (long-term) national adaptation implementation strategy</li> <li>3. Enhancing capacity for planning and implementation of adaptation</li> <li>4. Promoting coordination and synergy at the regional level and with other multilateral environmental agreements</li> </ol>
<p><b>ELEMENT D. REPORTING, MONITORING AND REVIEW</b></p> <ol style="list-style-type: none"> <li>1. Monitoring the NAP process</li> <li>2. Reviewing the NAP process to assess progress, effectiveness and gaps</li> <li>3. Iteratively updating the national adaptation plans</li> <li>4. Outreach on the NAP process and reporting on progress and effectiveness</li> </ol>

Source: LEG, 2012.

Table 2-2  
Comparison of local-level vulnerability and assessment frameworks

Name	Developer	Target audience	Key inputs	Key outputs
Climate Vulnerability and Capacity Analysis Handbook (CVCA) < <a href="http://careclimatechange.org/tool-kits/cvca/">http://careclimatechange.org/tool-kits/cvca/</a> >	CARE	Project managers, field staff, local partners and communities	Framework with supporting questions and exercises: participatory community-level analysis combines local knowledge with climate science	Informs programming and provides the evidence base for advocacy

Name	Developer	Target audience	Key inputs	Key outputs
<p>Community-Based Risk Screening Tool – Adaptation and Livelihoods (CRISTAL)</p> <p>&lt;<a href="https://www.iisd.org/publications/summary-cristal-community-based-risk-screening-tool-adaptation-livelihoods">https://www.iisd.org/publications/summary-cristal-community-based-risk-screening-tool-adaptation-livelihoods</a>&gt;</p>	<p>International Institute for Sustainable Development, International Union for Conservation of Nature, Stockholm Environment Institute, Swiss Foundation for Development and International Cooperation</p>	<p>Community-level project planners and managers</p>	<p>Two-module analytical framework for linking local livelihoods and climate. MS Excel interface for entering information and compiling report. Typically 1–5 days' input required</p>	<p>Results serve as a basis for designing or adjusting projects for adaptation</p>
<p>Integrating Climate Change Adaptation into Secure Livelihoods. Toolkit 1: Framework and Approach</p> <p>&lt;<a href="https://www.christianaid.org.uk/sites/default/files/2016-03/climate-change-adaptation-toolkit-framework-approach-oct-2010.pdf">https://www.christianaid.org.uk/sites/default/files/2016-03/climate-change-adaptation-toolkit-framework-approach-oct-2010.pdf</a>&gt;</p>	<p>Christian Aid</p>	<p>Country programme and partner staff</p>	<p>No set steps. Three toolkits for understanding livelihoods, adaptation, community climate analysis and strategy development</p>	<p>Analysis informs livelihood programming and climate change strategy development</p>

Source: OECD, 2011.



Table 2-3  
**Non-governmental organization climate risk assessment processes**

<p>Six steps for prioritizing environmental hazards that pose a risk to projects and identifying and choosing options to address them:</p> <ol style="list-style-type: none"> <li>1. Map the areas to assess;</li> <li>2. Review existing scientific knowledge;</li> <li>3. Involve the community;</li> <li>4. Evaluate impacts and risks;</li> <li>5. Identify and evaluate adaptation options;</li> <li>6. Create an action plan;</li> <li>7. Monitor and evaluate adaptation results.</li> </ol>	<p>A series of questions and accompanying tools to understand climate-related vulnerability and adaptive capacity (CVC) in communities:</p> <ol style="list-style-type: none"> <li>1. Assess CVC at national level;</li> <li>2. Assess CVC at local government/ community level;</li> <li>3. Assess CVC at household/individual level.</li> </ol> <p>Guiding questions fall into four categories, which comprise CARE's Community-Based Adaptation Framework:</p> <ul style="list-style-type: none"> <li>• Climate-resilient livelihoods;</li> <li>• Disaster risk reduction;</li> <li>• Capacity development;</li> <li>• Addressing underlying causes of vulnerability.</li> </ul>	<p>Steps to identify livelihood resources exposed to climate hazards and/or important to coping, to be reinforced in projects:</p> <ol style="list-style-type: none"> <li>1. Describe livelihood activities and key resources;</li> <li>2. Analyse climate risks;</li> <li>3. Identify and revise current project activities;</li> <li>4. Propose, analyse and select new project activities;</li> <li>5. Identify desired outcomes of new project activities for monitoring and evaluation.</li> </ol>	<p>Four basic stages to support adaptation to climate change:</p> <ol style="list-style-type: none"> <li>1. Review available information on short-term weather and longer-term climate science;</li> <li>2. Compare with the local or indigenous knowledge of communities most directly affected;</li> <li>3. Conduct participatory vulnerability and capacity assessments;</li> <li>4. Select the most appropriate option for integration:             <ul style="list-style-type: none"> <li>• Adaptation planning;</li> <li>• Climate proofing;</li> <li>• Climate screening.</li> </ul> </li> </ol>
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Source: OECD, 2011.

## 2.4. References

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