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Short course 4: *Fundamentals of Developing a Climate Rationale*

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This workbook is part of **Short Course 4: *Fundamentals of Developing a Climate Rationale***. It is packaged together with the associated PowerPoint presentation and an Instructor's Guide. This short course is the fourth in a series of five climate finance short courses developed by the UNI-LEAD project to strengthen capacities of universities within the LDC University Consortium on Climate Change to provide technical advice and services to their governments for increased access to climate finance. The project is funded by the GEF, implemented by UNEP and executed by START International in partnership with Climate Analytics Africa, Inc.

List of acronyms and abbreviations

GCF	Green Climate Fund
AF	Adaptation Funds
BUR	Biennial Update Reports
CRTB	Climate Risk Toolbox
CEA	Cost Effectiveness Analysis
CBA	Cost-Benefit Analysis
CCDR	Country Climate and Development Reports
OECD	Economic Co-operation and Development
FAO	Food and Agriculture Organization
GCVCA	Gender-sensitive Climate Vulnerability and Capacity Analysis
GEF	Global Environment Facility
GHG	Greenhouse Gases
ITAP	independent Technical Advisory Panel
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
LDC	Least Developed Countries
MCA	Multi-Criteria Analysis
NAP	National Adaptation Plan
NMHSs	National Meteorological and Hydrological Services
NDC	Nationally Determined Contribution
SIDS	Small Island Developing States
SDG	Sustainable Development Goal
TNA	Technology Needs Assessment
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WEC	World Economic Forum
WMO	World Meteorological Organization

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Course introduction

Climate science is complex and multifaceted — generating state-of-the-art knowledge on our changing climate, while contending with significant model uncertainty and contradiction as to the sign and direction of future climate change. Credible, relevant, and actionable climate information is essential for enabling public and private actors, including development financing institutions, governments and private sector investors to take an evidence-based approach to addressing risks arising from climate variability and change. The application of climate science is also critical for making a defensible case for mobilizing financial resources to support adaptation, such as through the Green Climate Fund (GCF) and similar mechanisms. This short course explores the key aspects of climate science that are necessary to support the development of a strong climate rationale within climate finance proposals. This course is oriented around the GCF-WMO Climate Information Platform, which provides access to climate information, tools, and guidance that help to support climate rationale development.

What to find in this course and where?

The content of the Climate Science for Climate Finance course responds to the objectives and outcomes of the course as illustrated in Figure 1. The course is made up of four sessions. **Session 1** is focused on **Climate Science as a Basis for Climate Action**, and provides a brief overview of the importance of climate science within the global climate change landscape (and in particular, its relevance for accessing climate finance). **Session 2** will review the foundational terms and key considerations necessary for **Conceptualizing a Climate Rationale**. **Session 3** will provide detailed steps for **Developing a Climate Rationale**, with a particular focus on the key processes and dynamics for creating a rationale aimed at adaptation. Lastly, **Session 4** will discuss the **Data Platforms and Additional Resources** that can support the reader in informing and shaping their climate rationales in alignment with international best practices and climate finance requirements.

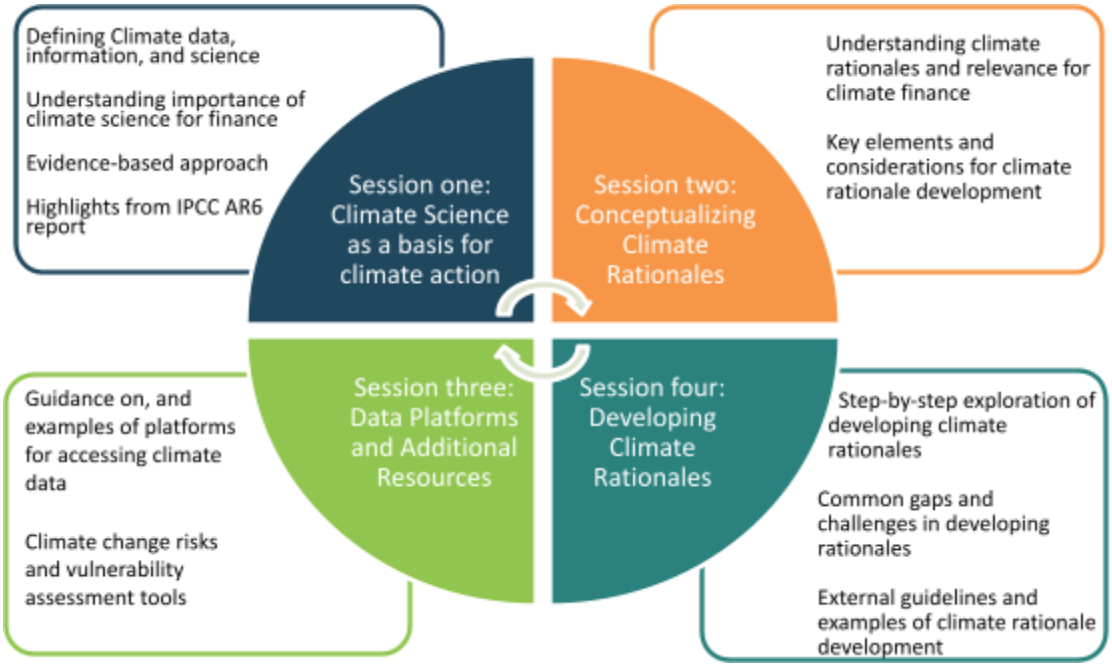


Figure 1: Course Sessions

Session one – Climate science as a foundation for climate finance

1.1. Introduction

This session defines the key concepts that are central to understanding the interface between climate science and finance. It also explores how climate science can contribute to robust climate action and enhanced access to climate finance. Key terms and theories, including climate data, climate information, and evidence-based approaches will be covered to serve as a foundation for the remaining sessions of the short course.

1.2. Some basic definitions

1.2.1. Climate Data & Information, and Climate Science

As defined by the WMO, **climate data** are the records of observed climate conditions taken at specific sites and times with particular instruments under a set of standard procedures (World Meteorological Organization, 2020). **Climate information** connotes the use and application of climate data into useful products that are more applicable than the climate data. Translating climate data (and other complementary qualitative factors) into climate information entails the synthesis, analysis, and interpretation of raw inputs, and their presentation in a coherent and targeted manner.

Climate science refers to research that investigates the structure and dynamics of earth's climate system and provides the scientific foundation of our understanding of climate change. In the interview below, Kevin Horsburgh, Lead Climate Scientist at the Green Climate Fund (GCF) summarizes the importance of climate science for developing a strong climate rationale. In his role, Kevin promotes stronger climate science to inform the development of more robust GCF proposals and project outcomes.

Interview

Source: CFAN

hInterview with Kevin Horsburgh, Lead Climate Scientist at the Green Climate Fund (GCF) in Songdo, South Korea

- What do you think are the biggest challenges in addressing climate change ?
- How can we use models to project climate change impacts ?
- How can we translate climate data and science for local and bottom-up application ?

1.3. Importance of Climate Science to Climate Finance

Bilateral lenders, multilateral climate funds, and national governments all contend with a high volume of proposals, all with different (and sometimes) competing priorities. To this end, these entities have established standards and practices to ensure that funding proposals and opportunities are evidenced based and aligned with local, national, regional, and international needs and realities. The evidence basis of climate science is essential for establishing a strong case for accessing climate finance, ideally through the integration of multiple streams of credible and defensible climate information and evidence. All climate funds – and, increasingly, other sources of finance – have explicit components that require the prospective recipient to articulate how a project proposal is grounded in robust, context-specific climate science.

1.4. An Evidence-Based Approach

An evidence-based approach is favored because it offers the following benefits:

It is more likely to accurately and thoroughly identify the climate risks that need responding to. The approach also enables one to demonstrate how the proposed responses to the climate impacts are likely to work.

Using climate science within a broader evidence-based approach at the beginning of a proposal cycle enables one to identify the risks, limitations, and benefits associated with a particular response. This is crucial for planning funding proposals that are reasonable and achievable, which makes them more likely to be funded

1.5. Highlights from IPCC 6th Assessment Report (AR6)

A key source of global climate science and climate information is the Assessment Report Series of the Intergovernmental Panel on Climate Change (IPCC), the mandated body of the United Nations tasked with informing governments about the state of the knowledge of climate change.

The IPCC serves as a repository for all the baseline and widely accepted climate science, and is an important *starting point* for understanding the baseline science and finding regionally relevant observations, projections, and analyses. The most recent Assessment Report was the 6th AR, which The Guardian reported as the "starkest warning yet" of "major inevitable and irreversible climate changes". This session briefly describes key high-level findings from the 6th AR that are relevant to Sub-Saharan Africa, and South Asia.

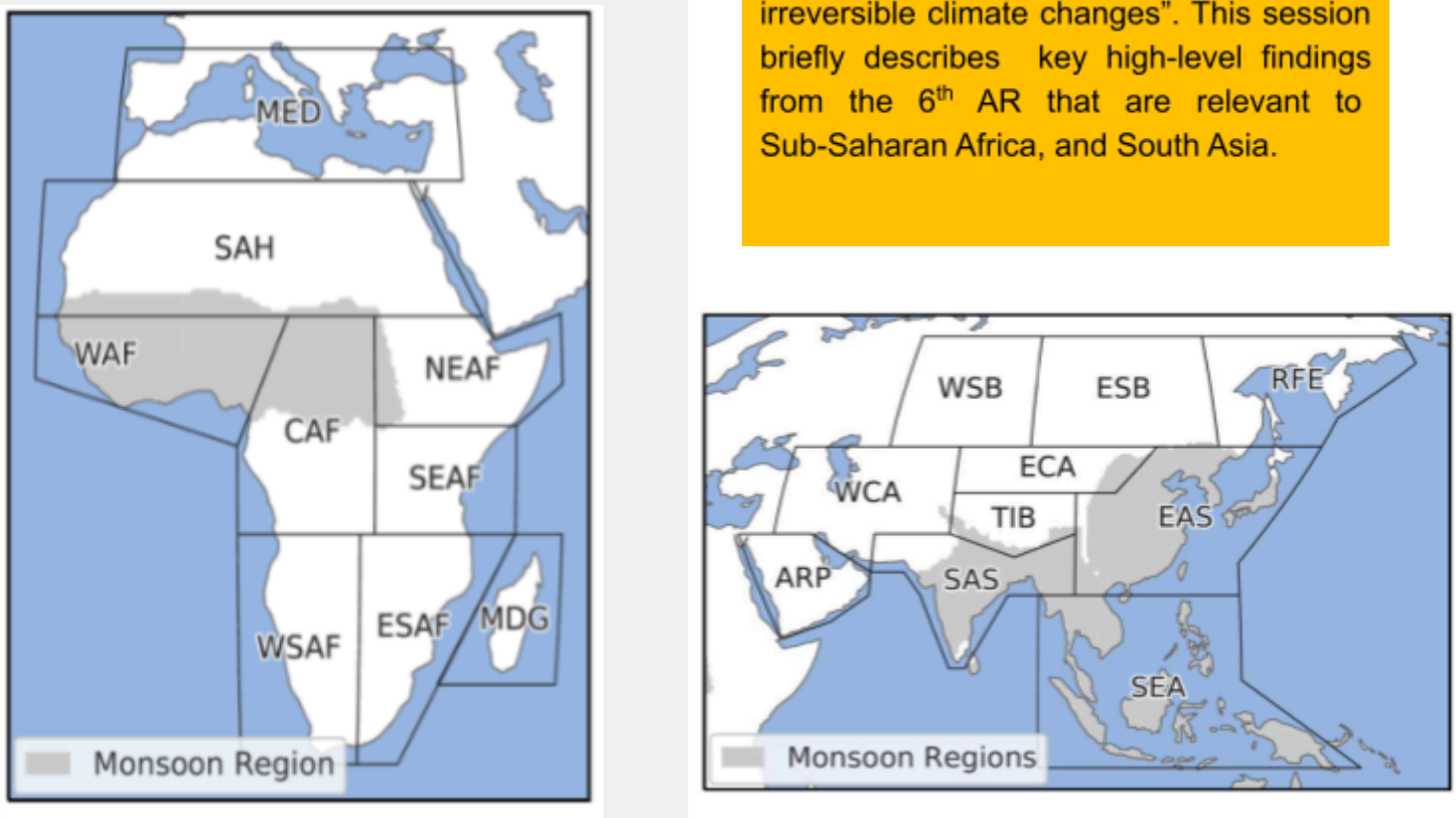


Figure 2 - Disaggregation of regional zones by the IPCC (Source: IPCC AR6)

As shown in Figure 2, the IPCC disaggregates its analysis of the state of the global climate into various regions. Each region has distinct socio-environmental characteristics that can lead to different manifestations and impacts of climate change.

It is also important to note that these divisions are not perfect; there are further variations in climate change impacts and projections *within* each region, and many countries can overlap into multiple regions as well. Nonetheless, these disaggregated regions offer researchers and project proponents greater insights into country- or region-relevant climate science. It is important to underscore that while international climate funds and other potential partners/funders may leverage IPCC findings to guide their own approaches and priorities, much of the observations, projections, and analyses provided by the body may not be at the national or subnational levels, thus limiting their utility for funding proposals. Project proponents should exercise caution and seek to use only the information that is geographically most relevant to them.

While the precise projections (and indeed, confidence levels) for climate change scenarios can greatly vary between and within regions, there are some overarching messages that are useful for understanding the most pressing challenges currently facing Africa and Asia.

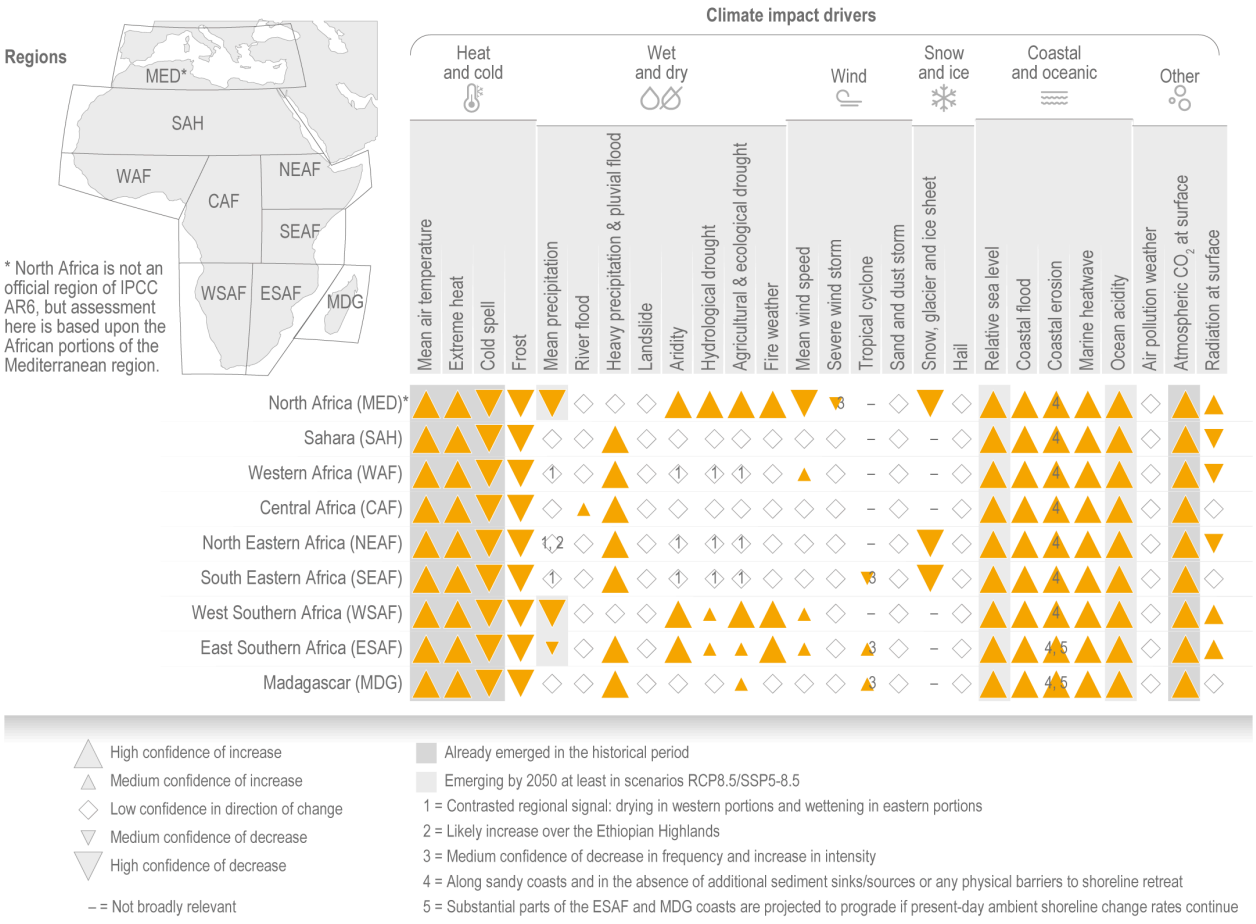


Figure 3: Climate Impact Drivers in Africa. Source: IPCC AR6

Figure 3 summarizes the various projected climate impact drivers that may affect – and, in some cases, are already affecting – the different regions in Africa. Of note is the high confidence in increasing temperatures and extreme heat in the WAF, NEAF, and SEAF regions. Similarly high confidence in increases in sea levels, coastal floods, coastal erosion, marine heatwaves and ocean acidity also demonstrate the cross-sectoral and cross-ecosystem challenges that countries will have to grapple with in the coming future.

Climate science and evidence-based approaches should also be leveraged to quantify estimations of populations affected by certain climate hazards, as well as the number of potential beneficiaries from an intervention. The IPCC highlights the fact that anywhere between 2 million and 10.2 million people are affected by droughts in various parts of WAF, NEAF, and SEAF.

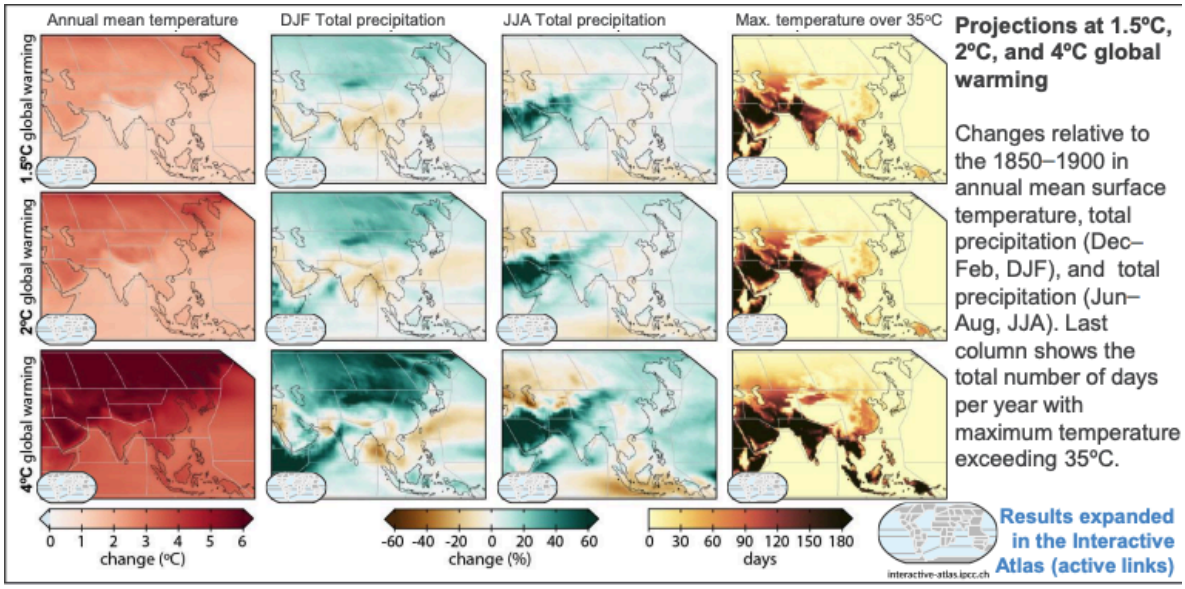


Figure 4 - Temperature change projections for Asia based on different warming scenarios (Source: IPCC AR6)

The threats facing various regions in Asia are equally pressing. In particular, as Figure 4 suggests, the increase in temperatures (and subsequent heat waves) and extreme precipitation events in SAS and other regions are some of the most well-known challenges of climate change. The IPCC also offers useful information on the impacts of climate change on critical sectors.

Figure 4 highlights the potential impacts of future climate change on crop yields. In this case, the projected reduction in rice and wheat yields in Bangladesh, and increase in fisheries yields in Nepal can provide a justification for developing adaptation responses that address the projected changes. The sectoral and socioeconomic implications of climate change impacts are vital to highlight to climate funders as a rationale for intervention.

It is worth noting, especially in the context of the countries we are working with, that there are noteworthy criticisms about the IPCC (despite its acceptance at the governmental level).

Carmona et al. (2023) and Ford et al. (2016) are among many scholars who have analyzed the inclusion of traditional and indigenous knowledge/science in IPCC literature.

They find that it is often lacking, and more heavily perceive these communities as passive "victims" of climate change, rather than active agents with a wealth of knowledge and experience that could be useful for understanding and reacting to climate change. While this may not necessarily impact the trajectory of a climate rationale, it is important for project

proponents to be aware that all climate science and data sources may have limitations and criticisms, and that overreliance on a single source can often result in the obfuscation or omission of key details.

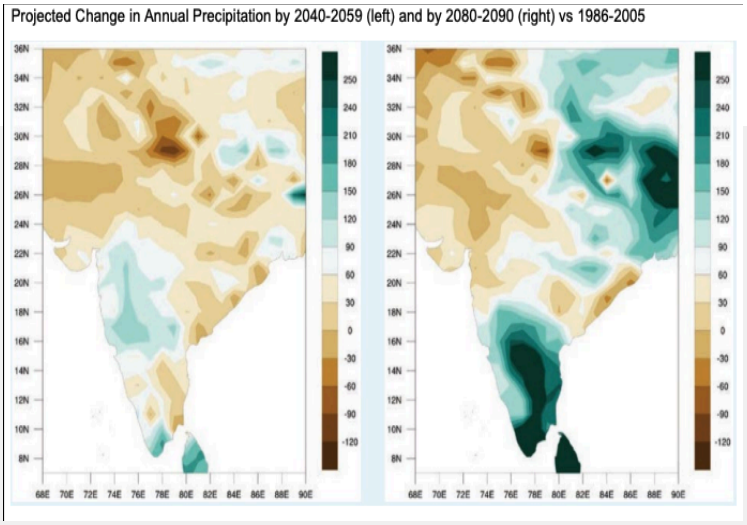
Country/ Region	Commodity	Temp.	Prec.	Impact on production yield	Projected year
South Asia					
India	Rice/Wheat/ Pluses/			▽ 2.3%	2030
	Coarse cereals			▽ 8.62%	2050
Rajasthan (India)	Wheat/ Barley/ Maize			▲ ▲	2050
India	Rice			▽ 10–30%	
Hyderabao (India)	Maize	+1°C, +2°C, +4°C		△ 25–70%	
North India	Rice			△	2030
South India	Rice			▽ 5–17%	
Bangladesh	Rice			▽ 12.1–17%	
	Wheat			▽ 12.4–61%	
Bhutan Med latitude	Rice			▽ 6.7%	2050
Bhutan Med latitude	Rice			▽ 12.6%	2050
Sri Lanka	Rice			▽ 3.6–19.8%	
	Tea			▽ 8–17%	2050–2070
South Asia	Rice			▽ Up to 5%	2040
Bangladesh/ India/Pakistan	Wheat			▽ 5 to 10%	2040
South India (other than Bangladesh/ India/Pakistan	Wheat			△ 5–7% ▽	2040
Trishuli River, Nepal	Fisheries			▲ ▲	

Figure 5: Projected impacts of climate change on agriculture and food systems in South Asia, based on post-IPCC-AR5 studies (Source: Intergovernmental Panel on Climate Change., 2022)

It is also worth noting that the information from the AR6 reports should generally only serve as a starting point for project proponents seeking to develop climate rationales. As can be seen from the figures above, the AR6 analyses are often high-level, and therefore provide a more general indication of the climate impacts, projections, and trajectories for entire continents. As will be discussed in the sessions below, a project-specific climate rationale will ideally be focused on specific climate impacts and interventions within a narrowly defined (national,

subnational, or regional) geographical area. In these instances, the data and analyses from IPCC reports like the AR6 may not be sufficient, but may point project proponents towards studies, resources, and general observations that could inform the development of a more tailored climate rationale.

The differences between the data in the AR6 reports and the information used in climate rationales can often be seen in visualizations. Figure 6 below is from an approved Green Climate Fund Project (SAP037), aimed at investing in early-stage climate technologies in India, with a particular focus on sustainable agriculture, natural resource management, and mobility and supply chains. The graphic highlights the projected changes in annual precipitation based on data gathered by the G20 Climate Risk Atlas and World Bank Climate Risk Profile.
The same can be seen in West Africa through the approved Green Climate Fund Project (FP188), aimed at developing climate-resilient fisheries interventions in Ghana. The submitted climate rationale analyses of existing datasets by the FAO to highlight historical (and later projected) changes to temperature and precipitation around the Gambia River watershed. Given the size of the country, this high-level dataset is sufficient.
The information presented through graphics and data like this were ultimately utilized to not only justify the proposed project's priority climate impacts, but also the chosen interventions (which were highly specific to river basin salinity for coastal communities).



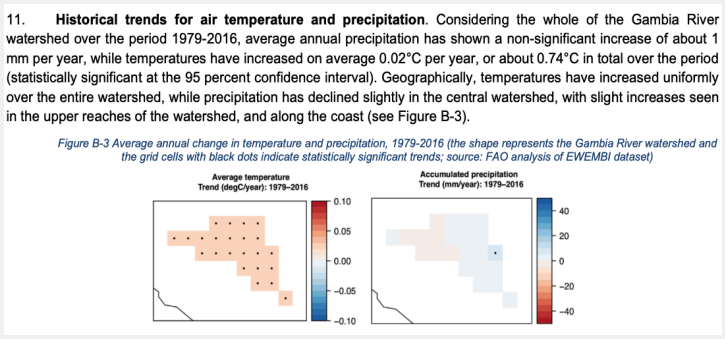

11. **Historical trends for air temperature and precipitation**. Considering the whole of the Gambia River watershed over the period 1979-2016, average annual precipitation has shown a non-significant increase of about 1 mm per year, while temperatures have increased on average 0.02°C per year, or about 0.74°C in total over the period (statistically significant at the 95 percent confidence interval). Geographically, temperatures have increased uniformly over the entire watershed, while precipitation has declined slightly in the central watershed, with slight increases seen in the upper reaches of the watershed, and along the coast (see Figure B-3).

Figure B-3 Average annual change in temperature and precipitation, 1979-2016 (the shape represents the Gambia River watershed and the grid cells with black dots indicate statistically significant trends; source: FAO analysis of EWEMBI dataset)

Figure 6: Left: Projected change in annual precipitation in India relative to historical data from 1986-2005 (Source: GCF, 2024) Right: Average annual change in temperature and precipitation in the Gambia, based on historical data from 1979-2016 (Source: GCF, 2022).

1.6. Exercises, guiding questions

Do you know what climate risks, projections and trends would be fundamental to developing a climate rationale in your country?

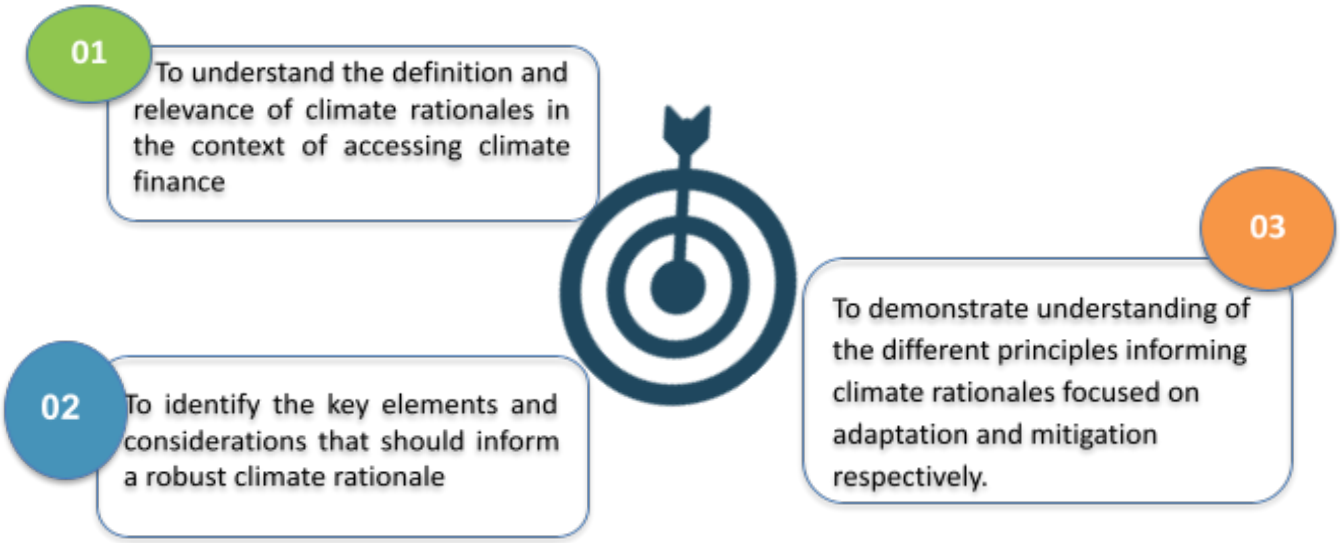
What science informed those projections and trends?

Session Two – Conceptualizing a climate rationale

2.1. Introduction

The foregoing examination in Session 1, around the foundational connections between climate science and climate action, sets the stage for utilizing the climate rationale as an approach for connecting the two. This session focuses on the evidence basis for constructing a climate rationale, and its relevant principles and considerations. Session 2 will also serve as a basis for the next session, which explores how to develop a climate rationale.

2.2. Learning objectives



2.3. Understanding the "Climate Rationale"

The most explicit way to connect climate science to climate finance is through a **climate rationale**. These are central components of funding proposals, with major climate funds, such as the GCF, GEF, and AF, all requiring some form of a climate rationale within submitted proposals.

Simply put, a climate rationale is a **logical connection** between **current and/or anticipated climate change effects**, their **impacts on communities** and services, and their **proposed responses**.

The climate rationale also allows for making a case for the **necessity of climate finance**, and to clearly **explain the climate impacts/risks being addressed, or the projected emissions mitigation outcomes**.

Lastly, a good rationale should **make use of the best available climate data and science** that demonstrates a robust linkage between climate change vulnerabilities and impacts , proposed responses, and the anticipated benefits. A good climate rationale should flow well and articulate these linkages in a clear and concise manner.

A practical example of how a climate rationale can directly influence climate finance is the GCF Funding Proposal, which is very explicit and thorough in its demands for a climate rationale. The key language that the GCF requests is highlighted in Table 1.

Table 1 - Key Principles for Climate Rationale Development. Source: GCF Funding Proposal Template

Key Principles to Address to Define a "Climate Rationale" in a GCF Proposal
• Describe the **climate change problem** the proposal is expected to address. • Describe the **mitigation needs** (GHG emissions profile) and/or **adaptation needs** (climate hazards and associated risks based on impacts, exposure, and vulnerabilities) that the proposed interventions are expected to address. • Describe the **most likely scenario** (prevailing conditions or other alternative) that would remain or continue in the absence of the proposed interventions. Include baseline information. • Explain the **methodologies** used to derive the climate rationale. Source: GCF Proposal Template, Section B.1

2.4. Key Elements of a Climate Rationale

As was described above, a strong climate rationale should identify the **climate impacts that need to be addressed**. It should demonstrate how these climate impacts are related to the **vulnerabilities and risks** facing the population, sectors, ecosystems, etc.

If the project is mitigation-focused, the climate rationale should highlight **current emissions trajectories,** and how the proposed solutions facilitate **pathways to shift emissions trajectories**.

For adaptation-focused projects, the rationale should provide an **assessment of options based on priorities.** In other words, what are the range of available (and feasible) responses to the challenge? Why are these the most viable potential interventions?

Lastly, a good climate rationale should clearly demonstrate how the proposed responses are **aligned with domestic and international policies/frameworks**. Governments express their climate change needs and priorities in documents like the NDC or NAP, or in national climate- or sector-specific policies. Highlighting how solutions would contribute to these policies and international agreements like the Paris Agreement make a proposal more compelling.

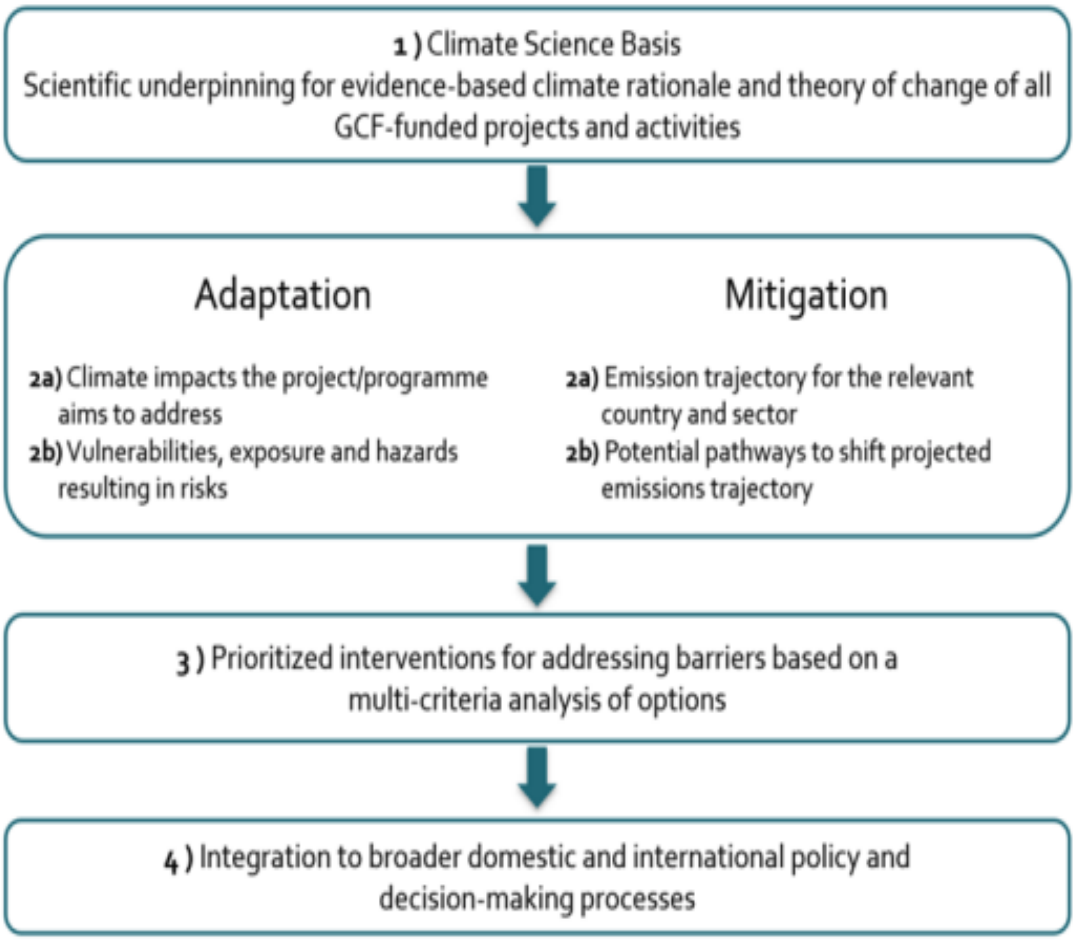


Figure 7: Overview of steps for GCF Climate Rationale Development

Figure 7 above shows how these key principles are encapsulated by the Green Climate Fund. It is important to note that the GCF highlights **scientific underpinning for evidence-based climate rationales** as an overarching requirement for all proposals. Further insights into what the GCF requires of different types of climate rationales are covered below, and are summarized in this video.

Table 2 below highlights some of the key questions that one can ask themselves while developing a climate rationale.

Table 2 - Key Guiding Questions for Climate Rationale Development

Why is this project/programme **important for the country, population, and the economy** to address climate change?
What types of **observed changes are climate-related** in the target region(s)?
To what extent are these **changes attributable to the impacts of climate change** for the system, sector, and/or the different socio-demographic groups in the target region(s)?
What are the **projected climate change impacts** likely to occur in the intervention area (e.g. by 2030 or 2040)?
What **interventions are proposed and considered** to address the identified climate change-related impacts?
How does the (adaptation) project/programme **address climate vulnerabilities and/or adaptive capacity**?

2.5. Key Principles for Mitigation-Focused Climate Rationales

There is a slight difference in approach and considerations when developing climate rationales that are mitigation vs. those that are adaptation focused.

For mitigation activities, *the climate rationale should articulate how the climate issues and proposed solutions are aligned with national priorities and policies*. The project proponent should clearly articulate how rising GHG emissions are connected to climatic changes in the country or region, and how the proposed solutions would facilitate a meaningful mitigation of these emissions.

The NDC can serve as a good starting point for identifying adaptation and mitigation priorities within a country. National policies could also provide an indication of the priority sectors, regions, and/or communities that could be targeted for emissions mitigations.

Secondly, and equally as important, proposals should demonstrate that a **projected level of GHG emissions reductions will occur.** Some approaches to assessing mitigation impact include:

1. Determining project impact boundaries
2. Defining baseline (using assumptions consistent to those made in national GHG reporting)
3. Showing additionality (if relevant)

For the GCF, an activity is considered additional if it can be shown that the GHG emission reductions would not occur in the absence of the GCF funding.

These same approaches are shown in Figure 8, with guiding questions that can help one think about how to approach developing the key elements of a mitigation-specific climate rationale.

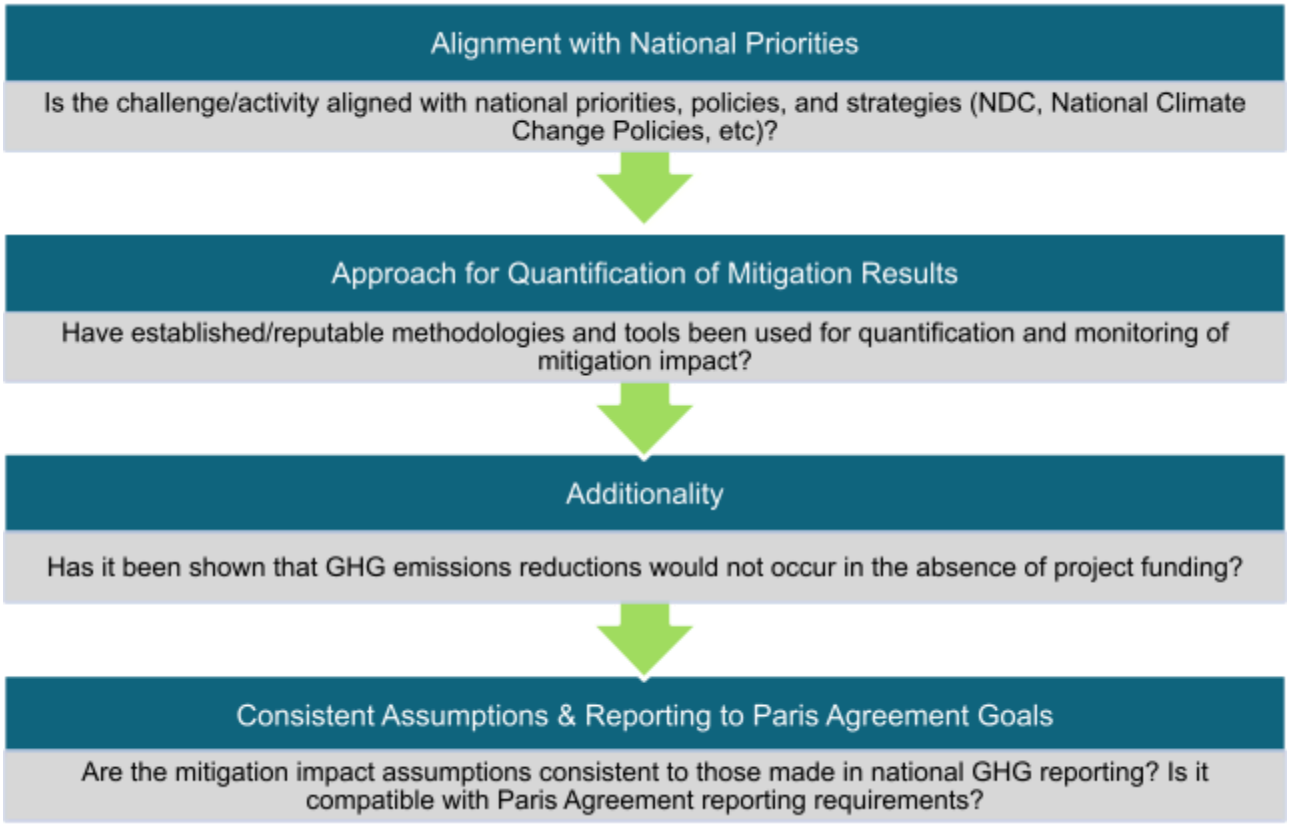


Figure 8: Key Principles & Guiding Questions for Mitigation-Specific Climate Rationales

2.6. Key Principles for Adaptation-Focused Climate Rationales

Adaptation proposals *should use the climate rationales to provide evidence-based analysis demonstrating how a proposed activity is likely to be an effective adaptive response to the risk or impact of a specific climate change hazard.*

There are 4 key elements that should be covered in an adaptation-specific climate rationale. The rationale must (1) **identify the climate effects, and the systems, groups, sectors, and subregions at risk from these hazards.**
It must also (2) explain how the **proposed response will reduce risk exposure or vulnerabilities.** The choice of a certain intervention over others must also be articulated.
Similar to mitigation-specific rationales, (3) demonstration of **alignment with national plans** (especially the NAP)**, policies, targets, etc** is crucial.

Lastly, the rationale should highlight (4) how the **impact of proposed solutions will be assessed.** It is important to note that a lot of these components are essential to the entire funding proposal, and it is not expected that the climate rationale should explain all these components in great detail. It is, however, important to begin thinking about and summarizing these principles and considerations in the climate rationale to *underscore the linkages in the Funding Proposal.*

It can be useful to look at each of these principles through the lens of guiding questions as described below:

- **Identification**

Does the proposal show how it will address current/future climate risks and impacts, and why the chosen method is effective?
Does the proposal consider non-climatic factors causing/exacerbating climate risks, and describe interactions between climate change and non-climatic factors?
Does the proposal identify groups, sectors, and subregions most susceptible to climate change impacts?

- **Response**

Does the proposal justify why a proposed intervention was chosen over alternatives?
Does the proposal consider barriers (e.g. technical, social, regulatory) for implementation, and how these barriers will be overcome?
Does the proposal apply methodological approaches for quantifying beneficiaries expected to result from the activity

- **Alignment**

Does the proposal align with the country's national plans and climate strategies (e.g. NAPs, NDCs, long-term strategies)?

- **M&E**

Does the proposal have a well-designed theory of change?
Does the proposal describe the M&E system used to assess the climate impact of the proposed project, and quantify adaptation beneficiaries?

Having now looked at the overarching elements, principles, and key considerations for developing a climate rationale, it is important to discuss some common challenges that are faced by institutions in LDCs and SIDS.

One of the main challenges is that project proponents can sometimes struggle to **distinguish between adaptation actions/projects and broader development initiatives.** The line between adaptation and development can often be blurry, making it difficult to make a compelling case about the climate relevance of proposed interventions. It is therefore crucial to **highlight specific climate impacts that an intervention responds to.**

Nonetheless, development and adaptation interventions can have substantial linkages, with each informing and enabling the other (as shown in Figure 9). It can therefore also be useful to highlight the linkages between proposed adaptation action and broader development goals or outcomes as a co-benefit, while maintaining a focus and emphasis on the climate-related dynamics of the rationale and proposed interventions.

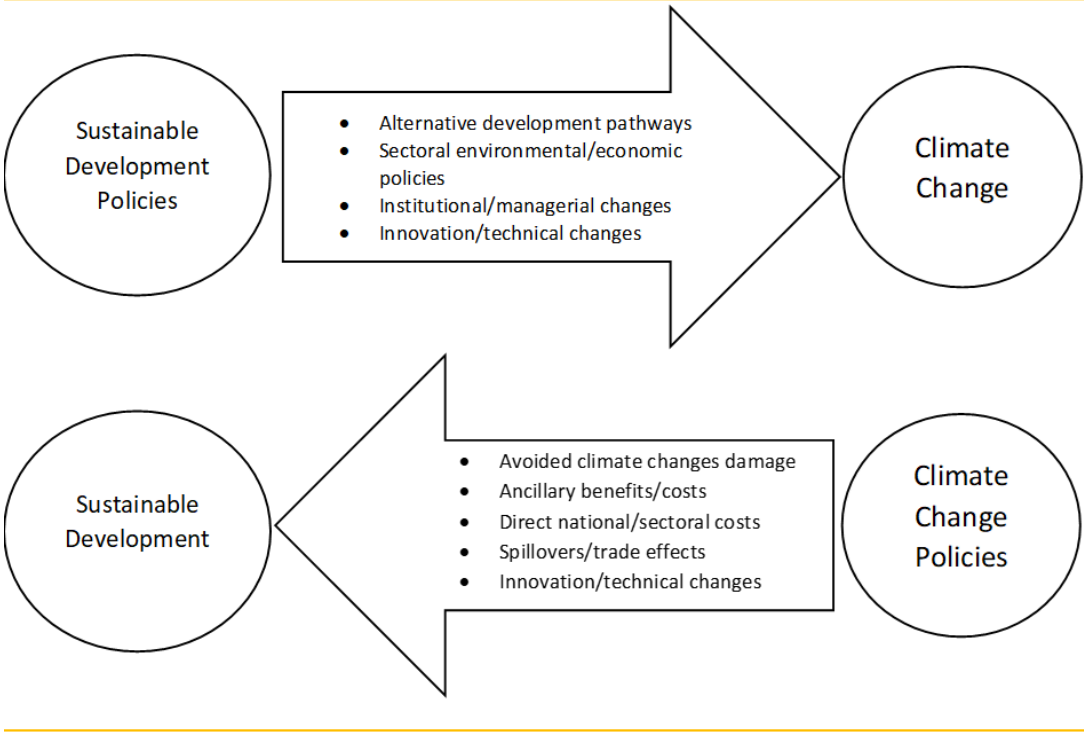


Figure 9: Two-way linkages between climate and sustainable development. Recreated from Swart et al. (2003).

Beyond this, most of the challenges expressed surround the lack of precise or consistent climate projections for much of the Global South. Examples include the East African Paradox, which highlights the uncertainty regarding precipitation projections in Eastern Africa (especially the

Horn of Africa). There are severe resource access and capacity constraints, alongside limited general availability of high-quality climate data in Africa and South Asia (especially at a national or subnational level). Session 4 will provide some useful tips in navigating these data-related challenges.

Session three – Developing a climate rationale

3.1. Introduction

Given the understanding built from the previous session on the foundational concepts and principles surrounding climate rationales, this discussion transitions the focus towards practical guidance for developing climate rationales for financing.

3.2. Learning objectives

On completion of the session, participants will be able to;

3.3. Steps for Climate Rationale Development: GCF-WMO guide

There are many ways in which a climate rationale can be developed, and as was explained in the previous section , the language of what is required in a rationale can be specific to both the nature of the proposal (i.e. adaptation, mitigation, and/or loss and damage) as well as each funding source (e.g. this course focuses on the GCF language).

The WMO and GCF have developed a guide that synthesizes the most important components of a climate rationale, and distills it into a 4-step process that can be followed to develop a fit-for-purpose climate rationale. The remainder of this session will illustrate these steps. While this session will briefly review some salient points and observations for each step, course

participants are encouraged to access the material in their own time to fully appreciate the details provided by the WMO and GCF.

While each of the 4 steps can have several sub-activities, they can generally be summarized as shown in Figure 10 below.

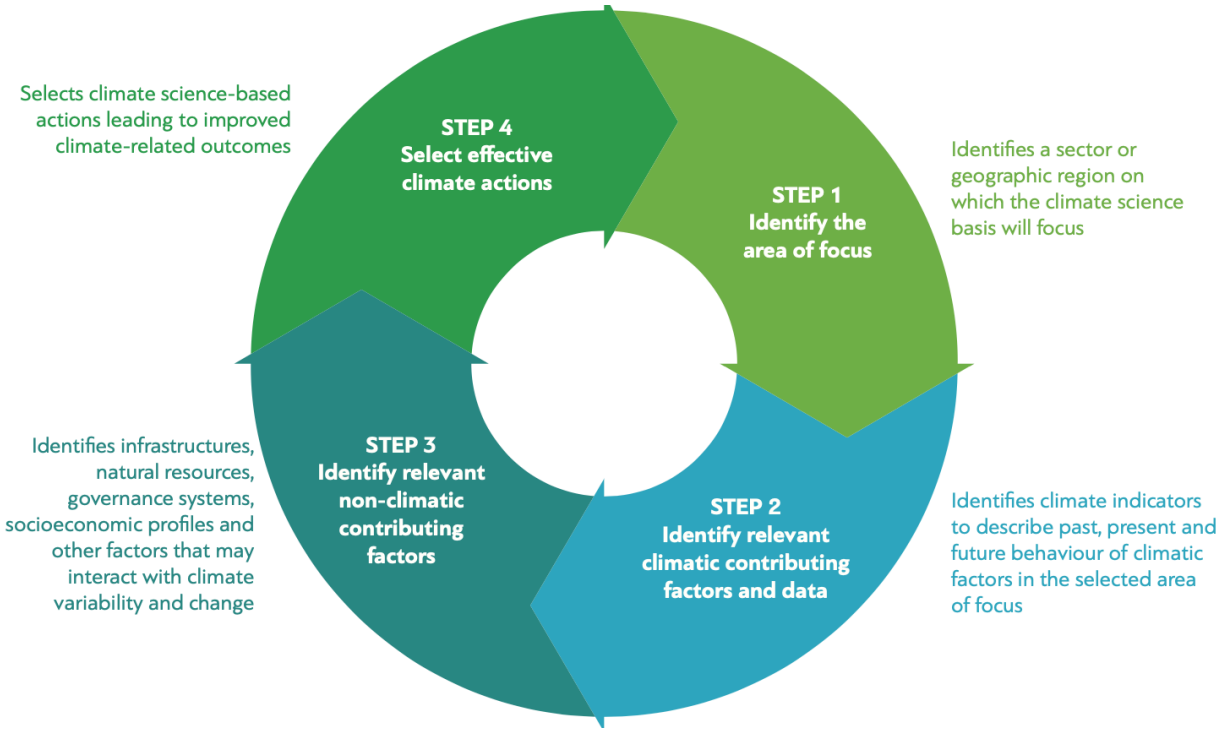


Figure 10:- Visual Overview of the Key Steps for Writing a Climate Rationale. Source: WMO (2022)

It is important to note how this process can be represented as a logical chain of interconnected processes that begin at identifying the problem, and conclude with proposing a solution. All these steps should be backed by evidence-based approaches based on sound climate science.

3.3.1. Identify area of focus

The first step, as shown in Figure 11, entails **identifying a specific climate priority, sector(s), and/or region** of focus for the proposed project. This can be achieved through the review of priorities by various stakeholders. As the guide suggests, relevant stakeholders can be convened for consultations to better understand the existing information base, and viable areas for intervention. It is critical to note the *importance of consultations with non-state stakeholders,*

like CSOs, sector experts, and NGOs, as they can offer substantial knowledge and resources too. What are some pressing issues, vulnerable areas, or promising opportunities that you can think of?

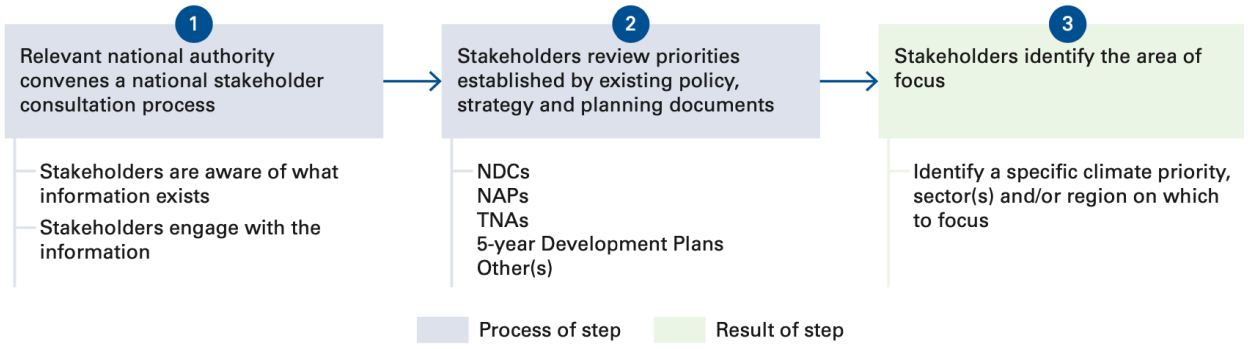
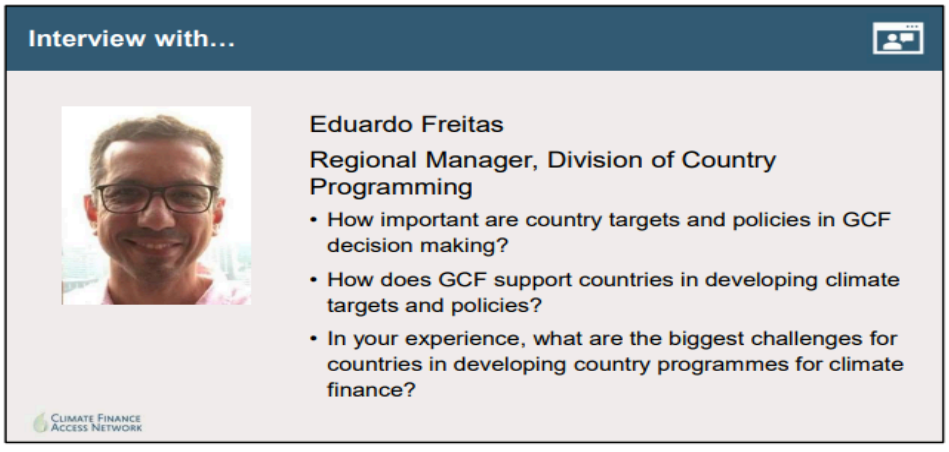


Figure 11:- Key Activities for Step 1 (Identify Area of Focus). Source: WMO (2022)

The reviewing of existing policy, strategy, and planning documents is also a useful method for this step. Some of the examples (NDCs, NAPs, TNAs, Development Plans, etc) contain explicit targets – sometimes quantified – that the national Government is seeking to meet. Others contain useful summaries of current climate assessments, which can inform the identification of risks and vulnerabilities.

For further perspective, consider watching the interview of Dr. Eduardo Freitas, a Regional Manager in the Division of Country Programming at the GCF.



Interview with GCF secretariat staff member on the importance of targets & policies in GCF decision-making

Source: CFAN

3.3.2. Identify Relevant Climatic Contributing Factors & Data

After identifying the area of focus, the second step is to **identify the climatic factors associated with climate impacts** in the chosen area of focus. As Figure 9 shows, this can be done through a series of simple processes.

Firstly, one should **gather historical climate data** relevant to the area of focus. This can include data on precipitation, temperature trends, sea level, droughts, rainfall patterns, etc. This should be *observational data*, which relies upon information collected in the past. National Meteorological and Hydrological Services (NMHSs) are the best source for this, as they would likely have the most detailed country-level data. For mitigation-focused projects in particular, documents like the Nationally Determined Contribution (NDC), Biennial Update Reports (BURs), and National GHG Inventory Reports are foundational sources for identifying emissions-related data.

The documents provide national government reporting on GHG emissions sources – often including disaggregated by sectors and gas types – as well as historical trajectories of emissions over various timescales. These are crucial pieces of information for the identification of priority sectors as well as understanding the long-term emissions landscape that would be contributed to by the proposed project.

Next, one should gather **climate projection data** relevant to the area of focus. Some of the sources for this will be discussed in Session 4 but what is important to note is that this data should *look into the future*. What are the projected precipitation patterns and levels in 2030? How is the temperature in a particular region expected to increase/decrease over time?

After gathering this information, it should be assessed to **ensure that the data is of a usable quality**. This will be discussed in more detail later but it is important to organize, quality-check, and present this information in a manner that is salient and logical. Proposals should not be informed by data from sources that would not be recognized by the National Government and/or international best practices.

The information can be presented through an **analysis of the magnitude and direction of projected changes**. The observational data and projections can be contrasted to determine the trends, variabilities, and extremes that will likely pose a challenge to the identified area of focus in the future.

Interpreting the results of the analysis can provide a clear understanding of how past, present, and future climatic dynamics interact, and how this may pose challenges to a specific area of focus.

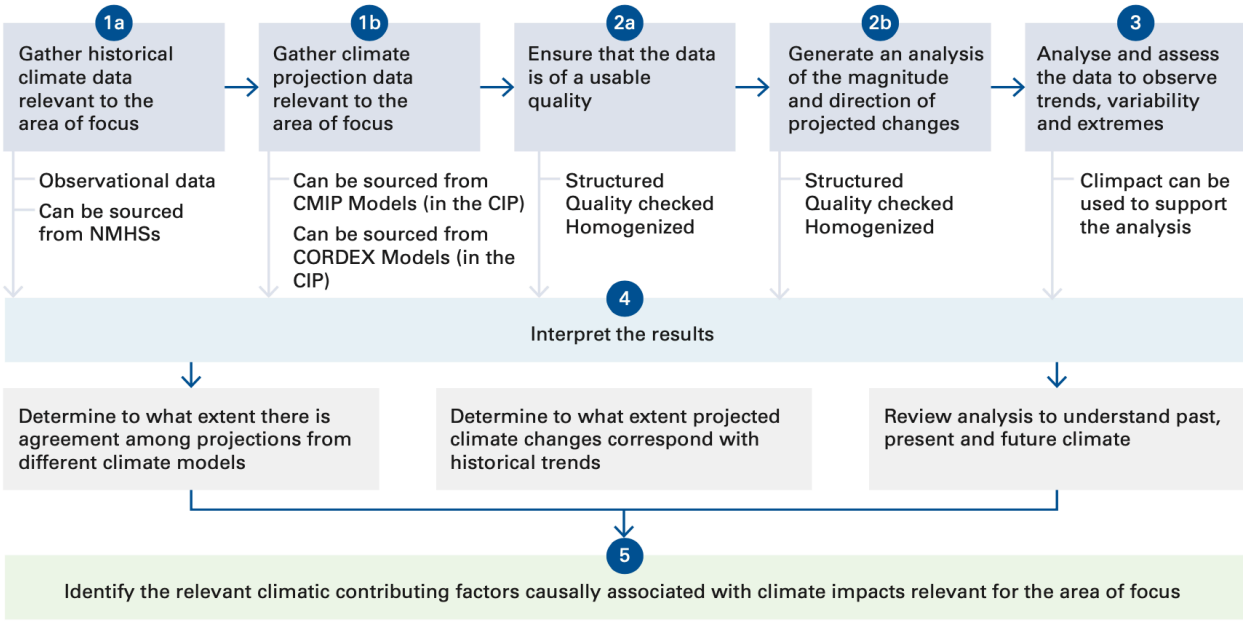


Figure 12: Key Activities for Step 1 (Identify Relevant Climatic Factors). Source: WMO (2022)

As was suggested at the beginning of this step, the information collected to inform and develop a climate rationale can vary based on the adaptation or mitigation focus of the proposed project. For adaptation-specific climate rationales, it is important to utilize vulnerability and risk assessments as one of the direct approaches for identifying how climatic contributing factors influence geographic, demographic and socioeconomic vulnerabilities.

When discussing vulnerability within a climate change adaptation context, the UNFCCC suggests the following minimum elements to be accounted for and incorporated:

- Climate change is explicitly forecasted
- Socio-economic exposure is forecasted: who is vulnerable, why, etc.
- Adaptation to prospective impacts of climate change is included (although there is little agreement as to what sort of adaptation should be considered – whether autonomous, most likely, potential, maladaptive, etc.)

A vulnerability and risk assessment provides a systematic/methodological approach for identifying priority vulnerabilities for which to ultimately propose specifically related adaptation interventions. The ability to demonstrate the causal linkage between climate change impacts, observed and projected vulnerabilities, and targeted adaptation strategies is essential for both a climate rationale and broader project proposal. Such assessments can enable project proponents to hone in on key groups, sectors, geographic areas, etc., assess current and future vulnerability, and integrate observations into proposals and policies. Some of the key objectives, activities and related guiding questions for conducting a vulnerability and risk assessment are highlighted in the table below (Downing and Patwardhan, 2005.) (table 3), and are further articulated in great detail in Section 3 of the UNFCCC's Adaptation Policy Framework Series. Session 4 of this short course also goes into further detail about the potential tools and resources available for conducting a climate vulnerability and risk assessment.

Table 3 - Objectives, context and analysis questions in vulnerability assessments related to sea-level rise. Source: Downing and Patwardhan (2005)

Objective	Context	Analysis questions
Gathering and organising data, identifying data and information needs	Preliminary assessment, often part of related environmental strategy documents	• What are the trends in relative sea level? • What are the geomorphological characteristics of the coastline?
Providing estimates of abatement costs and climate damages	Input of local data to inform international estimates of the benefits of greenhouse gas stabilisation	• What are the physical impacts of sea level rise? • What are the market and non-market losses associated with sea level rise?
Formulating and evaluating adaptation options	Input to development planning and adaptation policy	• What will be the reduction in losses due to a specific adaptation option (such as creating coastal barriers)? • In what way and to what extent should the design of coastal infrastructure accommodate the possibility of sea level rise?
Determining the value of reducing uncertainty through research	Input to research prioritisation	• Which research and observation strategies will have the greatest benefit in reducing uncertainty? • How should observation and monitoring programmes be designed?
Allocating resources efficiently for adaptation	Input to policy prioritisation	• Which coastal region is most vulnerable? • Which region or sector can benefit the most from adaptation actions?

3.3.3. Identify Relevant Non-Climatic Contributing Factors

Having now understood the climatic factors that are impacting the chosen area of focus, it is important to place this knowledge into context by **identifying non-climatic contributing factors.** In essence, one should be able to understand how climatic and non-climatic factors combine to contribute to risks and vulnerabilities. How do they interact? Are they interrelated?

As shown in Figure 13, this step entails **gathering data and information on potential non-climatic contributing factors**, and analyzing their interactions with climatic factors. These are essentially the human activities and processes that might be relevant to an issue being faced by an area of focus. Examples include land use change, infrastructure development, water management, social dynamics (e.g. migration or population growth). Through this step, one should be able to determine if the non-climatic factors can be causally linked to the climatic factors. For example: *Will increasing temperatures or changing precipitation patterns affect land*

use change, or economic activities? How so? These are the types of questions one should be asking as part of this step.

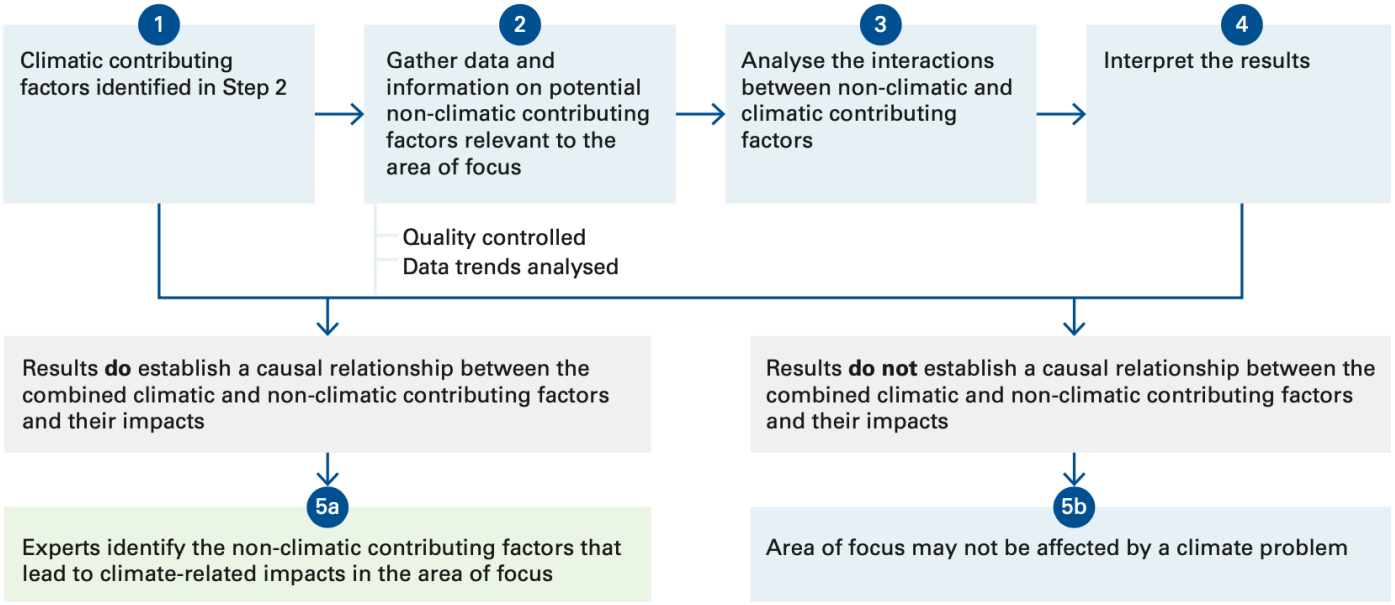


Figure 13 - Key Activities for Step 1 (Identify Relevant Non-Climatic Factors). Source: WMO (2022)

As with all the other steps, it is essential to underscore the importance of multi stakeholder engagement. Communicating and collaborating with various sectoral or thematic experts, economics, local knowledge producers, and state actors (among others) is essential for gathering relevant information, verifying its quality, and interpreting it in a meaningful manner.

3.3.4. Select Effective Climate Actions

The last step in the WMO/GCF Guide on climate rationale development is the **selection of effective climate actions**. This should be informed by the three previous steps (identifying the area of focus, climatic contributing factors, and non-climatic contributing factors) to propose solutions that would sufficiently and comprehensively address the various dynamics and challenges identified in the area of focus of choice. Figure 14 summarizes the sub-activities that accompany this step.

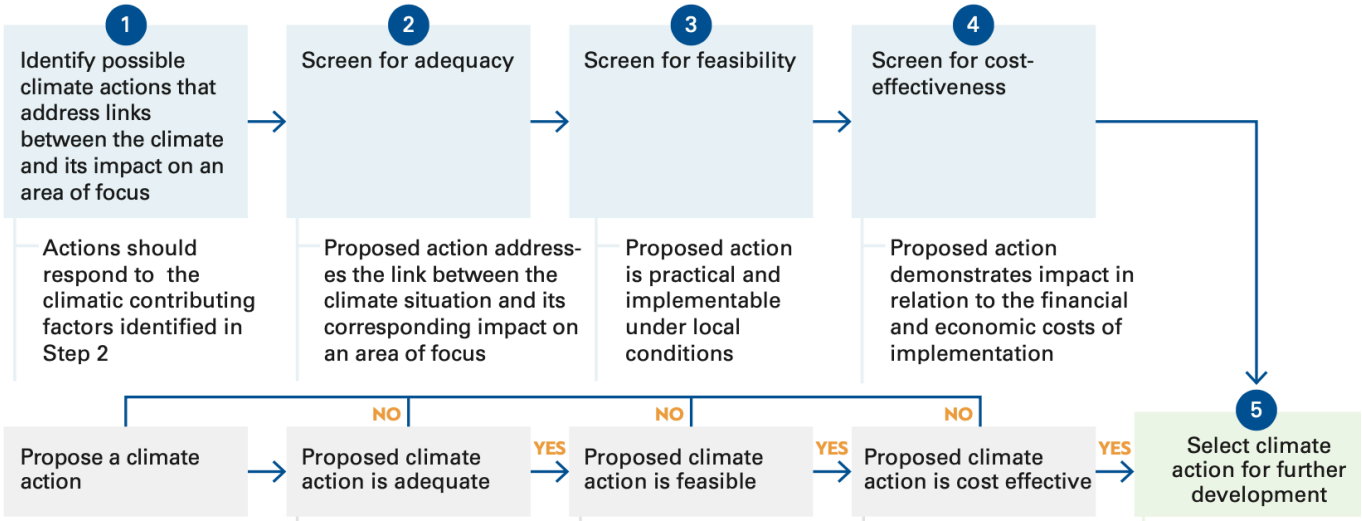


Figure 14: Key Activities for Step 1 (Select Effective Actions). Source: WMO (2022)

As part of this step, one should first **identify different possible climate actions that address links between climate risks and their impacts**. What are the range of possible options available for addressing a certain challenge? As was mentioned in Session 1, the IPCC AR6 is a good starting point for identifying some proposed solutions to various types of climate-relevant challenges in different regions.

One must then determine if the **proposed action adequately addresses the link between the climate situation and its corresponding impact.** It should be clear how the proposed solution matches the climate situation identified in Step 2 (in terms of scope and projected outcomes).

After screening for adequacy, it is important to determine if the proposed action **is practical and implementable**. Assessing the feasibility of the proposed solution under local conditions (including consideration of context-specific environmental and social factors) is essential for demonstrating its potential viability for funding. Lastly, as has been discussed previously, it is important to **demonstrate cost-effectiveness** by articulating how the impact of the proposed solutions relate to the financial and economic costs of implementation. Do the expenses, resources, and processes necessary for an action outweigh the potential benefits it may generate? Are there substantial environmental and social risks that might hinder the impact of the solution, or increase the cost of implementation?

Based on this, one should be able to successfully identify an action that is informed by a thorough identification and analysis of climatic and non-climatic contributing factors.

3.4. The Do's and Don'ts of Developing a Climate Rationale

Having reviewed the overarching steps that are involved in the development of a climate rationale, it is necessary to synthesize the key observations and takeaways to understand the considerations necessary when creating a climate rationale as part of a broader concept note for funding proposal. A strong rationale within a funding proposal context **should** include the following elements (adapted from Climate Analytics "Enhancing the Climate Rationale for GCF Proposals") :

Clear identification and description of the climate impacts to be addressed
Articulation (including, to the best level possible, quantification) of the vulnerabilities and risks of the climate impacts to human wellbeing
Emissions trajectories for mitigation projects
Assessment of adaptation options based on priorities (including through the use of approaches like vulnerability assessments)
Demonstration of how a proposed intervention fits into broader domestic and international policies and decision-making processes, including NDCs, NAPs, and national climate change and/or sector-specific policies.

The use of quantified data, graphics, and disaggregated information related to climate impacts and vulnerabilities is also worth noting as a consistent feature of climate rationales within successful funding proposals.

An example of a strong climate rationale

There is an abundance of publicly available climate rationales that have been successful in acquiring funding. The Green Climate Fund's website, for example, provides documentation on all approved funding proposals, including the proposed activity's climate rationale. One strong example from these is *GCF FP131: Improving Climate Resilience of Vulnerable Communities and*

Ecosystems in the Gandaki River Basin, Nepal. This funding proposal encapsulates all of the aforementioned key elements in the following manners:

Key Element	Example within FP131
Clear identification and description of the climate impacts to be addressed	The climate rationale provides a detailed breakdown of the current and projected changes in temperature, precipitation, and evapotranspiration within the identified target area. Paragraphs 28 details how the identified impacts "underscore the risk of occurrence and magnitude of extreme events such as winter droughts, flash floods and landslides. Increases in monsoon rainfall will lead to the saturation of soils which increases the possibility of floods, landslides and erosion of soils"
Articulation (including, to the best level possible, quantification) of the vulnerabilities and risks of the climate impacts to human wellbeing	Table 7 of the climate rationale presents a breakdown of land use patterns in the identified target area. Paragraphs 43, 44, and 45 provide further details on the demographics and economic activities of the target populations. The identification of subsistence agriculture as an economic mainstay for many communities is clearly linked to the identified area's projected climate impacts. All this information has also been disaggregated in different manners, including different subregions and ethnic groups within the target area.
Assessment of adaptation options based on priorities (including through the use of approaches like vulnerability assessments)	Paragraph 47 details the existing initiatives within the target area, and summarizes the key adaptation options and lessons that can be drawn from previous experiences. The entire climate rationale also clearly builds a compelling case surrounding the projected climate impacts on agricultural activities, and the importance of the agricultural sector to the local population and economy. The broad adaptation approach

	summarized in Paragraph 28 is therefore subsequently validated throughout the rationale. It is also worth noting that vulnerabilities and adaptation priorities were also discerned through various sources, including stakeholder consultations (as indicated in Paragraph 27).
Demonstration of how a proposed intervention fits into broader domestic and international policies and decision-making processes, including NDCs, NAPs, and national climate change and/or sector-specific policies.	Paragraph 47 details the existing initiatives within the target area, and articulates the potential synergies (and differences) between the proposed project and existing initiatives. Section D.5 of the Funding Proposal (Paragraphs 214 - 218) also details the alignment between proposed interventions and broader domestic and international policies.

It is also worth highlighting the presentation of disaggregated data in the climate rationale, which drew on a range of national and international sources to provide historical and projected trajectories of changes in temperature precipitation across various seasons and regions within Nepal. Aside from national-level data that provided a general overview of climate change impacts across Nepal, the climate rationale also provided detailed data focused on the identified target area. As can be seen in the table below, the project proponents leveraged national government data on climate change scenarios to inform the projected changes.

Table 5: Projected change in climate in GRB districts

Region	Rep. District	ΔP (%)	ΔT (°C)	Δ Rainy days (%)	ΔCDD (%)	ΔCWD (%)	ΔP99 (%)
High Mountain	Manang	3.0	0.88	-1.82	4.56	1.66	32.09
	Mustang	3.7	0.94	-2.26	2.62	1.11	31.60
Mid-Mountain	Myagdi	3.5	0.87	-1.73	5.51	1.47	29.66
	Baglung	3.3	0.92	-1.44	6.93	0.83	29.56
Hill	Nuwakot	3.0	0.88	-1.38	9.32	-1.69	34.31
	Dhading	2.5	0.88	-1.55	8.25	-2.54	29.16
	Tanahu	2.5	0.91	-1.94	9.92	-0.88	27.45
	Syangja	2.3	0.93	-1.86	9.36	-0.66	29.16
Siwalik/Terai	Chitwan	0.4	0.87	-2.25	9.43	-11.34	21.76
	Nawalparasi	1.6	0.90	-2.25	9.43	-10.61	21.36

Source: MoFE, 2019. *Climate change scenarios for Nepal for National Adaptation Plan (NAP)*. Ministry of Forests and Environment, Kathmandu

the proposal that it was a part of. The climate rationale contains all the key components to meet

the requirements for consideration by the Green Climate Fund – and, by extension, many other international climate funds.

An example of steps taken to strengthen a climate rationale

Often climate rationales provide insufficient context and evidence to meet funder requirements. One such example is the *GCF FP058: Responding to the Increasing Risk of Drought: Building Gender-responsive Resilience of the Most Vulnerable Communities*. Focused on climate change adaptation in Ethiopia, the project was not approved when first submitted for consideration due (in part) to a weak climate rationale.

The feedback provided by the GCF Board, independent Technical Advisory Panel (iTAP), and Secretariat indicated that the rationale lacked an integral socioeconomic analysis to facilitate the prioritization of interventions in a holistic manner. The proposed activities and interventions were similarly scattered and not clearly connected to one-another in a manner that could lead to economic benefits and broader co-benefits for the target communities. The iTAP specifically recommended (among other things) that the project proponents:

- Reorient activities to focus on water infrastructure and management interventions, given the clear importance of water-related adaptation in the geographical area of focus
- Develop a hydrological study to justify interventions, including the management and maintenance of the aquifer under different climate change scenarios.

This feedback was taken in by the project proponents, who resubmitted an edited proposal with a much narrower focus surrounding irrigation, rehabilitation of degraded lands around water sources, and related community awareness-raising and capacity building. This proposal was ultimately approved, with the condition that prior to the second disbursement of funds by the GCF, the project proponent would submit the results of a completed water-balance study (as recommended by the iTAP). The approved version of the funding proposal – and its climate rationale – can be accessed on the project's dedicated page on the GCF website.

There are several noteworthy takeaways from this example, which has been drawn from the Climate Analytics "Enhancing the Climate Rationale for GCF Proposals" report. Firstly, the recognition of a country's high level of climate change vulnerability is not necessarily sufficient for a high-quality climate rationale. More precise details should be articulated, including the precise climate impacts that are being focused on, and the nature of vulnerability (both climatic and socioeconomic/demographic) in a specific geographical target area of focus. Secondly, a lack of data or information to fully inform the climate rationale – and indeed, subsequent

project interventions – should not necessarily prevent the advancement of a proposal. Measures to collect this type of data can be embedded into the project activities themselves, thus enabling the project proponent to collect rationale-relevant information during the early stages of project implementation. Lastly, the importance of connecting climate impacts (both observed and projected) to population vulnerabilities is essential. A socioeconomic analysis is therefore crucial – especially in adaptation projects – to underscore how climate change will impact specific communities, sectors, livelihoods, or regions in a manner that makes intervention a priority.

Based on case studies like the one above, here are some of the key mistakes to avoid when developing climate rationales:

Providing only surface-level overviews of climate impacts (both observed and projected), especially when a project has sub-national target areas and/or more geographically precise information is available
Failing to identify specific climate impacts or priority areas of intervention that the project activities will directly respond to
Limited details surrounding the socioeconomic implications of identified climate impacts, including an analysis of impacted/beneficiary localities, communities, economic sectors, most vulnerable groups (such as indigenous communities and women), etc.
Insufficient articulation of the connection between climate change impacts, priority areas for intervention, and the ultimate choices of activities and interventions
Limited use of quantified data (or in-person engagements) to demonstrate climate impacts, vulnerabilities, and intervention options

Avoiding the common mistakes and oversights highlighted above can enhance the likelihood of a climate rationale being developed to the standards expected by international climate funders. While further details on the data sources and platforms that can inform the climate rationale are provided in Session 4 below, the above information should provide an indication of the key elements, do's, and don'ts for developing climate rationales in the context of accessing international finance for projects.

Additional Resources & Guidance on Climate Rationale Development

Below are some of the resources that were used to inform the content presented in this session. It is highly recommended that course participants access and review this material, as it is important to understand the specific requirements, considerations, and good practices that are accepted as the standard today.

- GCF "Steps to Enhance the Climate Rationale of GCF-Supported Activities"
- WMO "Climate Rationale: Strengthening Evidence-Based Adaptation Planning and Decision-Making"
- Climate Analytics "Enhancing the Climate Rationale for GCF Proposals"
- *Green Climate Fund International Technical Workshop – Adaptation Rationale for Project Pipelines and other Climate Investment*
- A Framework for Climate Change Vulnerability Assessments - GIZ

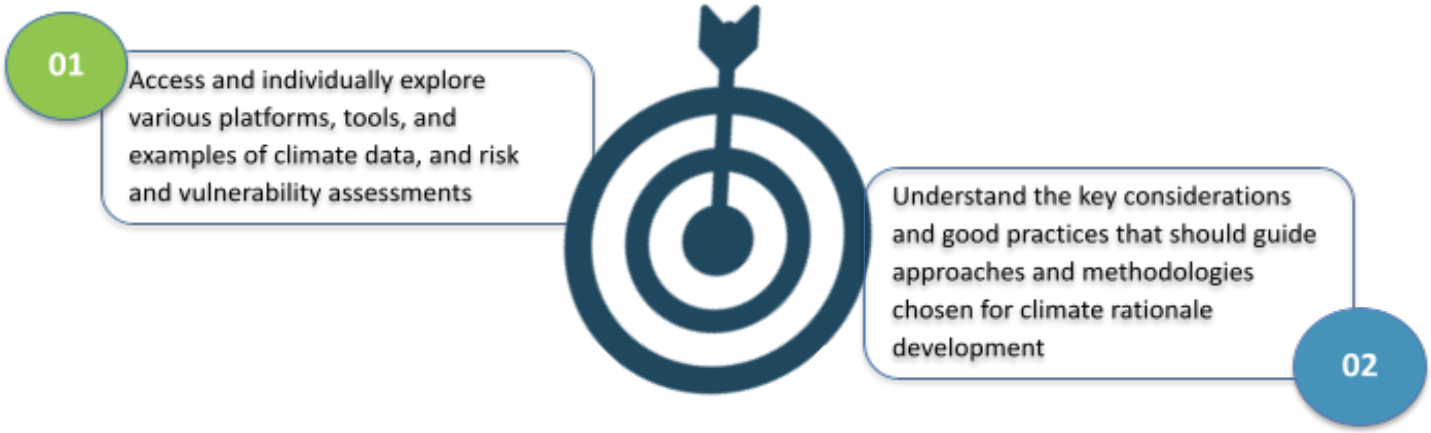
Session Four – Data platforms & additional resources

4.1. Introduction

To conclude the discussions surrounding climate rationale, this session connects all the previous content through an overview of data platforms for accessing climate data, alongside a review of tools and examples of climate change risk and vulnerability tools. The session also discusses the considerations and good practices surrounding climate data sourcing, which can vary significantly in different contexts.

4.2. Learning Objectives

On completion of the session, participants will be able to:



4.3. Understanding Climate Data and Models

There exists an extensive range of information that can be presented in different ways to understand climate change impacts and inform subsequent responses. A strong information base is central to developing and articulating a compelling climate rationale that is grounded in established science and evidence.

Despite – and often because of – its importance to the climate rationale, the wide landscape of climate data, model, and information can be challenging to navigate, interpret, and apply.

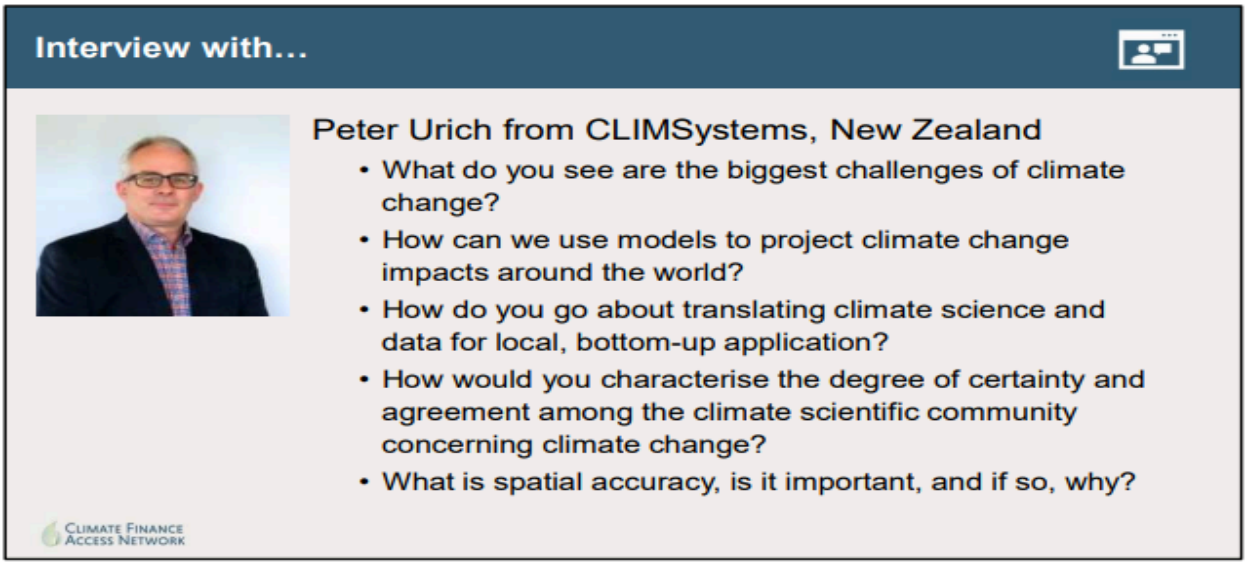
Climate models, for example, can be developed using a wide array of variables. Some may be directly related to physical risks (e.g. the ocean, land, ecosystems), while others could have more indirect connections to climate change impacts (e.g. sectoral emissions projections).

When seeking to apply climate data and models, it is therefore essential to first **identify a core question** that may be answered by a combination of these different variables.

What do you aim to search for or highlight in a climate rationale through these particular variables? This guiding question will naturally vary depending on the topical/sectoral focus of the project proposal, the end-users, and the availability of relevant information. Identifying such a question can greatly support a narrowing down and guide the choice of information that would best align with the intended messages of the climate rationale being developed.

An interview with Peter Urich (link), scientist specializing in risk resilience and director at CLIMSystems (New Zealand) provides more insights into the importance of data verification for developing accurate climate models, which are crucial for informing project developers and decision makers across various sectors.

CLIMSystems specializes in the development and design of advanced software systems aimed at assessing impacts and adaptations to climate variability and change. The video provides insights into the various processes that go into developing climate models, and the key considerations that may be useful to those seeking to apply the results.



4.4. Available Platforms to Access Climate Data

This course has focused on providing guidance on how to develop a climate rationale in a methodical manner. We have refrained from reviewing the wide array of climate data/information platforms, due to the quite variable scope, robustness and accuracy of climate

data platforms. Some platforms rely on single-use data sources, while others exclusively leverage government data (indeed, there are cases where these sources can even have substantially conflicting information).

Ultimately, choosing platforms to access climate data completely depends upon your national/subnational context, data availability, and the needs for your project. As a general good practice**,** it is encouraged to:

Ensure **alignment of data with nationally sources** (e.g. GHG inventory reports and BURs

Leverage internationally recognized sources and methodologies for data, including IPCC reports and related sources

It is important to underscore that the lack of availability of precise or perfect data in the chosen areas of focus is not a disqualifying factor. Funders understand that there are inequalities and differences in data availability across the world – and especially in LDCs – and this **should not be grounds for rejection of a proposal.**

What is important, however, is that the data that is used is the best available possible. This means the data should be from internationally and/or nationally recognized sources, and provides as much high-quality detail as possible. Where possible, the reader should explicitly seek to integrate gender-disaggregated data, for example.

It is therefore good practice to **align data with nationally accepted sources**, including GHG Inventory Reports or Biennial Update Reports (BURs). This is useful because governments submit NDCs and adaptation targets based on data that was collected through authorized methodologies. Proposing solutions based on data that might be different from what a Government used to calculate its own targets may lead to a mismatch in priorities.

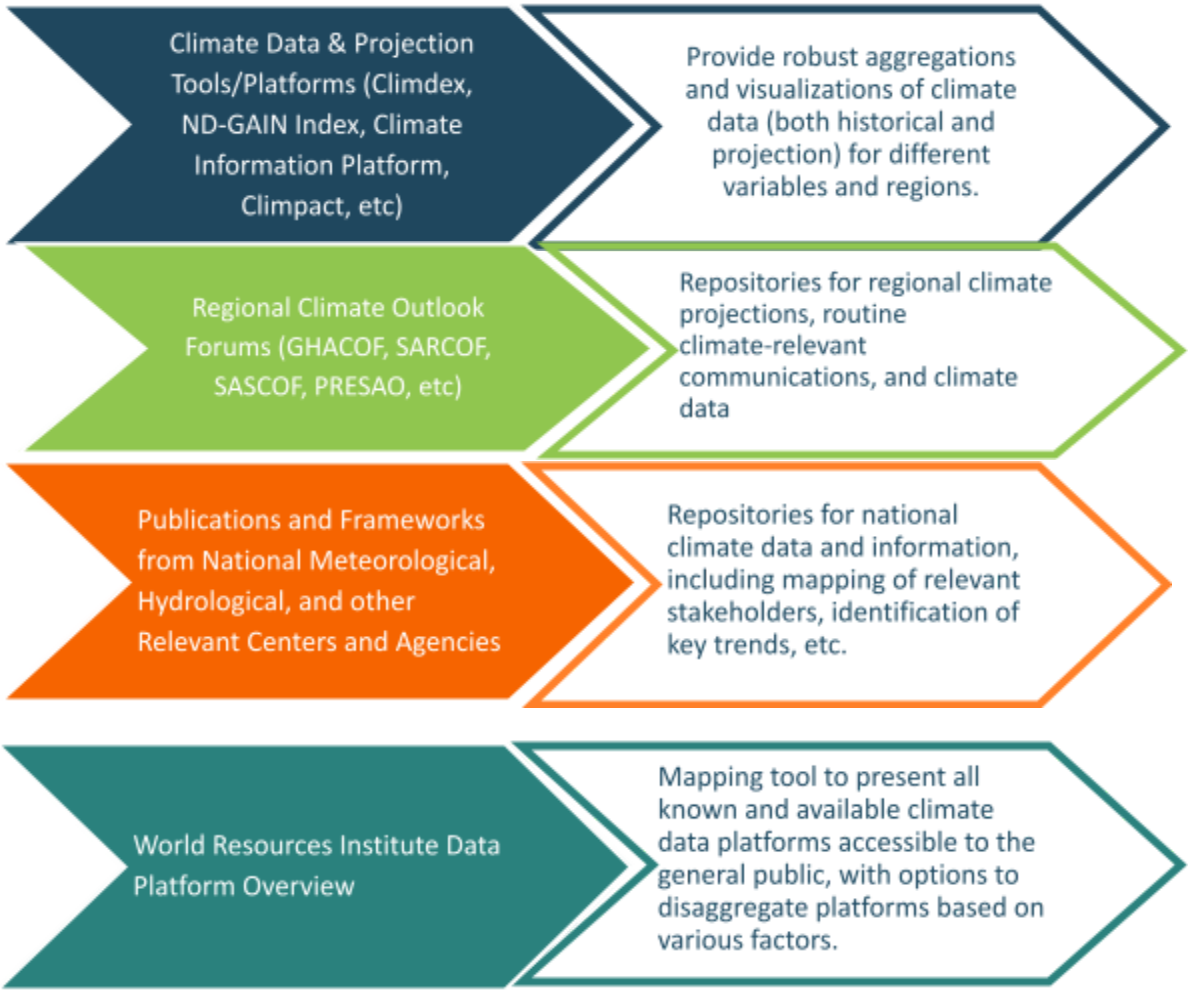
This can be done by **leveraging internationally recognized sources and methodologies**, including IPCC reports and related sources. Generally, anything that has been referenced or applied by a UN Body, or a reputable international/multilateral organization should be acceptable.

The resources discussed in this session may support in developing a climate rationale, but readers are encouraged to conduct further analysis to determine viability. In particular, readers should follow the good practices mentioned above to ensure that the information being used is:

- As directly relevant and/or applicable to the target area of intervention as possible;
- Sourced from data provided by the national government, UNFCCC, IPCC, or an entity accredited/recognized by any of the three.
- As comprehensive as possible, to present a diverse set of climate information (e.g. multi-hazard observed trends, projections, demographic impacts, etc)

4.5. Key Considerations and Good practices for Utilizing Climate Data Resources

There are several broadly useful sources for accessing different types of climate data. These include:



However, it is important to underscore once again that different tools have different access modalities and considerations, and it is essential for project proponents to conduct thorough research. The sources chosen should have reliable, quality data that is relevant to the chosen area of focus. Furthermore, it is worth noting that sources such as the Regional Climate Outlook Forums might not always have fully accurate or actionable seasonal projections but the do offer a valuable repository for historical data and, often, literature on the non-climatic factors contributing to a challenge.

Climate Data and Projection tools are also based on a range of assumptions and models, which can often fail to account for crucial context-specific considerations (especially in LDCs and SIDS, where data collection is flawed or limited). Utmost care and caution is therefore advised to ensure you are choosing the right tools. Once again, when in doubt, the most reliable data to use is either provided by the national government, or published by the IPCC and/or UN agencies.

4.6. Climate Change Risks and Vulnerability Assessment Tools

LDCs and SIDS have contributed the least to cumulative global GHG emissions, but are often the most vulnerable to, and directly impacted by subsequent anthropogenic climate change. These countries therefore often have an explicit focus on understanding and addressing climate change adaptation, loss, and damage.

Risk and vulnerability assessments can be useful in determining and articulating how climate change can (or already does) affect specific populations, ecosystems, subregions, or even the entire territory of a country. Such information is crucial to include in climate rationales, as it can make a compelling case for the connection between climate change, targeted issues or vulnerabilities, and the proposed solutions.

Risk and vulnerability assessments can be conducted through a range of tools and resources. Some examples of digital toolkits and platforms that can provide some information on potential climate risks, impacts, and vulnerabilities are listed below. As can be seen in the descriptions for each tool, there is considerable variability in (among others) the geographical, sectoral, demographic, and temporal scope of each tool. While these tools are useful, it is worth noting that they may be variations in data quality and precision based on the chosen area of focus, or data availability for specific risks. Project proponents must therefore carefully review any

potentially useful tools to ensure that they are relevant, both in terms of scope and, if relevant, the recency of the data utilized.

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Impacts
• Climate Impact Explorer: Gives information on climate change impact projections at country and provinces for all countries worldwide - up to 30 climate indicators/variables.
• COMPASS Toolbox: a selection of climate scenario modeling tools developed by NewClimate Institute to support decision-makers, analysts and civil society to assess and understand the impacts of climate action and policies
Climate (Hazards) and Exposure
• ThinkHazard! : Provides information on climate hazards occurring in a specific geographic zone and advice on dealing with these hazards for adaptation projects.
Vulnerability/Adaptation
• Climate Vulnerability and Capacity Analysis Tool (CVCA): A tool that can support project proponents in collecting and analyzing information on community-level climate change vulnerabilities, as well as in the identification of potentially appropriate actions for building climate resilience
• Country Climate and Development Reports (CCDRs): diagnostic reports that support project proponents to identify main pathways to reduce GHG emissions and climate vulnerabilities, including the costs and challenges as well as benefits and opportunities from doing so.
• Gender-sensitive Climate Vulnerability and Capacity Analysis (GCVCA): Framework for analyzing vulnerability and capacity to adapt to climate change and build resilience to disasters at the community level, with a particular focus on social and in particular gender dynamics. The guiding framework is particularly focused on Mozambique, but also offers useful details and approaches for project proponents in all countries.
• FAO Framework Methodology for Climate Change Vulnerability Assessments of Forests and Forest Dependent People: Technical framework methodology that describes the elements and steps that should be considered for different time horizons, and outlines a structured approach for conducting forest vulnerability assessment in the context of climate change.
Risks
• World Bank Climate and Disaster Risk Screening Tools: A series of risk screening tools that support project proponents in conducting detailed

evaluations of current and future climate and disaster risks, with extensive guidance surrounding the risk assessment process
• Climate Risk Planning & Managing Tool for Development Programmes in Agri-Food Systems (CRISP): interactive web-based working tool for understanding climate related risks associated with specific agricultural systems, articulating science-based adaptation hypotheses, identifying cascading impacts and reviewing relevant adaptation options
• PROVIDE Climate Risk Dashboard: an interactive online tool providing detailed information on different future global warming scenarios and expected impacts on the climate, natural, and human systems. The data covers indicators related to climate variables and extreme events as well as oceanic habitability around the globe, and urban heat stress at city level.
• Climate Risk Toolbox (CRTB): Tool designed by the FAO Risks Team to support the design of climate-resilient agricultural investment projects and plans, by allowing users to conduct climate risk screenings through advanced climate-related geospatial information and data
• The 2023 Climate Risk Landscape: UNEP Report that explores the major market trends in both physical risk and transition risk tools and provides detailed analysis on dozens of individual tools relevant to climate change.
• Climate Risk Assessment for Ecosystem-based Adaptation: A guidebook for planners and practitioners that presents a standardized approach to assess risks within social-ecological systems based on multiple application examples
Resilience
• Resilience Booster Tool: Planning of resilience well at the design stage of a project. The tool considers 9 attributes of resilience: robustness, learning, redundancy, rapidity, connectivity, diversity, flexibility, inclusion and auto organization. • Estimating the mitigation potential of forest landscape restoration - Practical guidance to strengthen global climate commitments : A tool developed by IUCN to guide forest landscape restoration activities and programs in the rapid estimation of forest landscape restoration mitigation potential, alignment with national greenhouse gas estimation processes and identification of opportunities to enhance the role of forest landscape restoration in national mitigation efforts • The Blue Guide to Coastal Resilience: Guidance tool that helps Disaster Risk Reduction (DRR) planners assess climate risks, conditions for Nature-based Solutions (NbS) to work, as well as the costs of using them.

- Resilience Atlas: interactive analytical tool for building and understanding of the extent and severity of some of the key stressors and shocks that are affecting rural livelihoods, production systems, and ecosystems in the Sahel, Horn of Africa and South and Southeast Asia. The tool also provides insights into the ways that different types of wealth and assets impact resilience in particular contexts.

As was discussed in Session 3, the climate rationale process is concluded by selecting appropriate actions. This can be done through different ways, but should always be informed by the vulnerability assessments, climatic and non-climatic factor analyses, stakeholder consultations, and any other relevant data gathered during the climate rationale development process. Other options for selecting and prioritizing different climate actions are listed below. This can be done on the basis of cost effectiveness, potential environmental and social implications, project scope and impact, and other factors. The ultimate aim is to explore and experiment with different approaches to analyze available options and compare them based on your respective needs, contexts, and priorities. These tools include:

- Cost-Benefit Analysis (CBA)
- Cost Effectiveness Analysis (CEA)
- Multi-Criteria Analysis.

While they cannot be explored in detail in this course, readers are encouraged to leverage the UNFCCC overview of approaches for assessing costs and benefits to learn more about available approaches and their methodologies.

Additional resources

- Case studies (from external sources)
  - **UN agencies**: UNEP, WMO, UNDP, IPCC, UNFCCC, SDG Tracker…
  - **Other international agencies**, such as: OECD, World Economic Forum, UN Stats. OECD Data
- International and local NGOs
  - Including indigenous knowledge and experience in IPCC assessment reports
  - Analyzing engagement with Indigenous Peoples in the Intergovernmental Panel on Climate Change's Sixth Assessment Report
  - United Nations Framework Convention on Climate Change (UNFCCC). *Assessing the Costs and Benefits of Adaptation Options: An Overview of Approaches*; UNFCCC: Bonn, Germany, 2016. https://climate-adapt.eea.europa.eu/en/metadata/guidances/assessing-the-costs-and-benefits-of- adaptation-options-an-overview-of-approaches .
  - The CliFiT4SE Toolkit and its Climate Rationale
  - Climate Impact Explorer: Gives information on climate change impact projections at country and provinces for all countries worldwide - up to 30 climate indicators/variables.
  - ThinkHazard : Provides information on climate hazards occurring in a specific geographic zone and advice on dealing with these hazards for adaptation projects.
  - Climate Vulnerability and Capacity Analysis Tool - CVCA
  - Resilience Booster Tool: Planification of resilience well at the design stage of a project – Considers 9 attributes of resilience: robustness, learning, redundancy, rapidity, connectivity, diversity, flexibility, inclusion and auto organization.
  - IPCC's 6th Assessment Report
  - GCF "Steps to Enhance the Climate Rationale of GCF-Supported Activities"
  - WMO "Climate Rationale: Strengthening Evidence-Based Adaptation Planning and Decision-Making"
  - Climate Analytics "Enhancing the Climate Rationale for GCF Proposals"
  - *Green Climate Fund International Technical Workshop – Adaptation Rationale for Project Pipelines and other Climate Investment*
  - A Framework for Climate Change Vulnerability Assessments – GIZ
  - United Nations Framework Convention on Climate Change (UNFCCC). Assessing the Costs and Benefits of Adaptation Options: An Overview of Approaches
  - NDC Partnership Knowledge Portal: Climate Toolbox
  - How to understand and interpret global climate model results: A guide explaining why there are so many climate model results and how to interpret the various

ways that they are presented, in order to understand what models tell us about the likely future climate.

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Glossary of terms

Term	Definition	Source
Climate Data Record	Time series of measurements of sufficient length, consistency, and continuity to determine climate variability and climate change	National Research Council Report - https://nap.nationalacademies.org/catalog/10944/climate-data-records-from-environmental-satellites-interim-report
Climate Information	The gathering and analysis of actual weather and climate observations as well as simulations of the climate for the past, the present and the future	Baffour-Ata et al., 2022 https://journals.ametsoc.org/view/journals/wcas/14/2/WCAS-D-21-0075.1.xml
Climate Science	The study of climate science doesn't focus just on what makes changing climate important; it studies how it will affect people around the world	https://www.ucdavis.edu/climate/science
The Intergovernmental Panel on Climate Change (IPCC)	The official United Nations body for assessing climate change. The objective of the IPCC is to provide governments at all levels with scientific information that they can use to develop climate policies. IPCC reports are also a key input into international climate change negotiations. A flagship activity of the IPCC is the development of assessment reports, for which thousands of experts volunteer their time as IPCC authors to assess the thousands of scientific papers published each year to provide a comprehensive summary of what is known about the drivers of climate change, its impacts and future risks, and how adaptation and mitigation can reduce those risks.	https://www.ipcc.ch/about/
Climate Rationale	A climate rationale provides the scientific underpinning for evidence-based climate decision making. It ensures that the linkages between climate impacts, climate action and societal benefits is fully grounded in the best available climate data and science.	https://www.globalsupportprogramme.org/sites/default/files/uploaded-images/climate_rationale_wmo_gallo_ilaria_1.pdf
BURs	Biennial Update Reports (BURs) are reports to be submitted by non-Annex I Parties (developing country parties) to the Paris Agreement, containing updates of national Greenhouse Gas (GHG) inventories, including a	https://unfccc.int/biennial-update-reports

	national inventory report and information on mitigation actions, needs and support received.	
Cost-Benefit Analysis (CBA)	CBA is a methodology and decision-making tool, which helps identify solutions (either policy options or investment projects) for an efficient allocation of scarce financial resources. It is usually conducted with reference to a project that is under consideration, but has not yet begun.	https://www.adaptation-undp.org/sites/default/files/resources/cba.pdf
Cost-Effectiveness Analysis (CEA)	Cost-effectiveness analysis (CEA) compares an initiative's monetary costs to outcomes such as tons of CO2 emissions avoided or reduced as a result of an intervention project or program. It is similar to, or in some cases the same as, a value-for-money or social return on investment analysis where the return is measured in non-monetary terms.	https://www.cif.org/sites/default/files/knowledge-documents/cost_effectiveness_analysis_0.pdf
Multi-Criteria Analysis (MCA)	MCA describes any structured approach used to determine overall preferences among alternative options, where the options accomplish several objectives. In MCA, desirable objectives are specified and corresponding attributes or indicators are identified. The actual measurement of indicators need not be in monetary terms, but are often based on the quantitative analysis (through scoring, ranking and weighting) of a wide range of qualitative impact categories and criteria.	https://unfccc.int/files/adaptation/methodologies_for/vulnerability_and_adaptation/application/pdf/multicriteria_analysis__mca_pdf.pdf
Nationally Determined Contributions (NDCs)	NDCs are national climate plans highlighting climate actions, including climate related targets, policies and measures governments aim to implement in response to climate change and as a contribution to global climate action. Central to the NDCs is the concept of national determination.	https://unfccc.int/process/the-paris-agreement/nationally-determined-contributions/ndc-spotlight
Greenhouse Gases (GHGs)	Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrochlorofluorocarbons (HCFCs), ozone (O3), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).	https://unfccc.int/resource/cd_roms/na1/ghg_inventories/english/8_glossary/Glossary.htm
Green Climate Fund (GCF)	Largest dedicated multilateral climate fund. Established within the UNFCCC and directly supports the financing of adaptation, mitigation, or cross-cutting projects in support of the Paris Agreement.	https://www.greenclimate.fund/about
International Union for the Conservation of Nature (IUCN)	An international organization working in the field of nature conservation and sustainable use of natural resources. Founded in 1948, IUCN has become the global authority on the status of the natural world and	https://www.iucn.org/about-iucn

	the measures needed to safeguard it. It is involved in data gathering and analysis, research, field projects, advocacy, and education. IUCN's mission is to "influence, encourage and assist societies throughout the world to conserve nature and to ensure that any use of natural resources is equitable and ecologically sustainable".	
Disaster Risk Reduction (DRR)	"Disaster risk reduction" can be defined as "action taken to reduce the risk of disasters and the adverse impacts of natural hazards, through systematic efforts to analyse and manage the causes of disasters, including through avoidance of hazards, reduced social and economic vulnerability to hazards, and improved preparedness for adverse events". It is therefore tailor-made to help counteract the added risks arising from climate change.	https://www.ipcc.ch/apps/njlite/srex/njlite_download.php?id=6184#:~:text=%E2%80%9CDisaster%20risk%20reduction%E2%80%9D%20can%20be,vulnerability%20to%20hazards%2C%20and%20improved
Nature-based Solutions (NbS)	Nature-based Solutions address societal challenges through actions to protect, sustainably manage, and restore natural and modified ecosystems, benefiting people and nature at the same time. They target major challenges like climate change, disaster risk reduction, food and water security, biodiversity loss and human health, and are critical to sustainable development.	https://www.iucn.org/our-work/nature-based-solutions
Adaptation	Adaptation refers to adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects. It refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change. In simple terms, countries and communities need to develop adaptation solutions and implement actions to respond to current and future climate change impacts.	https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/introduction
Mitigation	As there is a direct relation between global average temperatures and the concentration of greenhouse gases in the atmosphere, the key for the solution to the climate change problem rests in decreasing the amount of emissions released into the atmosphere and in reducing the current concentration of carbon dioxide (CO2) by enhancing sinks (e.g. increasing the area of forests). Efforts to reduce emissions and enhance sinks are referred to as "mitigation".	https://unfccc.int/topics/introduction-to-mitigation
Vulnerability	Vulnerability varies widely across communities, sectors and regions. This diversity of the "real world" is the starting place for a vulnerability assessment. International comparisons of vulnerability tend to focus on national indicators, e.g., to group less developed countries or to compare progress in human	https://www4.unfccc.int/sites/NAPC/Country%20Documents/General/apf%20technical%20paper03.pdf

	development among countries with similar economic conditions. At a national level, vulnerability assessments contribute to setting development priorities and monitoring progress. Sectoral assessments provide more detail and targets for strategic development plans. At a local or community level, vulnerable groups can be identified and coping strategies implemented, often employing participatory methods. Climate change (IPCC): Vulnerability = Risk (predicted adverse climate impacts) – Adaptation	
independent Technical Advisory Panel (iTAP)	Mandated body of the Green Climate Fund that serves as an independent technical advisory body which is accountable to the Board. The iTAP conducts technical assessments of concept notes and funding proposals to comment on whether they should be approved, while also providing feedback to project proponents on how to improve various elements of their proposal.	https://www.greenclimate.fund/sites/default/files/event/meet-itap-webinar-theory-change-1-oct-2021-fv.pdf
Coupled Model Intercomparison Projects (CMIPs)	An integrated framework within which a number of individual Model Intercomparison Projects (MIPs) are organized. MIPs are sets of experiments and simulations designed to test and compare specific aspects of climate models. Each individual MIP lays out an experimental design aimed at improving understanding of: ● important physical processes in the climate system; or ● the response of the climate system to external drivers (such as increasing greenhouse gases). Scientists are currently on the Sixth Phase of the Couples Model Intercomparison Project (CMIP6). CMIP6 also includes scenarios and pathways that differ based on GHG intensity levels.	https://climateknowledgeportal.worldbank.org/overview
UNFCCC Paris Agreement	The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. It entered into force on 4 November 2016. Its overarching goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels." However, in recent years, world leaders have stressed the need to limit global warming to 1.5°C by the end of this century. The Paris Agreement is a landmark in the multilateral climate change process because, for the first time, a binding agreement brings	https://unfccc.int/process-and-meetings/the-paris-agreement

	all nations together to combat climate change and adapt to its effects.	
UNFCCC Biennial Update Reports (BURs)	BURs are reports to be submitted by non-Annex I Parties, to the UNFCCC containing updates of national Greenhouse Gas (GHG) inventories, including a national inventory report and information on mitigation actions, needs and support received. Such reports provide updates on actions undertaken by a Party to implement the Convention, including the status of its GHG emissions and removals by sinks, as well as on the actions to reduce emissions or enhance sinks.	https://unfccc.int/biennial-update-reports
UNFCCC National Inventory Reports (NIRs)	As part of the Convention agreement, Annex I Parties are required to provide annual GHG inventory covering emissions and removals of direct GHGs (carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3)) from five sectors (energy; industrial processes and product use; agriculture; land use, land-use change and forestry (LULUCF); and waste), and for all years from the base year (or period) to two years before the inventory is due.	https://unfccc.int/ghg-inventories-annex-i-parties/2023
United Nations Framework Convention on Climate Change (UNFCCC)	The UNFCCC secretariat (UN Climate Change) is the United Nations entity tasked with supporting the global response to the threat of climate change. UNFCCC stands for United Nations Framework Convention on Climate Change. The Convention has near universal membership (198 Parties), and the The ultimate objective of all three agreements under the UNFCCC is to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system, in a time frame which allows ecosystems to adapt naturally and enables sustainable development.	https://unfccc.int/about-us/about-the-secretariat