INTERNATIONAL BACKGROUND ON ADAPTATION MRE

CENTRAL ASIA REGIONAL CENTRE FOR CLIMATE ACTION TRANSPARENCY (RECATH)

FEBRUARY 2024

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TABLE OF CONTENT

1. UNFCCC MRV&M&E Framework 5
1.1 **Reporting Under the Paris Agreement – the Enhanced Transparency Framework** 5
1.1.1 Rationale for implementing a national *Transparency Framework* 5
1.1.2 ETF main principles 7
1.1.3 Planning for ETF implementation 8
1.2 **Reporting requirements in practice** 9
1.2.1 Overview 9
1.2.2 Adaptation reporting requirements 11
2. Methodological background for adaptation MRE 14
2.1 Conceptual framework on adaptation M&E 14
2.1.1 A risk-based framework introduced through the IPCC AR5 report 14
2.1.2 Characterization of adaptation projects 16
2.1.3 Adaptation M&E Specificities 19
2.1.4 Gender mainstreaming 20
2.2 M&E systems in place (NAPs): key findings 22
2.2.1 The process implemented 22
2.2.2 M&E systems in place: overview 24
2.2.3 Way forward 26
2.3 Lessons drawn through the preparation of the Global Stocktake Report 27
3. Indicators for tracking adaptation 29
3.1 Typology? 29
3.1.1 Indicators to identify (and monitor) adaptation needs 30
3.1.2 Indicators to track the implementation of adaptation action (policies & measures) 30
3.1.3 Indicators to assess the results towards adaptation /resilience 31
3.2 Selection of indicators: feed-back from experience 32
3.2.1 From impact chains to Results-Based Management framework (RBM) 32
3.2.2 Adaptation monitoring, evaluation, and learning frameworks 34
3.2.3 Interconnection with other M&E frameworks 35
4. Perspectives 37
4.1 The way toward common “metrics” 37
4.2 The Proximity to Target approach 38
4.3 On the way to COP28 40
5. ANNEX 42
5.1 Composite indicators: pilot experiences 42
5.1.1 European adaptation preparedness scoreboard 42

5.1.2 Resilience indicators 42
5.2 Examples of adaptation information platforms / tools 46
5.2.1 France 46
5.2.2 Guatemala 47
5.2.3 California 48
5.2.4 Marocco 49
5.2.5 Tunisia 50
5.2.6 Pakistan 50

1. UNFCCC MRV&M&E Framework

1.1 Reporting Under the Paris Agreement – the Enhanced Transparency Framework

1.1.1 Rationale for implementing a national *Transparency Framework*

The successful implementation of climate action in general and of the NDC in particular requires an effective Measurement, Reporting and Verification (MRV) system, enabling the country to monitor the effectiveness of its mitigation and adaptation measures and facilitating its access to climate finance. Internationally, the implementation of an MRV system is the basis for understanding the current GHG emission levels, the ambition of the existing efforts, and the progress made in contributing towards the goals of the Paris Agreement. Through its Article 13, the Paris Agreement established the Enhanced Transparency Framework (ETF) to regularly measure the progress made by countries to strengthen the global response to the threat of climate change; to comply with the ETF reporting requirements, all Parties to the UNFCCC need to implement a domestic MRV system that can annually quantify national GHG emissions by sources and removals by sinks, and report on the implementation of mitigation and adaptation policies and measures – and of results achieved. While the Enhanced Transparency Framework is providing a common framework for all countries – covering all pillars of climate action, some flexibility is provided on reporting requirements for non-annex 1 countries. In particular, reporting on adaptation is not mandatory to date; however recommendations are provided in the technical documentation regarding the expected content and format of reports (adaptation component of the BTR, adaptation communication).

Therefore, measurement, reporting and verification (MRV) as well as monitoring and evaluation (M&E) systems must be core components of any successful climate policies. It is a systematic way of instilling the culture of transparency and being accountable when implementing climate change programmes. With MRV/M&E, it is possible to improve climate policy choices by evaluating potential effects of actions, tracking implementation progress, assess impacts of climate actions. These attributes of MRV/ M&E can help build mutual trust between governments and development partners as well as offer the basis for upping ambition of climate actions and gather evidence to inform policy revisions. MRV/M&E system can also facilitate domestic and international reporting using good quality data, rigorous methodology and protocols for accounting, and tracking.

While “MRV” (Measurement, Reporting and Verification) is the most commonly term used when tracking mitigation actions, “M&E” (Monitoring and Evaluation) is still preferred when referring to adaptation actions. Climate change M&E for adaptation refers to mechanisms put in place at different scales to respectively monitor and evaluate efforts to adapt to the impacts of climate change with the aim of systematically identifying, characterizing and assessing progress over time[1]. In general, both terms (MRV and M&E) are still widely used either for mitigation and adaptation even if definitions and scopes are significantly different: the different components of MRV and M&E concepts are summarized in the table below[2]. Adaptation M&E still differs from mitigation MRV: due to the lack of common methodologies and of quantitative metrics on adaptation, the *Measurement* component as well as the corresponding *Verification* component have not been widely considered so far for adaptation.
MRE (Monitoring, Reporting and Evaluation) is progressively replacing the M&E concept for adaptation – particularly within European Union countries, in a context of increasing reporting requirements on

[1] IPCC, Global Warming of 1.5°C - Glossary, 2018
[2] Definitions adjusted from EEA, Indicators for adaptation to climate change at national level - Lessons from emerging practice in Europe, 2018

adaptation (through UNFCCC processes as well as through National Adaptation Plan processes). An alternative concept and terminology refers to MEL (Monitoring, Evaluation, Learning) - learning occurs when knowledge generated through monitoring and evaluation (and available research and insights) leads to changes in practices, behaviours, and policies[3]; which is implicitly captured through the MRE approach.

Figure 1. MRV and M&E definitions[4]

Monitoring A continuous and systematic process of tracking the progress made in planning and implementing a climate change adaptation policy, program or other intervention, taking into account its specific objectives and inputs. Monitoring is often based on the use of a specific set of indicators, which consider the context in which adaptation occurs.	***Evaluation*** The systematic, transparent and objective process of assessing the effectiveness of a climate change adaptation policy, program or other intervention in terms of its specific objectives, usually in terms of its impact on reducing vulnerability and increasing resilience. Evaluation may use both quantitative and qualitative data from a range of sources, including those gathered through monitoring processes.
Measurement "The process of data collection over time, providing basic datasets, including associated accuracy and precision, for the range of relevant variables. Possible data sources are field measurements, field observations, detection through remote sensing and interviews." (Source: UN REDD)	***Reporting*** The communication of the information collected about the progress or the impact of a climate change policy, program or other intervention. This process might take place internally within an organisation or country when associated with a specific monitoring or evaluation scheme, or be a requirement related to some international procedures (e.g. National Communications of the UNFCCC, Monitoring Mechanism Regulation (MMR) of the European Union).

Verification
'"The process of formal verification of reports, for example, the established approach to verify national communications and national inventory reports to the UNFCCC." Source: UN REDD)

As efforts are underway to establish integrated frameworks for tracking and reporting climate action under the Enhanced Transparency Framework (ETF) of Paris Agreement, the transverse concept of "climate transparency" - combining mitigation MRV and adaptation MRE – tends to become the overarching concept, to be implemented through the Biennal Transparency Reports (BTR) (see box below).

Climate Transparency?

As introduced in the Paris Agreement / art. 13, in order to build mutual trust and promote effective implementation, an enhanced transparency framework (ETF) of climate action is created, with some flexibility, which takes into account the different capacities of Parties. Each Party is expected to regularly provide the following information[5] – including through Biennal Transparency Reports (BTR):

a) A national inventory report of anthropogenic emissions by sources and anthropogenic removals by sinks of greenhouse gases;

b) Information necessary for monitoring the progress made by each Party in the implementation and achievement of its nationally determined contribution;

c) Regarding adaptation, each Party should provide information on the effects of climate change and on adaptation to such changes, as appropriate.

d) Information on support (needed and received[6]) should also be monitored covering financial,

[3] IISD, 2023, Next Steps for Defining a Monitoring, Evaluation, and Learning System for the Global Goal on Adaptation by COP 28 May 2023

[4] Definitions adjusted from EEA, Indicators for adaptation to climate change at national level - Lessons from emerging practice in Europe, 2018

[5] See UNFCCC, 2018, Decision 18/CMA.1 Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement

[6] *Developed countries are also expected to provide information on support provided and mobilized.*

technology transfer and capacity-building support.

1.1.2 ETF main principles

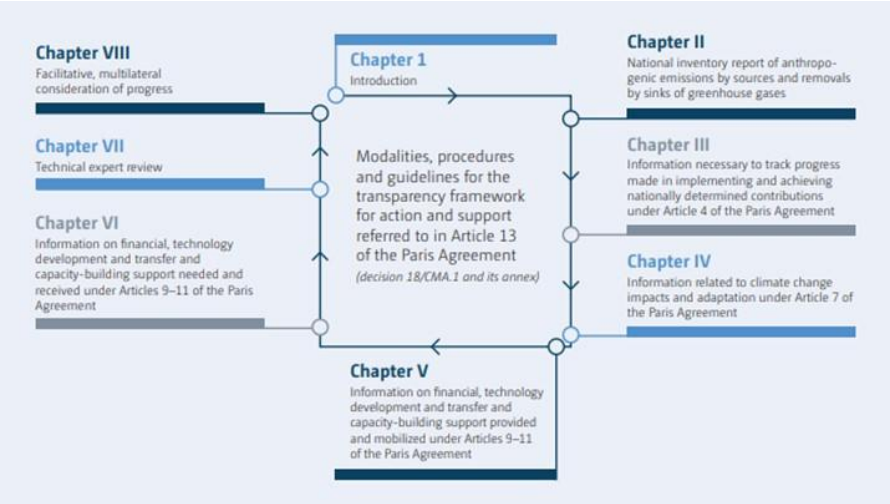
At COP 24, the UNFCCC adopted the rules and procedures for implementing the Paris Agreement, which are contained in the "Paris Rulebook". For developing countries, the application of the Rulebook in terms of strengthening transparency should result in a need for capacity building support, particularly to put in place the methodological tools necessary to account for greenhouse gas (GHG) emissions, tracking mitigation and adaptation P&M as well as support needed and received. These tools should make it possible to strengthen the transparency of international obligations with respect to the UNFCCC and the Paris Agreement, particularly in terms of measuring the progress made in the implementation of Nationally Determined Contributions (NDCs).

Through its Article 13, the Paris Agreement established an Enhanced Transparency Framework (ETF) to regularly measure the progress made by countries to strengthen the global response to the threat of climate change. The objective of the new framework is to build mutual trust between countries, raise climate ambition and rigorously monitor public mitigation and adaptation policies. It should make it possible to better track GHG emissions over time, to assess the progress made by Parties in meeting their individual commitments on mitigation and adaptation, and to assess collective progress towards the 2°C long-term pathway. The transparency framework should ultimately ensure that Parties meet their obligations under the Paris Agreement even though targets are not legally binding. It will hold all governments accountable for meeting their national commitments in a bottom-up approach.

Article 13 sets out two clear objectives of the enhanced transparency framework, one on climate action and the other on support for climate action:
1. With respect to climate action, the objective of the enhanced transparency framework is "to provide a clear understanding of climate change action in light of the objective of the Convention as set out in its Article 2, including clarity and monitoring of progress towards the achievement of NDCs under Article 4 of the Paris Agreement and Parties' adaptation actions under Article 7, including good practices, priorities, needs and gaps, to inform the global stocktaking under Article 14."
2. With respect to support for climate action, the enhanced transparency framework aims "to clarify the support provided and received by individual Parties in the context of climate change actions under Articles 4, 7, 9, 10 and 11, and, to the extent possible, to provide a comprehensive overview of the overall financial support provided, in order to inform the global stocktaking under Article 14."

Rules adopted at COP-24 (modalities, procedures and guidelines – so-called MPGs – gathered in the "Paris Rulebook") guide the implementation of the Agreement. Decision 18/CMA.1 adopts the modalities, procedures, and guidelines (MPGs) for the transparency framework for action as summarized in figure 2 below.

Figure 2. Overview of the modalities, procedures and guidelines

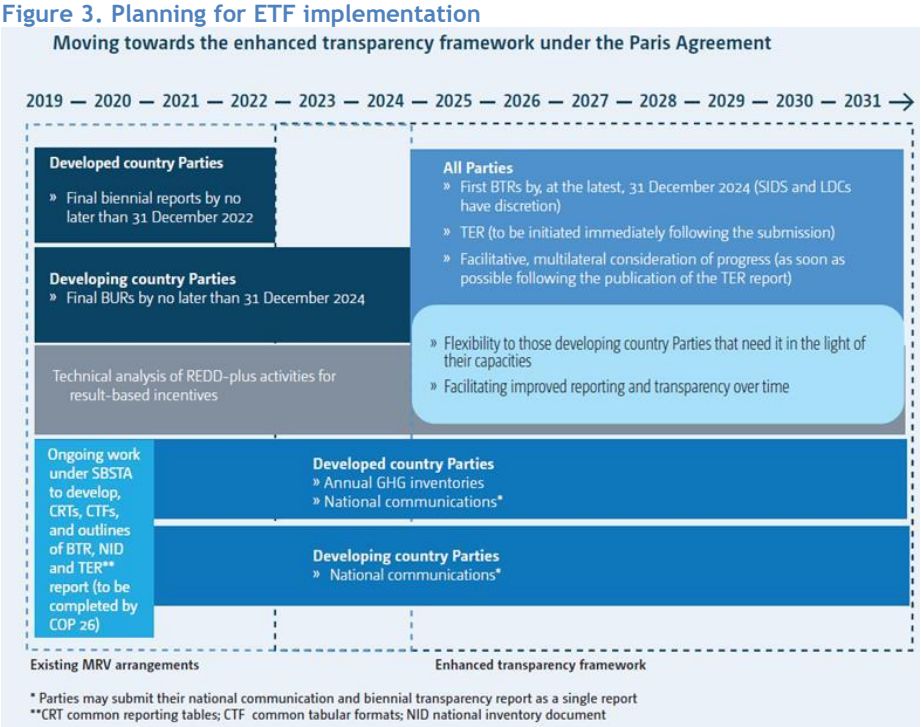


Source: UNFCCC, 2020[7]

1.1.3 Planning for ETF implementation

Adopted MPGs should build on, and eventually replace, the monitoring, reporting and verification (MRV) system currently in place – once the latest biennial reports and biennial update reports are submitted. Parties are expected to submit their first biennial transparency reports (BTRs) and national inventory reports (NIR), if submitted separately, no later than 31 December 2024. Steps of ETF implementation are summarized in the figure below.

Figure 3. Planning for ETF implementation



Source: Enhancing NDCs by 2020: Achieving the Goals of the Paris Agreement, WRI, 2017

[7] UNFCCC, Technical handbook for developing country Parties on Preparing for implementation of the enhanced transparency framework under the Paris Agreement, 2020

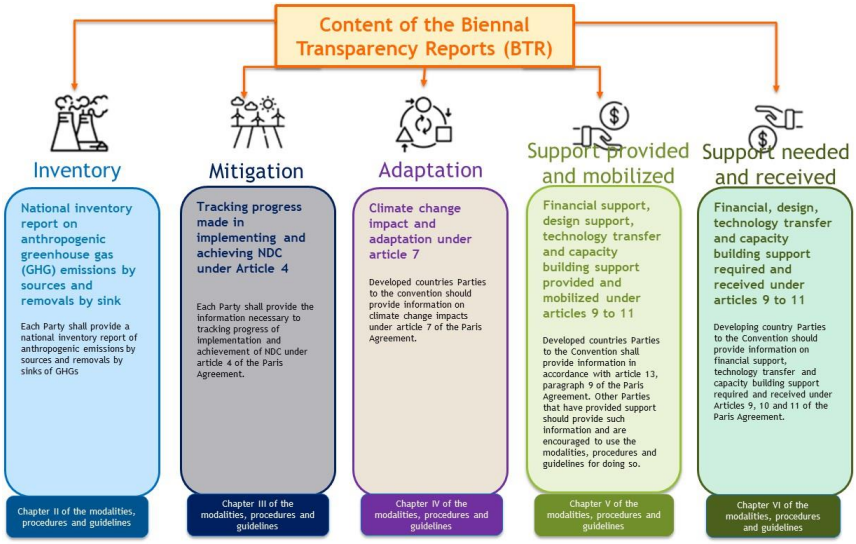
1.2 Reporting requirements in practice

1.2.1 Overview

All Parties, except Least Developed Countries (LDCs) and Small Islands Developing States (SIDS), shall submit information under Article 13 at least every two years. Each Party shall regularly provide a national GHG emissions and removals inventory report and information on climate change impacts and adaptation, as well as information necessary to monitor its progress in implementing its NDC. Developed countries that provide support must communicate information on the support provided (financial resources, technology transfer and capacity building) to developing countries, while developing countries should report on the support they need and have received.

The technical work to be carried out in order to implement the new MRV/M&E system has been divided into five sub-components to be reflected in the Biennial Transparency Report (BTR) as summarized in figure below - 1st BTR to be published by December 2024 :

Figure 4: Scope of the Biennial Transparency Reports



Source: Adjusted from decision 18/CMA.1 UNFCCC, annex, paragraph 10

According to Article 13, information reported in the BTR includes NDC description, emission levels, domestic actions on mitigation and adaptation, and the status of financial, technology development and transfer, capacity-building support for climate in the country. Tools and methodologies are still needed to help in-country technical work. Common reporting tables for electronic reporting have been developed by the Subsidiary Body for Scientific and Technological Advice (SBSTA) for the compilation of national GHG inventories as well as Common Template Tables (CTFs) for a number of other areas. Adaptation information if not reported as a BTR chapter can be submitted as a stand-alone document (Adaptation Communication).

Figure 5: Expected content of the Biennial Transparency Reports (indicative outline)

Theme	Sub-themes and data requirements
National GHG inventory 	• National circumstances and institutional arrangements; • National inventory report of emissions by sources and removals by sinks of GHGs; • Information on methods and cross-cutting elements (e.g. information on the category and gas, and the methodologies, emission factors and activity data used at the most disaggregated level; description of key categories; recalculations; uncertainty assessments; assessment of completeness; and QA/QC plan); • Estimates of emissions and removals for all categories, gases and carbon pools considered in the GHG inventory; • Consistent annual time series.
Mitigation[4] 	• National circumstances and institutional arrangements; • Description of the NDC; • Information necessary to track progress made in implementing and achieving its NDC; • Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans; • Projections of GHG emissions and removals, as applicable; and • Other information relevant to tracking progress.
Adaptation[5] 	• National circumstances, institutional arrangements and legal frameworks; • Impacts, risks and vulnerabilities, as appropriate (current and projected climate trends and hazards, observed and potential impacts of climate change, including sectoral, economic, social and/or environmental vulnerabilities); • Adaptation priorities and barriers; • Adaptation strategies, policies, plans, goals and actions to integrate adaptation into national policies and strategies; • Progress on implementation of adaptation; • Monitoring and evaluation of adaptation actions and processes; • Information related to averting, minimizing and addressing loss and damage associated with climate change impacts; • Cooperation, good practices, experience and lessons learned.
Support[6,7] 	• National circumstances, institutional arrangements and country-driven strategies; • Description of underlying assumptions, definitions and methodologies used to provide information on support provided, mobilized, needed and received; • Information on financial support provided, mobilized, needed and received under Article 9 of the Paris Agreement; • Information on technology development and transfer provided, needed and received under Article 10 of the Paris Agreement; • Information on capacity-building support provided, needed and received under Article 11 of the Paris Agreement; • Information on support needed and received for the implementation of Article 13 of the Paris Agreement and transparency-related activities, including for transparency-related capacity-building.

Source: UNFCCC, 2020[8]

[8] UNFCCC, Handbook on institutional arrangements to support MRV/transparency of climate action and support, 2020

1.2.2 Adaptation reporting requirements

Following ETF requirements, information on adaptation may be included in the BTRs on a voluntary basis: flexibility is provided to countries in terms of whether to include adaptation information, the types of information to include in that respect and the reporting and communication instruments to employ – including the reference to other documents to reduce the reporting burden. When defining its strategy for reporting on adaptation, a given country must define its specific purposes for reporting adaptation information and clarify the interaction with the other relevant instruments under the Convention and identify what information needs to be collected and submitted while cross-referencing information communicated in other documents.

1.2.2.1 Expected content

UNFCCC technical documentation and related publications[9] provide guidance on reporting requirements for adaptation: expected content is presented in the table below. It is to be noted that, beyond UNFCCC communication, those templates and guidelines may help develop a domestic tracking system for adaptation; through an effective linkage between national adaptation M&E frameworks and UNFCCC templates, the country can strengthen the coherence and relevance of international reporting and domestic action on adaptation – while mutualizing effort for data and information gathering and processing.

Table 1. Outline of the Adaptation content for the BTR

Section	Expected information
A. National circumstances, institutional arrangements and legal frameworks	National circumstances relevant to its adaptation actions
	Institutional arrangements and governance
	Legal and policy frameworks and regulations
B. Impacts, risks and vulnerabilities, as appropriate	Current and projected climate trends and hazards
	Observed and potential impacts of climate change
	Approaches, methodologies and tools, and associated uncertainties and challenges
C. Priorities and barriers	Domestic priorities and progress towards those priorities
	Adaptation challenges and gaps, and barriers to adaptation
D. Adaptation strategies, policies, plans, goals and actions to integrate adaptation into national policies and strategies	Implementation of adaptation actions in accordance with the global goal for adaptation as set out in Article 7, paragraph 1, of the Paris Agreement[10]
	Adaptation goals, actions, objectives, undertakings, efforts, plans, strategies, policies, priorities, programmes and efforts to build resilience
	How best available science, gender perspectives and indigenous, traditional and local knowledge are integrated into adaptation
	Development priorities related to climate change adaptation and impacts

[9] See: Technical handbook for developing country Parties on Preparing for implementation of the enhanced transparency framework under the Paris Agreement, UNFCCC, 2020

[10] Global goal : adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal

Section	Expected information
	Adaptation actions and/or economic diversification plans leading to mitigation co-benefits
	Efforts to integrate climate change into development efforts, plans, policies and programming
	Nature-based solutions to climate change adaptation
	Stakeholder involvement, plans, priorities, actions and programmes.
E. Progress on implementation of adaptation	Implementation of the actions identified in section D above
	Steps taken to formulate, implement, publish and update national and regional programmes, strategies and measures, policy frameworks and other relevant information
	Implementation of adaptation actions identified in current and past adaptation communications
	Implementation of adaptation actions identified in the adaptation component of NDCs, as applicable
	Coordination activities and changes in regulations, policies and planning
F. Monitoring and evaluation of adaptation actions and processes	Establishment or use of domestic systems to monitor and evaluate the implementation of adaptation actions
	Achievements, impacts, resilience, review, effectiveness and results
	Approaches and systems used, and their outputs
	Assessment of and indicators for: (i) How adaptation increased resilience and reduced impacts; (ii) When adaptation is not sufficient to avert impacts; (iii) How effective implemented adaptation measures are
	Implementation, in particular on: (i) Transparency of planning and implementation; (ii) How support programmes meet specific vulnerabilities and adaptation needs; (iii) How adaptation actions influence other development goals; (iv) Good practices, experience and lessons learned from policy and regulatory changes, actions and coordination mechanisms
	Ownership, stakeholder engagement, alignment of adaptation actions with national and subnational policies, and replicability
	The results of adaptation actions and the sustainability of those results
G. Information related to averting, minimizing and addressing loss and damage associated with climate change impacts	Observed and potential climate change impacts
	Activities related to averting, minimizing and addressing loss and damage associated with the adverse effects of climate change
	Institutional arrangements to facilitate the implementation of the activities referred to in paragraph above
H. Cooperation, good practices, experience and lessons learned	Efforts to share information, good practices, experience and lessons learned, including as they relate to: (i) Science, planning and policies relevant to adaptation; (ii) Policy innovations and pilot and demonstration projects; (iii) Integration of adaptation actions into planning at different levels; (iv) Cooperation to share information and to strengthen science, institutions and adaptation; (v) Area, scale and types of cooperation and good practices; (vi) Improving durability and effectiveness of adaptation actions; (vii) Helping developing countries to identify effective adaptation practices, needs, priorities, and challenges and gaps in a way that is consistent with encouraging good practices
	Strengthening scientific research and knowledge related to: (i) Climate, including research and systematic observation and early

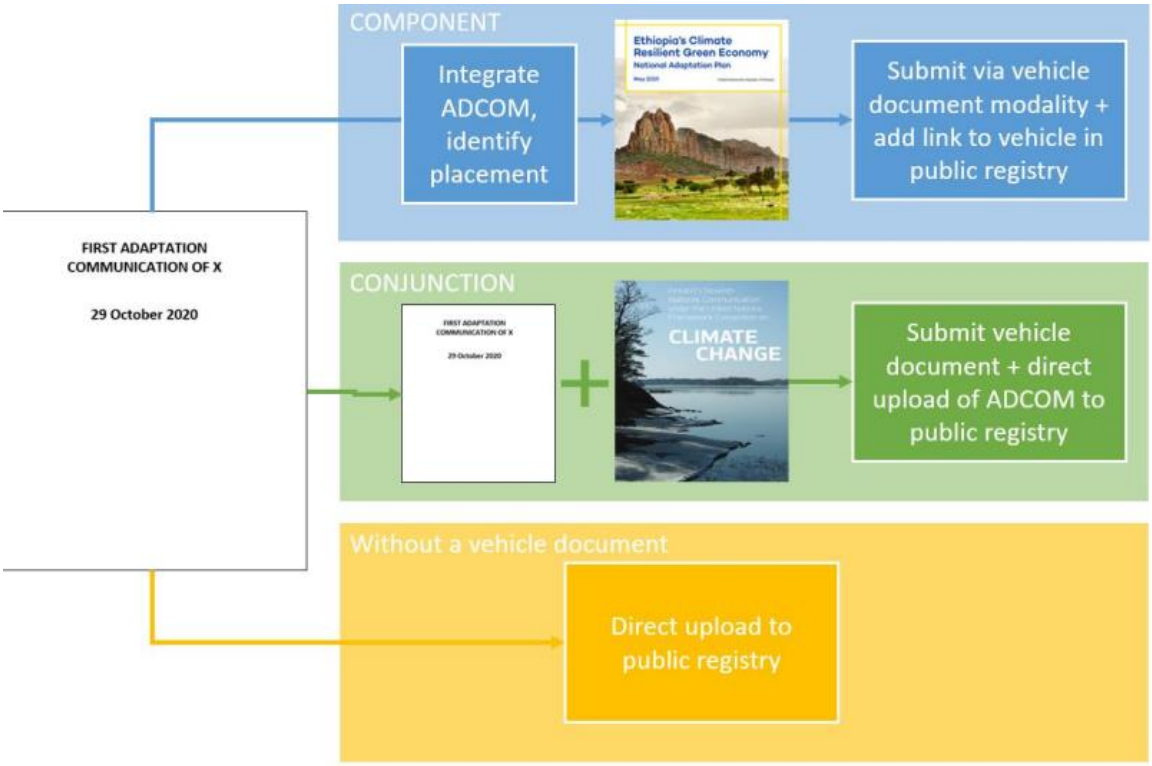
Section	Expected information
	warning systems, to inform climate services and decision-making; (ii) Vulnerability and adaptation; (iii) Monitoring and evaluation
I. Any other relevant information	Any other information related to climate change impacts and adaptation under Article 7

Source: based on the Technical handbook for developing country Parties on Preparing for implementation of the enhanced transparency framework under the Paris Agreement, UNFCCC, 2020 (Table 4, Specific types of information on climate change impacts and adaptation to be included in biennial transparency reports)

1.2.2.2 Instruments

Countries may use different instruments to report and communicate on their adaptation actions – in consistency with the recommendations for the preparation of Adaptation Communications (ADCOM) and of BTRs: national adaptation plan (NAP), nationally determined contribution (NDC), national communication (NC), and biennial transparency report (BTR) may serve as vehicle documents as illustrated in the figure below.

Figure 6. Options for submitting and updating an ADCOM



Source: UNFCCC/Adaptation Committee[11]

While slightly different, the adaptation component of the BTRs and the Adaptation Communication are closely related; beyond *communication*, the purpose of the BTRs on adaptation is to provide a clear understanding of adaptation actions under Art. 7 of the Paris Agreement, including good practices, priorities, needs and gaps, and provide input to inform the global stocktake (GST). BTRs will become available as a vehicle document when their submission begins in 2024. As the submission cycle is different, if submitting an ADCOM as a component of a BTR, Parties might need to consider how the ADCOM operates in parallel with the 2-year cycle for BTRs. However, since there is neither

[11] UNFCCC/Adaptation Committee, 2021, Draft supplementary guidance for voluntary use by Parties in communicating information in accordance with the possible elements of an adaptation communication

an obligation to include adaptation information in a BTR, or to submit an ADCOM every two years, Parties can adapt their ADCOM submission cycle around the BTR cycle, for instance, by submitting an ADCOM with every second BTR, or by providing an additional ADCOM that updates the information in a previously submitted BTR as needed. Another possibility is to vary the type of information that the ADCOM contains in each BTR (e.g. ex ante information every two years, and ex post information every two years). As in the case of NCs and NAPs, ADCOMs and BTRs involve similar types of information, opening further possibilities for information synergies.

2. Methodological background for adaptation MRE

A number of studies and research have been published to help track adaptation actions and results taking into account the specific M&E challenges. The literature was relatively abundant early 2010s to support the development of the first generation of National Adaptation Plans aligned to the UNFCCC Cancun Adaptation Framework. The methodological development was initially supported by donors (GIZ, DFID, World Bank in particular) and by NGOs (based on vulnerability and resilience assessment methodologies at the local level). The issue was given new attention recently with a view to help countries track the adaptation component of their NDCs and comply with new international accountability and reporting requirements as defined through the Paris Agreement (article 7 - Adaptation; article 13 - Enhanced Transparency Framework). On-going reflections in relation to the development of a Global Goal on Adaptation (GGA) build on lessons drawn from past experiences and provide input to the new generation of National Adaptation Plans.

2.1 Conceptual framework on adaptation M&E

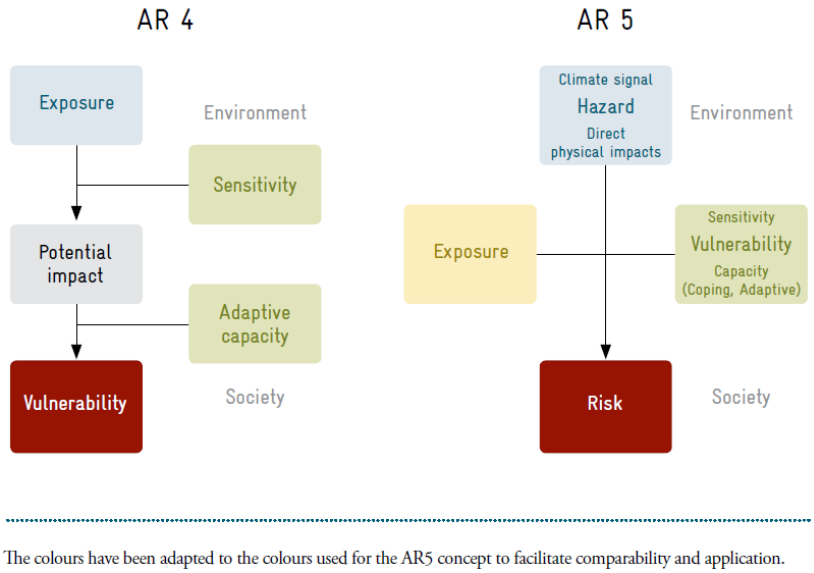
2.1.1 A risk-based framework introduced through the IPCC AR5 report

In the Fifth Assessment Report (AR5) of the Working Group II (WGI) of the Intergovernmental Panel on Climate Change (IPCC), significant conceptual changes have been introduced – compared to previous publications: the concept of vulnerability used in previous reports has been replaced by that of risk of climate change impacts, in line with risk assessment practices from a disaster risk reduction perspective.

Climate risk, impacts/impacts (IPCC, AR5 Glossary, 2014)
Risk is often represented as the probability of occurrence of dangerous trends or events that are amplified by the consequences of such phenomena or trends when they occur. In AR5 reports, the term risk is used primarily to refer to the potential, when an outcome is uncertain, for adverse effects on people, livelihoods, health, ecosystems and species, economic, social, and cultural heritage, services (including environmental services), and infrastructure.
The term impacts is used to refer to the effects of extreme weather and climate-related events and climate change on natural and human systems. It generally refers to the effects on people, livelihoods, health, ecosystems, economic, social, and cultural heritage, services (including environmental services), and infrastructure, taking into account their interactions with climate change or hazardous climate events occurring over a period of time, and the vulnerability of the exposed society or system. The impacts of climate change on geophysical systems, including floods, droughts, and sea level rise, are a subset of impacts called physical impacts.

The concept of risk adopted by AR5 not only introduces new terms and definitions to replace the old ones, but it follows a different underlying philosophy as put in perspective in the following figure.

Figure 7: Comparison of concepts between AR4 and AR5



Source: GIZ and EURAC, 2017[12]

Hazards' analysis is the entry point for climate risk assessment: a hazard corresponds to an external climate signal that does not depend on exposure or vulnerability (see box below) and cannot in itself be influenced by adaptation or other measures to address climate-related loss and damage[13]. The specific elements that may be affected by this hazard characterize the degree of exposure of the system concerned (e.g., people, infrastructure, or ecosystems); a change in exposure over time (e.g., change in the number of people living in drought-prone areas) can significantly increase or decrease the risk[14].

Hazards, Exposure, Vulnerability (IPCC, AR5 Glossary, 2014)
Hazards are defined in the AR5 reports as physical phenomena and trends associated with climate or their physical impacts: the potential for a physical phenomenon or trend - natural or human-induced – which can entail loss of life, injury or other health effects, as well as damage to and loss of property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.
Exposure is characterized by the presence of people, livelihoods, species or ecosystems, environmental functions, resources or services, infrastructure elements, or economic, social or cultural assets in a place or context that is susceptible to be damaged.
Vulnerability is understood as the propensity or predisposition of a system to suffer damage, encompassing a variety of concepts or elements, including sensitivity or fragility and the inability to cope and adapt - adaptive capacity refers to the ability of systems, institutions, humans and other organisms to adjust to protect themselves from potential damage, to take advantage of opportunities or to respond to consequences. The notion of sensitivity is not isolated in the revised IPCC glossary; it corresponds to the internal characteristics of the system concerned, which will affect the impact of a given event.

[12].
[13] GIZ and EURAC, Risk Supplement to the Vulnerability Sourcebook. Guidance on how to apply the Vulnerability Sourcebook's approach with the new IPCC AR5 concept of climate risk. Bonn: GI, 2017.
[14] GIZ and EURAC, Risk Supplement to the Vulnerability Sourcebook. Guidance on how to apply the Vulnerability Sourcebook's approach with the new IPCC AR5 concept of climate risk. Bonn: GI, 2017.

In existing terminology, a hazard is not necessarily an extreme weather event (e.g., tropical storm, flood), but can also be slow on-set trends (e.g., increase in average temperature, sea level rise). It should also be noted that a hazard can be a climatic event (e.g. heavy rainfall), but it can also be a direct physical impact (e.g. flooding); as an illustration, we use the classification defined in the European taxonomy.

Table 2. Classification of hazards in the European taxonomy

	Temperature-related	Wind-related	Water-related	Solid-mass related
Chronic	Changing temperatures (air, freshwater, marine water)	Changing wind patterns	Changing precipitation patterns and types (rain, hail, snow-ice)	Coastal erosion
	Heat stress		Precipitation and/or hydrological variability	Soil degradation
	Temperature variability		Ocean acidification	Soil erosion
	Permafrost thawing		Saline intrusion	Solifluction
			Sea lever rise	
			Water stress	
Acute	Heat wave	Cyclone, hurricane, typhoon	Drought	Avalanche
	Cold wave/frost	Storm (including blizzards, dus and sandstorms)	Heavy precipitation (rain, hail, snow/ice)	Landslide
	Wildfire	Tornado	Flood (coastal, fluvial, pluvial, ground water)	Subsidence
			Glacial lake outburst	

Source: EU technical expert group on Sustainable Finance, 2020[15]

2.1.2 Characterization of adaptation projects

While there is still a lack of agreement on what counts as adaptation among practitioners[16], guidance can be derived from a number of publications and more particularly from donors' frameworks – used for allocating funds on adaptation-oriented projects. In general, an adaptation project differs from a development project in that it explicitly aims at and contributes to reducing the risks of climate-related impacts on the targeted system (see box below).

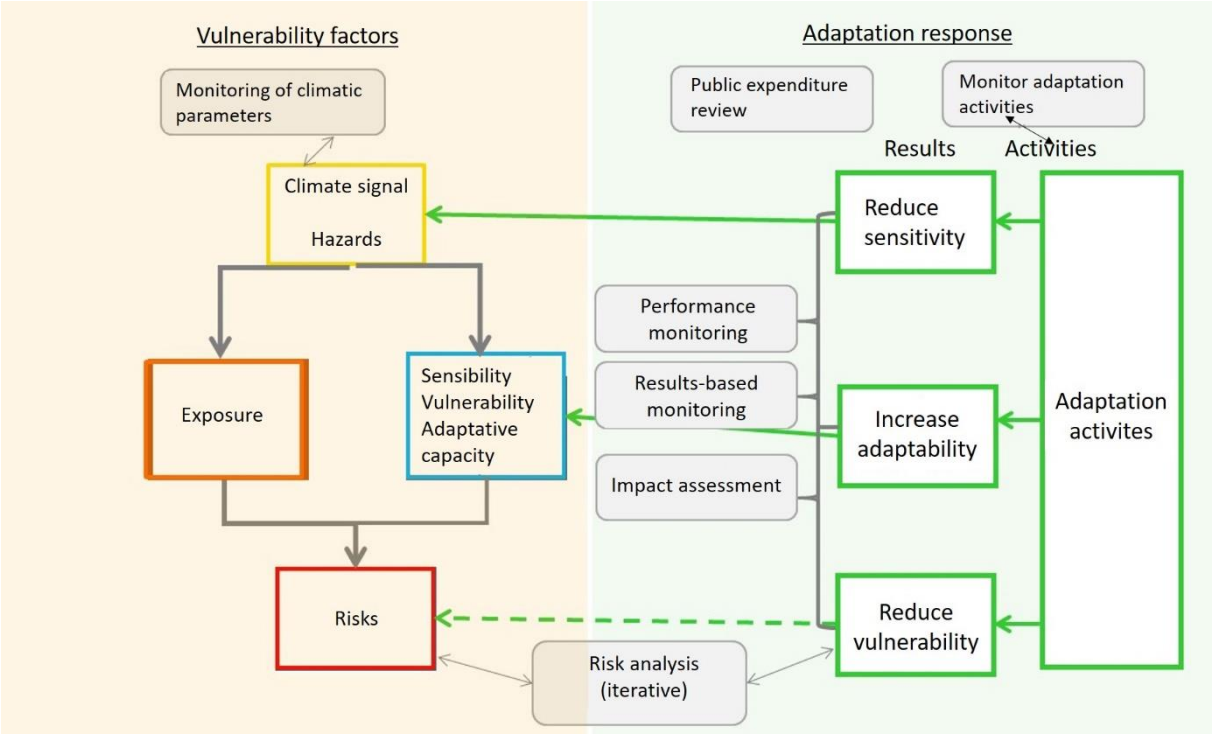
Adaptation
Adaptation is defined as "adjusting to the current or expected climate and its consequences. For human systems, this means mitigating adverse effects and exploiting beneficial effects". Note that this definition covers adjustment to the current climate, including response to threats related to natural climate variability (IPCC, 2014[17]).
Common Principles for Climate Change Adaptation Finance Tracking[18]
In 2015, the group of Multilateral Development Banks (MDBs), who jointly report on Climate Finance, and the International Development Finance Club (IDFC) published the Common Principles

[15]
[16] Tompkins EL, Vincent K, Nicholls RJ, et al. 2018. Documenting the state of adaptation for the global stocktake of the Paris Agreement. WIREs Climate Change. 9(5): pp.1-9.
[17] IPCC, AR5 Glossary, 2014
[18] IDFC, Common Principles for Climate Change Adaptation Finance Tracking, 2015

for Climate Change Adaptation Finance Tracking, with a view to agree on the scope of adaptation finance and to facilitate comparability of the reporting process.
Activities to be tracked consist in activities that address current and expected effects of climate change, and that respond to the following prerequisites:
1. Setting out the context of risks, vulnerabilities and impacts related to climate variability and climate change;
2. Stating the intent to address the identified risks, vulnerabilities and impacts in project documentation;
3. Demonstrating a direct link between the identified risks, vulnerabilities and impacts, and the financed activities.

In practice, the term "adaptation project" is likely to be applied more or less broadly depending on the actors, particularly in terms of strategy and the degree of ambition in terms of reducing climate risks. The debate on the notion of additionality concerns the distinction between "business as usual" development projects and projects that have integrated the climate dimension, which does not depend exclusively on the activities undertaken as such, but rather on the relationship between these activities, the climate change context and the vulnerability of the stakeholders targeted by the intervention. In other words, how the project (or policy) is designed – based on a vulnerability assessment - is as important as the activity plan per itself (see figure below).

Figure 8: Characterization of adaptation actions

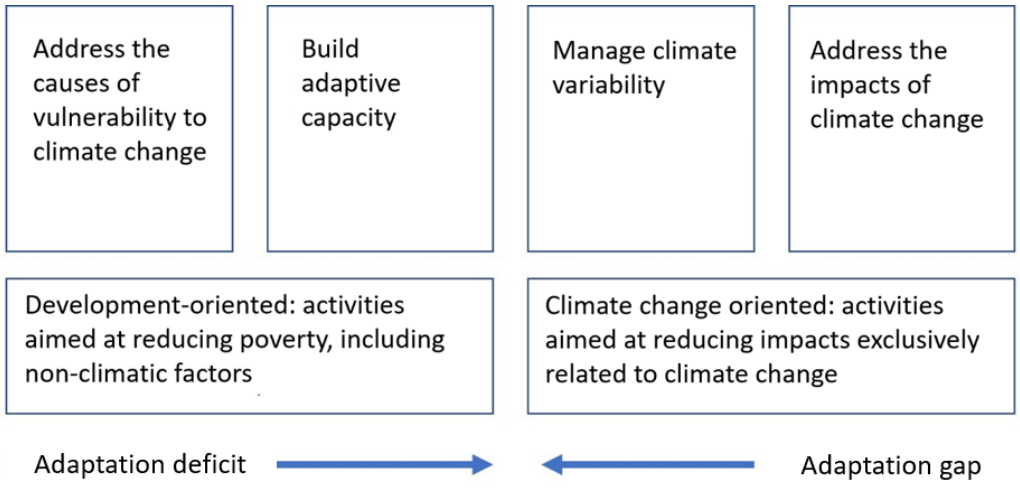


Source: Adapted (AR5) from the Training Manual on Monitoring and Evaluation (M&E) of Adaptation, GIZ, 2013.

The notion of the adaptation continuum (see figure below) illustrates different degrees of ambition from an adaptation perspective. This notion of a continuum recognizes that only a few activities - those "climate change-focused" on the right side of the continuum - have an adaptation benefit only if climate change actually occurs (a "high regret" action in the absence of CC): such activities help fill an "adaptation gap," a situation where the intervention is intended to address an inability to specifically address the effects of climate change. In contrast, many activities - on the left side of the continuum - contribute to adaptation by addressing broader sustainable development needs, such as health, education, livelihoods, or governance ("low" or "no regret" actions in the absence of CC). Such actions often serve as preconditions for building the resources and capacities that enable

societies to anticipate future needs, respond and react to hazards. These activities correspond to an "adaptation deficit", in which the problem being addressed is due to more generic developmental delays, not just an inability to cope with climate change.

Figure 9: Adaptation continuum



Source: adapted from GIZ, based on McGray et al. 2007 and World Bank 2011.

While adaptation actions are defined in essence by their potential contribution to the reduction of climate-related risks, they can be very diverse in nature depending on the strategies chosen and the impacts already observed by the project leaders. They can be technical, legislative and regulatory, institutional - or concern the deepening of knowledge, awareness-raising and communication, etc. They also cover a large number of sectors and themes (development, urban planning, forestry, water resource management, health, etc.) and can deal with the issues in a transversal manner or by sector and theme of interest. For example, a rural community may adopt new crops that are more tolerant of heat or drought; a coastal community may restore dune systems to protect against more frequent storm surges, or move away from the coast altogether if it is at high risk; a government may protect its citizens by investing in early warning systems for heat waves, particularly in urban areas; and it may develop its environmental observation capabilities to monitor how climate change is likely to affect important national resources. In each case, what actually falls under the umbrella of adaptation depends on the local context and the objectives being pursued. The high diversity of actions potentially considered as adaptative makes M&E systems all the more complex to implement, as commented thereafter.

Resilience ?
The rise of concerns about climate change has given rise to the notion of resilience - the improvement of resilience in the face of the expected effects to result from the adaptation interventions implemented. Initially, more specifically the issues related to the risks of natural disasters, this concept is increasingly used in the context of adaptation to climate change, particularly in the context of development aid. The Paris Agreement thus underlines the need for the deployment of ambitious national action plans with interventions which should make it possible to strengthen the capacity to adapt, strengthen resilience and reduce vulnerability to climate change, with a view to contributing to sustainable development and ensure an adequate adaptation response in the context of the temperature target . Resilience-focused evaluation and methodologies are being developed (see the Resilience Rating System, WB, 2021).
Definition: The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential

function, identity and structure while also maintaining the capacity for adaptation, learning and transformation[19].

2.1.3 Adaptation M&E Specificities

Key definitions

CC monitoring and evaluation (M&E) refer to mechanisms put in place at different scales to respectively monitor and evaluate efforts to reduce greenhouse gas emissions and/or adapt to the impacts of climate change with the aim of systematically identifying, characterizing and assessing progress over time[20] - as commented in the introductory section (see 1.1.1 Rationale for implementing a national Transparency Framework).
Monitoring and evaluation are closely linked processes and are often mentioned together when referring to adaptation policies and to reporting requirements. Monitoring, reporting and evaluation have different aims and may involve different actors. This 3-level approach for adaptation is referred to as MRE at policy level[21].

Lack of a universal metric for adaptation

Adaptation is a subjective concept, based on a specific context and on proxy measures that can be linked to the achievement of broader societal goals (e.g., well-being, human development). Indicators used can range from simple measures, such - as education levels and average income, to more complex aspects such as trust and leadership, corresponding to different questioning. Main recommendations resulting from recent research[22] with regard to the definition of indicators for adaptation are as follows:

- Selection of metrics according to the objectives of the evaluation: for example, an evaluation of the effectiveness of an adaptation intervention at the level of a given population will need to select metrics based on the characteristics of the given population, the nature of the intervention, and the local factors influencing climatic and non-climatic risks, whereas the evaluation of a portfolio of investments needs metrics of broader applicability. This includes specifying the geographic and temporal scales of the scope of the evaluation.
- Use of existing metrics: In principle, any indicator that can plausibly be argued to capture aspects of adaptation could be an adaptation indicator, as long as its relevance to adaptation is made explicit (i.e., the extent to which the indicator directly indicates a change in terms of climate risk reductions). For example, an indicator of water savings in an area where water availability is affected by climate change can be an adaptation indicator, while in another context it is a simple indicator of resource efficiency.
- Differentiation of process and outcome indicators in line with standard terminology: an indicator can be defined to measure changes that contribute to enhanced adaptability (i.e., adaptive capacity) and not to measure outcomes in terms of enhanced resilience , potentially using proxy measures; for example, "literacy rate," or access to micro-credit, "can be one of the indicators assumed to represent adaptive capacity.
- Clarification of calculation methods: beyond a title, the definition of an indicator must specify its operationalization method (including data sources). For example, although the indicator "economic damage avoided" seems to be a relatively consensual indicator, it can be calculated in many different ways, producing very different figures. This clarification is all the more important when using indices that combine several factors or variables.

Time scales and uncertainty

[19] IPCC, Global Warming of 1.5°C - Glossary, 2018
[20] IPCC, Global Warming of 1.5°C - Glossary, 2018
[21] EEA, Indicators for adaptation to climate change at national level - Lessons from emerging practice in Europe, 2018
[22] Leiter, T., Olhoff, A., Al Azar, R., Barmby, V., Bours, D., Clement, V.W.C., Dale, T.W., Davies, C., and Jacobs, H. 2019. "Adaptation metrics: current landscape and evolving practices". Rotterdam and Washington, DC. Available online at https://gca.org/

Uncertainty is a main issue when designing interventions – as it may be the case for any long term interventions, combining :

- uncertainties in climate change models: for interventions that address infrequent extreme events, the effectiveness of prevention measures can only be assessed if the expected event occurs. If such an event does not occur, it may be difficult to determine whether the intervention has achieved its intended results.
- uncertainty about patterns of economic and social change: social aspects are particularly critical for adaptation and resilience assessment but are sometimes poorly accounted for in conventional assessment; they are even more difficult to track because they are qualitative, incremental, sequential in nature-not a linear process.

The concept of adaptation pathways is particularly relevant when addressing these uncertainty issues, through the development of different scenarios for actions linked to critical pre-defined thresholds.

Contextualization and multi-scale dimension

Adaptation interventions must be tailored to the scale and sector of the targeted system while considering contextual elements, hence the importance of considering territorial data when designing projects as well as to inform evaluation (see box below). The scale to be used for analysis should be informed as part of the analytical process; the upper and lower scales may provide critical information when considering cross-cutting impacts (geographic and temporal scales), including multi-scale catalytic effects such as multiplier effects, spillover effects, and demonstration effects-which can be difficult to identify and characterize ex ante.

Monitoring of territorial data
Observation of the territory with regard to climate change is inseparable from the monitoring and evaluation of adaptation projects. It involves monitoring indicators related to key developments in the territory in relation to the main climate change issues identified. These indicators do not provide information directly on the project but on the territorial context (socio-economic, environmental and climate); they are not intended to feed the monitoring system of the project/policy itself but rather to provide contextual information when evaluating the results.

This dependence on the context is all the more complex for this type of project as it is necessary to consider unstable reference situations, as the interventions take place by definition in an environment that is evolving due to climate change - and socio-economic developments. For example, an objective of reduction of material damages linked to floods (having as sole indicator the evolution of the amount of damages) can be reached after the interventions not because of their efficiency but because no flood will have taken place on the territory during the given period. Conversely, an objective of reducing vulnerability to heat-related mortality may not be achieved, not because the interventions were not effective, but because socio-economic trends (e.g. an increase in the number of elderly and vulnerable people) or climatic trends (e.g. an unexpected acceleration in warming) have largely changed, rendering the final reduction objective, which was initially planned, obsolete. This particularity makes it extremely difficult to design relevant indicators enabling to compare data before and after the intervention; hence the need for referring to causal chains between an intervention and a change on the ground (chain of impacts), what has become common practice among adaptation M&E practitioners (see box below).

2.1.4 Gender mainstreaming

The articulation between climate change issues and gender issues is very often put forward and becomes a key criterion for access to funding from donors; as an illustration a Gender Action Plan is required for funding applications to the Green Climate Fund, including the definition of monitoring and evaluation indicators and dedicated measures. It is widely recognized that climate change affects

women[23] more than men - especially in rural areas, as women are i) more dependent on natural resources for their livelihoods, ii) less able to respond to natural hazards, such as droughts, landslides, floods and hurricanes – e.g. men may migrate to less vulnerable areas while they will stay and take care of the family, iii) underrepresented in decision-making bodies at all levels. Women in poverty are generally exposed to higher risks and burdens from the effects of climate change. On the other hand, it is also recognized that women have a key role to play in responding to climate change because of their local knowledge and leadership on certain activities, e.g. in terms of sustainable resource management, knowledge transfer within households/communities[24].

In this context, the question of "gender-specific" monitoring arises, e.g. what effects to expect and monitor in terms of gender equality and how to translate it into the M&E system (indicators, targets, etc.). A first level of consideration consists of identifying ad targeting women in the characterization of beneficiaries and setting objectives accordingly; in the case of projects targeting communities, an objective of 50% of female beneficiaries is generally set, which requires integrating measures into the interventions to ensure that women have access to project benefits. A number of tools are being developed to help define and evaluate measures from a gender equality . Indeed, a true evaluation of the effects of an intervention on gender aspects should involve going beyond counting the number of women participating in the project.

[23] UNDP.2016. Gender and climate change: Overview of linkages between gender and climate change. Global Gender and Climate Alliance (GGCA)
[24] https://unfccc.int/gender

2.2 M&E systems in place (NAPs): key findings

Key findings from an internal review conducted by Citepa in 2021(16 NAPs reviewed)[25] are summarized below, with a view to highlight key features from adaptation M&E systems developed to date (national scale).

2.2.1 The process implemented

By definition, a M&E system continuously collects data and information with the aim of checking whether an intervention is on track to achieving set objectives and, thanks to this information, provides an assessment of the worth or utility of an intervention at a specific point in time. Its overall objective - as described by all the NAP concerned by this study - is to check whether implementation processes and adaptation actions proposed are on the right track. In other words, the system aims to follow progress achieved in the development of adaptation interventions and to identify potential deviations from objectives. The underlying idea is – according to the NAPs of Albania, Burkina Faso, Ethiopia, Grenada, Kenya, Peru, Saint-Vincent and South Africa – to "learn lessons from the past", which means that one shall understand the M&E process as a springboard for improving the effectiveness of the NAP.

This method – that is defined as a "learning by doing approach" by South-Africa – was divided into three goals by Albania and Togo. The first goal is "effective steering" and refers to the fact of checking if processes are on the right track. Then, they define the "learning" goal that corresponds to the generation of knowledge and feedback about adaptation actions and processes. The third goal is "accountability", and it involves in ensuring transparency and information diffusion to other actors. Finally, many countries consider that the M&E system shall provide relevant and reliable information to decision makers so that they might improve strategies and implement successful policies and projects.

Albania and Colombia report the use of a "Result-Based M&E system". The particularity of this approach consists in assessing a program or a project on an ongoing basis by comparing effective results of the implemented action to the preliminary objectives at different points in time. This method – that requires the use of a limited core of indicators - allows to easily identify where and when there are problems in the implementation of processes and actions.

Kenya introduces the "theory of change". This concept involves developing very detailed short, medium, and long-term objectives for NAP actions at different scales (sectoral, national); describing deeply the issues faced by the sectors at stake and selecting reliable partners and actors. A theory of change describes how we believe that change could be made to happen and outlines the main elements for that change; It seeks to identify how we think that different factors could interact in relation to the change and what the underlying assumptions and risks[26].

The theory is described as based on the following four key steps:

- Focus on the high-level change desired.
- Identify what is needed for the desired development change to happen, informed by the problem tree analysis in the climate change adaptation and other evidence, and how partners are contributing to this change.
- Establish and make explicit the related key assumptions underpinning the theory of how change happens, and major risks that may affect it.

[25] 16 NAPs reviewed: Albania, Brazil, Burkina Faso, Ethiopia, Grenada, Kenya, Saint Vincent and the Grenadines, Togo, Uruguay, Cameroon, Peru, South Africa, Kiribati, Sri Lanka, Suriname

[26] United Nations Development Group LAC Secretariat, Theory of Change_Concept Note, 2016

- Identify partners and actors who will be most relevant for achieving each result, considering the related risks and assumptions.

In the same way, Peru proposes a very precise approach to identify issues and propose solutions. The method consists in employing schematic tools to present issues and solutions at stake. For instance, Peru uses very detailed impact chains that establish links between different climate hazards in order to better identify the causes of vulnerability. Concerning the impacts on humans as well as the solutions to be provided, problems and solutions trees are employed. Then, a common – but in fact more precise - indicator-based sectoral approach is set up (see 3.c.ii).

Finally, most of the countries (Brazil, Burkina Faso, Cameroon, Ethiopia, Grenada, Kiribati Islands, St-Vincent and the Grenadines, South Africa, Sri Lanka, Suriname) propose a design of MRE system based on a logical framework. The idea is to create a structure based on specific objectives, outcomes, strategies to which are associated adaptation actions and indicators. The result of this method is the creation of a "policy matrix" that provides a detailed overview of the plan. As most of the countries use sectoral and transverse programs of actions, several "policy matrix" are often presented in the NAP.

Table 3. Example of a log frame (South Africa)

Intervention 1: Reduce human, economic, environment, physical and ecological infrastructure vulnerability and build adaptive capacity				
Outcome 1.1: Increased resilience and adaptive capacity achieved in human, economic, environment, physical and ecological infrastructure				
Action	Lead	Partners	Time frame	Indicator
1.1.1 Strengthen local organisations to support individual (male and female) and community adaptation	DFFE	Department of Women, Youth and Persons with Disabilities (DWYPD), non-governmental organisations, municipalities, provincial government departments	Short term	Number of individual and community adaptation programmes implemented
1.1.2 Identify individuals (male and female) and communities at most risk from climate change within municipalities and deliver targeted climate change vulnerability reduction programmes for these individuals and communities	Municipalities	DFFE, DWYPD, Department of Public Works and Infrastructure (DPWI), Department of Health (DOH), provincial government departments, NGOs	Short term	Number of vulnerability reduction programmes implemented per municipality

Selection of indicators

Albania, Uruguay, and Burkina Faso jointly state that the selection process of indicators shall be undertaken through two phases. First, indicators are selected. In this regard, Albania and Uruguay recommend avoiding a too complex M&E system by selecting a limited core of indicators. St-Vincent and the Grenadines agrees with this method but proposes a rather modern approach by explaining that the set of indicators initially chosen might be increased over time to meet reporting needs. Moreover, together with Togo, St-Vincent and the Grenadines explains that indicators should be selected in a consultative manner and agreed upon by all stakeholders. The second phase consists in

developing indicator factsheets that indicate baseline values, data sources, calculation methods and timelines.

2.2.2 M&E systems in place: overview

2.2.2.1 M&E Institutional arrangements

Roles and responsibilities / who does what to inform / manage the M&E system

Environmental Ministries are reported to be the main institutions in charge of the M&E processes by Albania, Brazil, and Burkina Faso. The latter - together with Uruguay, Colombia and Kenya – explains that relevant sector ministries are also largely involved in the implementation and the realization of the M&E system regarding to their field of responsibility. For instance, in Burkina Faso, the National Council for the Environment and Sustainable Development is responsible for reviewing the implementation progress of the NAP and for running a database containing NAP performance assessment for use by decision makers. Sectoral ministries intervene at a second stage by updating the database with information on progress made by each sector. Togo proposes a different setting by introducing a specialised institution that is called "Institutional device for the coordination, monitoring and evaluation of development policies".

Overall structure

Most of the NAP report a global M&E system that is divided into several sectors or goals. There are only two exceptions. The first one concerns Uruguay that only published a NAP regarding the agriculture sector. The second one concerns Peru, and it distinguishes the M&E system associated with "adaptation to climate change" to the M&E system associated with the "National Plan for Adaptation to CC". The former will provide proposals for M&E at a more aggregate level and with the flexibility to adapt to different territories and sectors. The second will be directly oriented towards the plan itself, proposing monitoring indicators and guidelines for the evaluation phase.

All plans considered in this synthesis are implemented at the national level, which means that they cover the entire territory and that there are not region-specific plans. Kenya is the only country to mention "Counties Adaptation Plans" i.e. plans developed by local institutions for the climate change adaptation of counties.

Many countries consider "gender sensitivity" as a guiding principle of the actions proposed in their NAP but fewer investigate deeply the issues associated to gender and climate change. Among countries which investigate this idea, a quite common approach is to consider women in the "vulnerable population category" together with youth, unemployed and indigenous people (the composition of this category changes from one NAP to another). As a result, several NAP (Brazil, Kenya, Kiribati and Suriname) represent this category as a "sector" to which are associated actions and indicators. Finally, Suriname, Kiribati, Uruguay, and Burkina Faso dedicate one part to gender-related challenges (socioeconomic or climate-related ones) and also propose targets as well as solutions such as funds, agendas of actions and inclusive policies.

2.2.2.2 Indicators

Number

Numbers of indicators used by M&E system are quite heterogenous. It is however possible to distinguish three schools of thought (and the most widespread is the one using less than 100 indicators as it was suggested by Albania and Uruguay (see part "Selection of indicators").

Table 4: Number of NAP and associated countries per category.

Interval	Number of NAP concerned	Countries
0-100	10	Albania, Brazil, Burkina Faso, Ethiopia, Grenada, Kenya, Saint Vincent and the Grenadines, Togo, Uruguay
100-300	3	Cameroon, Peru, South Africa
>300	3	Kiribati, Sri Lanka, Suriname

Typology

As mentioned earlier in part 2.b, most of studied countries present their indicators through a logical framework. These indicators are called "performance indicators" because they aim to assess the degree of effectiveness of adaptation actions. However, some countries propose other distinctions between indicators. For instance, Albania and Colombia distinguishes "impact" and "response or outcome" indicators. The first ones consider the evolution of climate change impacts whereas the second ones evaluate the success of adaptation action. Colombia even adds a third category of indicators that is "planning indicators". The objective of this set of indicators is to assess the management of the plan. Moreover, Cameroon, Togo and St-Vincent and the Grenadines use "transverse indicators". This category of indicators concerns themes/ actions that may not be part of a particular sector and examples of such indicators are: the number of scientific publications published, the degree of increase in investments and the number of legal reforms. For its part, Peru employs a rather original approach by combining the use of "transverse", "performance" and "integrated indicators". There are two integrated indicators among which one "monitoring indicator" that is the "Climate Change Adaptation Management Indicator" (IGIACC) and another one "evaluation indicator" that is the "the Climate Change Damage, Disruption and Loss Indicator". These indicators are "integrated" because they include several dimensions. For instance, the IGIACC embrace three dimensions that are: training, research, and planning.

Scale

The scale associated to indicatory varies among the NAPs. Albania, Uruguay, Peru and Togo only propose a sectoral analysis and Grenada and St-Vincent and the Grenadines use a national approach. Plural analyses are also available. Brazil, Burkina Faso, Cameroon, Ethiopia, Kiribati, and South Africa adopted a multi-pronged approach with two dimensions. The two first ones chose a "national" and "sectoral" methodology whereas the other ones opted for a "national" and "local" approaches. Ultimately, Kenya, Sri Lanka, and Suriname used a three-dimensional tool considering "national", "local" and "sectoral" levels of analysis.

2.2.2.3 Reporting

Monitoring and reporting procedures / reports

According to Albania, the following elements should be present in the M&E report: new findings on climate change vulnerability, steps and activities undertaken through the NAP, progresses and obstacles in mainstreaming adaptation into the different sectors and in achieving goals and finally recommendations for future steps and measures. Burkina Faso proposes another reporting method that is a database indicating NAP performance assessments.

Evaluation procedures / reports / frequency

A four or five-year review of the NAP is adopted by Albania, Brazil and Togo. Burkina Faso and Ethiopia employ the same model but also uses "ad-hoc reviews" when needed (because of changes in effectiveness of adaptation actions for example) and an independent external evaluation at the end of the first implementation cycle of the NAP. St-Vincent and the Grenadines also uses a three-dimensional method but this one is defined around the implementation phases of the NAP. Firstly, one year after the beginning of the implementation of the NAP, the "inception phase report" assesses the first phase using a specially created set of indicators. Secondly, after three years occurs the

"midterm assessment" that aim to elaborate recommendations to inform the design of the NAP's third phase, with a view to promoting success stories and avoiding less effective and efficient practices. Finally, during the ninth year, the "final evaluation" takes place, with the aim of shaping the second-generation NAP. Sri Lanka offers another approach that divides the implementation and the review processes into three stages with:

- The "Foundation Building Stage" that corresponds to the first three years of implementation. At the end of this phase, the plan must undergo a revision.
- The "Development Stage" is set-up after the first revision and the second periodic revision occurs at the end of this stage (after three years).
- The "Goal Achieving Stage" consists in the last four years of implementation of the NAP and a post-plan review is undertaken after the completion of the 10th year of the Plan.

To capture the differentiated impacts of adaptation actions on women and men, Uruguay, Ethiopia and St-Vincent use gender-disaggregated indicators. It means that for chosen indicators, they compute the result for women and for men. Examples of such indicators from Ethiopia's NAP are : percentage of targeted population (women/men) adopting one or more climate-smart agricultural practices, percentage of target population (women/men) that are food secure, percentage of targeted population (women/men) with insurance. However, most of the countries do not place as much importance on the generation of gender-disaggregated results and do not use any gender specific indicator.

2.2.2.4 Information systems & tools

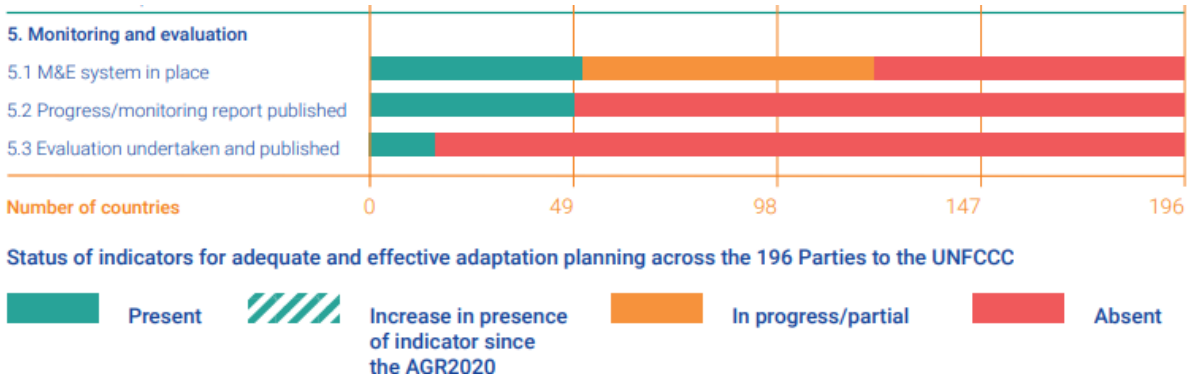
Information systems & tools especially designed as part of the M&E procedure are scarce. Only two of the studied countries mention the use or the development of such tools. To begin with, Uruguay touched upon the development of a platform bringing together existing information systems (agro-climatic, land use and risk information). Uruguay also discusses the implementation of a mechanism for systematically estimating damages and losses associated with climatic events in the agricultural sector.

Furthermore, St-Vincent and the Grenadines mentions the use of a MRV System that was delivered by the Government. The system is said to be "live", meaning that it requires engagement from stakeholders for information to remain current and relevant. In other words, this tool focuses on maintaining key data flows for the adaptation, including trends and projections on weather, temperature, biodiversity but also on socioeconomic vulnerabilities. By informing on the progresses and failures of existing adaptation actions, this tool hence pursues an objective of transparency with respect to decision makers and to the public.

2.2.3 Way forward

Given the complexity and multi-faceted process needed for implementing a national M&E system for adaptation, this process is still on-going for the majority of countries, more particularly for developing – as illustrated in the figure below (figures on the situation in 2021).

Figure 10. Overview of national adaptation M&E systems in place



Source: UNEP, 2021[27]

From 26 per cent of countries having M&E systems in place in 2021 - and another 36 per cent are in the process of developing a system, and only 8 per cent of countries have evaluated their adaptation plans[28]. **Continuous knowledge-sharing is all the more important to help leverage success - and failure - factors from systems in place, and provide input to the definition of the Global Goal on Adaptation accordingly.**

2.3 Lessons drawn through the preparation of the Global Stocktake Report

To assess the collective progress towards achieving the purpose of the Paris Agreement and its long term goals, Article 14 of the Agreement established the notion of the "global stocktake". The global stocktake is a cyclical mechanism taking place every five years beginning in 2023: preliminary results are expected by COP28 – to be held at Dubai from November 30, 2023 to December 12, 2023.

Beyond shedding light on what Parties have achieved, the outcomes of the global stocktake will inform Parties in "updating and enhancing, in a nationally determined manner, their actions and support in accordance with the relevant provisions of the Paris Agreement, as well as in enhancing international cooperation for climate action." It is important to note that, while this paper focuses on approaches to reviewing the overall progress made in achieving the global goal on adaptation, such a review will take place within the broader context of the global stocktake which will include several additional and complementary components. Article 7 of the Paris Agreement stipulates, for example, that besides reviewing the overall progress made towards the global goal on adaptation, the global stocktake will also recognize the adaptation efforts of developing country Parties, enhance the implementation of adaptation action taking into account adaptation communications, and review the adequacy and effectiveness of adaptation and support provided for adaptation. Regarding adaptation, the Global Stocktake has been set up as a platform to: • recognise the adaptation efforts of developing country Parties • enhance the implementation of adaptation action • review the adequacy and effectiveness of adaptation and support provided for adaptation • review the overall progress made in achieving the GGA.[29]

The Global Goal on Adaptation (GGA)

[27] UNEP, 2021, Adaptation Gaps Report
[28] UNEP, 2021, Adaptation Gaps Report; another estimate comes from the NAP global framework in 2022: 38% of NAPs have a MEL system in place - Emilie Beauchamp from NAP Global Network (Adaptation Action Coalition Fall Membership Event National Systems for Adaptation MEL: A Country Dialogue, 25 October 2022, Session Readout)
[29] UNFCCC/Adaptation Committee, 2021, Approaches to reviewing the overall progress made in achieving the global goal on adaptation_Technical paper

Article 7 of the Paris Agreement established the global goal on adaptation of "enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate response in the context of the temperature goal" of "[h]olding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels."[30]

Progress on the GGA was slow until the establishment of the Glasgow–Sharm el-Sheikh (GlaSS) work program in 2021 at COP 26. At the end of the first year of the GlaSS and its first four workshops, there had been only limited advances toward new areas of consensus and a lack of concrete proposals for the configuration and the content of the GGA. However, elements to be used as the basis for the GGA framework emerged from the COP 27 negotiations through Decision 3/CMA. This was primarily supported by the G77 but saw relative convergence for the elements to be considered as a draft GGA framework based on the four overarching dimensions of the adaptation cycle under the United Nations Climate Change regime[31]. It is expected that standardised methodologies developed through the GGA will help assess how well countries are doing in priority sectors and hence feed into the Global Stocktake. Further work is underway and will be presented at COP 28.

As constituted bodies and forums and other institutional arrangements under the Paris Agreement and/or the Convention are invited to prepare synthesis reports for the technical assessment in their areas of expertise, a number of publications have been prepared to help develop the methodological framework, more particularly regarding the definition of the Global Adaptation Goal. Key inputs discussed during the technical assessment phase are presented in the next chapter on Indicators.

[30] Article 2, para. 1(a), of the Paris Agreement.
[31] IISD, 2023, Next Steps for Defining a Monitoring, Evaluation, and Learning System for the Global Goal on Adaptation by COP 28

3. Indicators for tracking adaptation

While a number of methodologies for the selection and development of relevant sets of indicators for adaptation MRE are still under development, common recommendations are now emerging, building on experimentations and research, with the specific objective of developing a common framework for reporting against a "Global Adaptation Goal". This chapter summarizes key findings and references which can provide valuable input for the countries when developing indicators to track adaptation actions and results at national level –in consistency with international frameworks[32].

3.1 Typology?

Indicators and/or Metrics ?

The IPCC distinguished between the terms "metric" and "indicator" by defining a metric as a "group of values (measures) that taken together give a broader indication of the state or the degree of progress" while an indicator "is a sign or estimate of the state of something."[33] Nonetheless, other definitions exist. For example, the 2017 UNEP Adaptation Gap Report, by contrast, defined indicator as "Quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor" whereas metrics or indices are "a system of measurement that includes the item being measured, the unit of measurement, and the value of the unit."[34].

Climate change indicators are aggregate measured values used to monitor and assess interventions and changes in complex environmental phenomena. They are obtained on the basis of quantitative or qualitative data collected in a previous, preferably longer period of time, and they help monitor and assess changes that affect nature and society. As above-commented, countries may use adaptation indicators for a number of purposes. **The IPCC Fifth Assessment Report (AR5) mentions three complementary uses of adaptation metrics: (i) to identify adaptation needs (usually by assessing climate vulnerability or risk), (ii) to track the implementation of adaptation, and (iii) to assess its effectiveness**[35]**.**

This multiplicity of uses has led to the development of different types of indicators. Given the complexity and diversity of indicators potentially useful to track adaptation – depending on the specific purpose for tracking, the definition of a typology of indicators - aligned to the tracking purpose - helps structure and inform the data requirements. Given the wide and multi-faceted range of adaptation measures/policies/projects, lists of relevant indicators may be very long. As an illustration, a database for climate smart agriculture was developed by FAO under a CGIAR project: addressing the 3 interconnected challenges of productivity / adaptation / mitigation. This tool aggregates a total of 394 indicators (from DfID, World Bank, CCAFS, USAID, IFAD, GIZ and FAO) with

[32] See the publications of the UNFCCC Adaptation Committee.
[33] IPCC. 2014. Adaptation Needs and Options. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 833-868. Available at https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap14_FINAL.pdf
[34] UNEP. 2017. The Adaptation Gap Report 2017: Towards Global Assessment. Nairobi: United Nations Environment Programme (UNEP). p. xvi
[35] UNFCCC, 2021, Approaches to reviewing the overall progress made in achieving the global goal on adaptation_Technical paper by the Adaptation Committee

322 considered as relevant for adaptation. The FAO CGIAR tool helps the users extract a list of indicators based on: the scope (productivity / adaptation / mitigation, with sub-objectives predefined for each dimension), the scale (national/subnational/household), the type of indicators (readiness /enabling, process/output, outcome/impact). **Such databases, when they exist[36], can provide reliable sources of information for the identification of sets of indicators. However further processing is needed to be fully relevant to the priority challenges/the MRE purpose and applicable, as the resulting list may still be very long and potentially too generic.**

Different indicators for different purposes

One way to structure the development of indicators is to distinguish their specific purposes – from a MRE perspective. We use the differentiation defined in the IPCC Fifth Assessment Report (AR5) based on three complementary uses of adaptation metrics**: I) to identify adaptation needs, ii) to track the implementation of adaptation, and iii) to assess its effectiveness.**

3.1.1 Indicators to identify (and monitor) adaptation needs

To identify adaptation needs and design actions accordingly, the specific vulnerability of the considered system has to be analyzed and potential climate-related impacts have to be assessed. Indicators can be defined under that process to characterize the vulnerability drivers of the system; they may include indicators on climate parameters (change in precipitations and temperature, occurrence of extreme events), physical (e.g. soil characteristics) and socio-economic factors (e.g. level of income of households), a well as political aspects (e.g. conflict-prone areas). Those indicators are very context-specific and may be addressed at different scales depending on the issues addressed.

Those indicators are not intended to help track the implementation of action but rather to inform the decision-making process and/or evaluation studies. Baseline values may be defined and regularly revised but no targets are defined; except if they are integrated in a composite resilience index. ***In our approach, they are addressed as "observation" indicators[37]***.

3.1.2 Indicators to track the implementation of adaptation action (policies & measures)

The design of adaptation actions is embedded in projects/programs/policies and should provide information enabling to assess the progress in the implementation of the activities and the deliverable of outputs, including indicators with baseline value/description and targets to be achieved at the end of the implementation. Indicators to track progress in the implementation of the measures are generally provided in the description of the policy or measure (*output indicators*) – with baseline and target values, through a logical framework or other format.

Process-oriented input and output indicators have been the most common to date[38]. While it helps to assess what is being done to advance adaptation (input and output), it has to be combined with outcome-oriented indicators to be able to paint a picture of adaptation progress[39].

[36] Relevant databases are identified when working on specific sectors/scopes.
[37] Observation of climatic and non-climatic variables is one component of the adaptation process as described by the FAO in the publication: Tracking adaptation in agricultural sectors (2017)
[38] UNFCCC, 2021, Approaches to reviewing the overall progress made in achieving the global goal on adaptation_Technical paper by the Adaptation Committee
[39] Leiter T and Pringle P. 2018. Pitfalls and potential of measuring climate change adaptation through adaptation metrics. In: L Christiansen, Martinez G, and P Naswa (eds.). Adaptation metrics: Perspectives on measuring, aggregating and comparing adaptation results. Copenhagen: UNEP DTU Partnership. pp.36

3.1.3 Indicators to assess the results towards adaptation /resilience

When assessing the results of an adaptation action, different dimensions may be addressed as highlighted in the UNFCCC documentation[40] : not only effectiveness but also adequacy and sustainability of results (and related actions) must be assessed, with particular attention on potential mal-adaptation. The adaptation community is still struggling in providing guidance accordingly, given the potential multi-faceted, context-specific and long-term characteristics of adaptation measures; avenues are currently explored through the GGA process (see Section 4).

Common practices (M&E component of NAPs – see section 2.2) define performance / outcome / impact in relation to a Results-Base Framework or Theory of Change in order to track progress towards pre-defined objectives – usually defined either at sectoral level or at programme level. Contribution to broader development indicators (more particularly contribution to SDGs objectives and related indicators) is also often tracked as impact indicators. Specific attention is recommended on governance aspects – as a key component for the assessment of the country's readiness to address climate change effects (see box below).

Governance indicators

The level of maturity of the adaptation planning arrangements (and whether planning is appropriate in light of risks and vulnerability) is a key criteria from a readiness perspective. The development of metrics accordingly is recommended by Ngwadla and El-Bakri[41] - to help assess global readiness to address risk. Illustrative examples are i) the EU adaptation preparedness scoreboard (step-by-step indicators informing the policy-making process with a scoring grid to assess progress on 30 indicators), ii) the two-pronged monitoring and evaluation framework in Cambodia - based on the TAMD approach, including one part on institutional readiness indicators with a scoring grid (a "maturity scale").

As previously commented, the rise of concerns about climate change has given rise to the notion of resilience (see section 2.1.2), which is particularly relevant from an outcome assessment perspective: while the concept of adaptation is the process of changing a system towards a desired state, *resilience* describes the state of the system and can be considered an outcome of adaptation[42]. Such a *resilience screening* is a field for the development and the experimentation of tools and methodologies such as the WB Resilience Rating System[43], including a number of initiatives focusing on the development of composites indices (see box below).

Composite indices

The construction of composite indices on adaptation and resilience takes into account the multidimensional nature of the situations to be assessed. Index scores are often used to visualize trends, differences on maps (e.g., vulnerability maps) or to compare countries, target populations or entities. Their design requires multiple normative and country-specific choices, ranging from composition and weighting to calculation method and data requirements; each of these choices influences the index results, so that indices that claim to measure the same subject can lead to very

[40] UNFCCC, 2021, Approaches to reviewing the overall progress made in achieving the global goal on adaptation - Technical paper by the Adaptation Committee
[41] Ngwadla X and El-Bakri S. 2016. The Global Goal for Adaptation under the Paris Agreement: Putting ideas into action. London, UK: Climate and Development Knowledge Network. Available at: https://cdkn.org/wpcontent/uploads/2016/11/Global-adaptation-goals-paper.pdf
[42] ODI, 2021, Technical paper The Global Goal on Adaptation: a SIDS Perspective
[43] WB, 2021, Resilience Rating system: a methododology for building and tracking resilience to climate change

different results, as can be seen in national vulnerability indices. Insight into innovative composite resilience indicators will be provided as an exploratory approach.

See some examples in Annex.

3.2 Selection of indicators: feed-back from experience

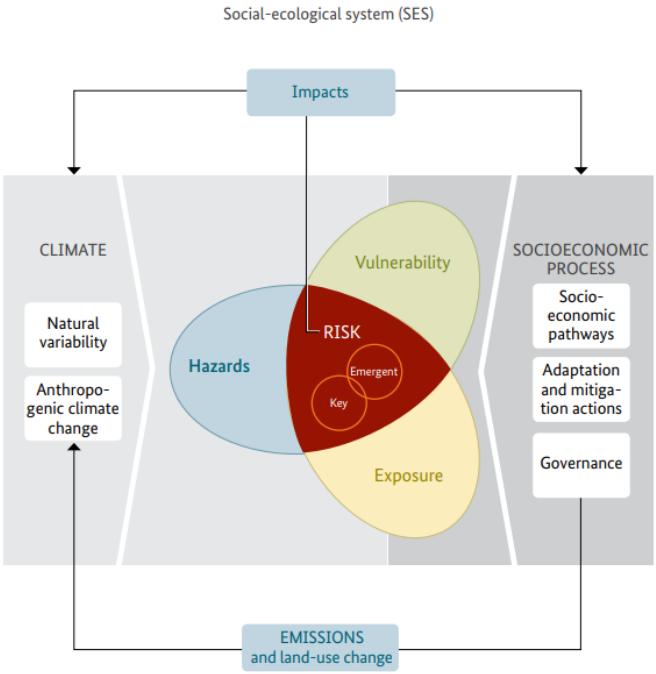
Different tools and methodologies exist to help select relevant lists of indicators. Databases on adaptation indicators, when they exist - mostly sectoral ones, provide reliable sources of information for the identification of sets of indicators. However further processing is needed to be fully relevant to the priority challenges to address and the specific MRE purpose. **Two examples of methodological approaches are proposed below.**

3.2.1 From impact chains to Results-Based Management framework (RBM)

One potential approach is proposed thereafter, as a 3-step process through i) the development of a RBM framework based on impact chains aligned to the main risks for the system considered (project/territory/sector/country), ii) the selection of sets of indicators, iii) adjustments / reformulation of the set of indicators to ensure overall consistency under the MRE system.

An impact chain, or causality chain, is an analytical tool that helps to better understand, systemize, and prioritize the factors that drive risks in the system of concern. Impact chains are developed according to the notion of risk as discussed in the Fifth Assessment Report (AR5) of the Working Group II (WGII) of the Intergovernmental Panel on Climate Change (IPCC, AR5 Glossary, 2014) (figure below).

Figure 11: Illustration of the risk concept



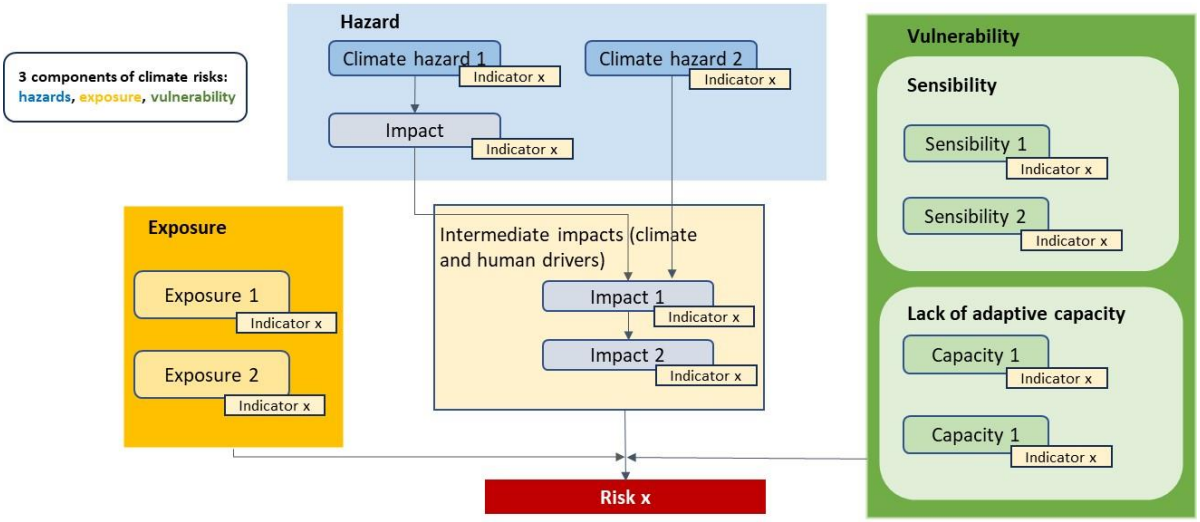
Source: (GIZ, 2018)

An impact chain (or causality chain) is built with the components of the risk – in consistency with the AR5 conceptual framework - and shows the interaction between these components. For each of these components, the impact chain presents factors related to:

- Climate signals for the hazard component,
- Sensitivity and lack of adaptive capacity for the vulnerability component,
- Exposure factors for the exposure component.

The identification of intermediate impacts helps to better understand the cause-effect chain leading to the risk.

Figure 12. Risk Chain Model presents a model of impact chain with all its components, factors, and indicators.



Source: Adjusted from GIZ, 2017[44]

The added **value** of developing impact chains is to:

- Visualize the **components** of risk (hazard, exposure, sensitivity, lack of adaptive capacity);
- Develop a simple and shared understanding of **relationships** between components of risk;
- Visualize where stakeholders can put efforts to **decrease risk** and **increase resilience** to climate change (adaptation);
- Facilitate the design of a logical framework and the **identification** of relevant indicators.

From the impact chain exercise and consequent findings, the objective is to develop a RBM – following common methodological practices on RBM and logical frameworks. Specific guiding questions are as follows[45]:

- What is the adaptation goal you wish to achieve in the sectors? What are the outcomes and outputs? What is the role of the sector in reaching national adaptation goals?
- What are the different pathways towards the final adaptation goal (they may already be articulated in e.g. Setoral Development Strategy, National Climate Change Strategy, NAP or other development policies)? Determine the level of the 'goal – national or sectoral´
- How can the current policies, plans and program portfolio within the sector help achieve the goal? Where are the bottle-necks to achieving the goal?
- What are the barriers to achieve the adaptation goal?

[44] GIZ and EURAC, 2017: Risk Supplement to the Vulnerability Sourcebook. Guidance on how to apply the Vulnerability Sourcebook's approach with the new IPCC AR5 concept of climate risk. Bonn: GIZ
[45] Adjusted from FAO, THE M&E OF ADAPTATION TRAINING PACKAGE, 2021 – module 6

- What assumptions are you making?
- Have you considered how pathways differ for different groups including those of different genders.
- Have you identified outputs, outcomes and impacts where relevant, and located these on the pathway?

Establishing a set of MRE indicators

As previously commented, a number of databases are available on adaptation indicators, which can be very exhaustive given the wide and multi-faceted range of adaptation measures/policies/projects (e.g. a total of 394 indicators identified in the database for climate smart agriculture developed by FAO under a CGIAR project). While they provide reliable sources of information for the identification of indicators, further processing is needed to focus on a set of indicators fully relevant against the priority challenges to address, the specific purpose and scale of the MRE process. In relation with the RBM approach, a potential process to establish a set of indicators is as follows (sectoral approach):

1. A database of adaptation indicators applicable to the sector is developed, building on existing database (including international and national databases).
2. From this database, a "long list" of indicators is prepared in relation with the RBM previously developed, differentiating potential indicators at impact/objective / outcome/output level – taking into account input from stakeholders (e.g. discussion on impact chains during sectoral workshops)
3. A prioritization exercise is proposed – with the objective of selecting 20 to 30 indicators per sector - through on-line survey or workshops, asking stakeholders to assess indicators against a set of criteria (e.g. SMART approach)
4. Processing and reformulation is done to ensure i) overall consistency against the pre-defined logical framework and the different MRE components, ii) synergy with existing indicators (national and international).

A number of iterations with potential data providers as well as with relevant stakeholders is necessary to help improve and tailor the definitions of the indicators; indicators may be adjusted and reformulated at this stage. Final step for informing the indicators' description is the provisions of values (baseline and target values) based on available documentation in the country, i.e. referring to policy objectives if existing or to research programs. All factsheets constitute a dashboard which can be used by any stakeholders involved in adaptation MRE; indicators may be monitored through a tracking tool / platform.

3.2.2 Adaptation monitoring, evaluation, and learning frameworks

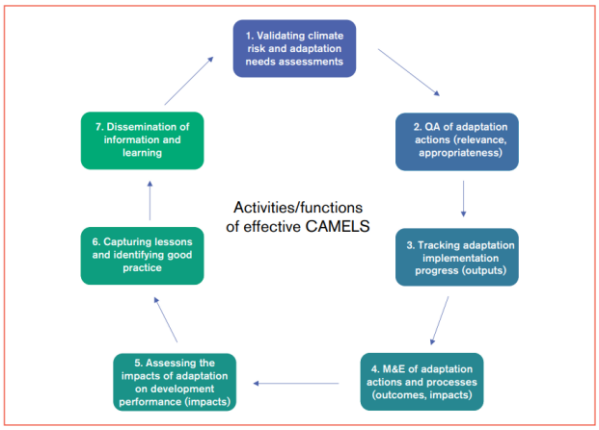
As commented in introduction, a number of methodologies on adaptation M&E have been developed during the last 15 years – with pilot implementation in different countries. The RBM approach presented above provides a common approach – consistent with most methodological frameworks implemented to date. Detailed presentation of existing frameworks is available in UNEP – and related agencies - documentation[46]. The IISD CAMELS approach is presented as an example in the box below.

The CAMELS framework

The framework is designed as a support for creating adaptation monitoring, evaluation, and learning frameworks at the national - in alignment with the principles enshrined in Article 7 of the Paris

[46] CTCN, 2015, P. Naswa, S. Traerup, C. Bouroncle, C. Medellín, P. Imbach, B. Louman and J. Spensley: Good Practice in Designing and Implementing National Monitoring Systems for Adaptation to Climate Change.

Agreement and the adaptation-related areas of the enhanced transparency framework's modalities, procedures, and guidelines.The framework works to fulfil seven key functions—ranging from the quality assessment of adaptation actions and processes to tracking adaptation implementation to disseminating information and learning—and is built to be both flexible and to facilitate coherent global reporting.



The design template is based on a small set of (1-4) questions addressing each of the Article 7 principles, for each of the seven functions above. The questions are designed to address the criteria of relevance, quality, effectiveness and adequacy and to speak to the ETF information areas, as far as is appropriate for each principle.
Methodology available at https://pubs.iied.org/pdfs/10202IIED.pdf

3.2.3 Interconnection with other M&E frameworks

Ensuring complementary and synergy with other frameworks implemented – in particular at national level – will help mutualize efforts for monitoring and evaluation, more particularly for data gathering and processing.

In particular, the Paris Agreement's siblings among the post-2015 development agendas, especially the Sustainable Development Goals (SDGs) and the Sendai Framework for Disaster Risk Reduction, as well as other Rio Conventions are cited as offering a set of indicators already tailored to the global level that potentially can be applied to reveal insights into global progress on adaptation[47].Besides lessening the burden of reporting on adaptation, borrowing these indicators for assessing adaptation can help better connect the policy domains of sustainable development, disaster risk reduction, and climate change adaptation which already have well-recognized synergies.[48]

Given the high level of attention given to the adaptation tracking issue – and more generally to the need for climate change transparency, new tools and frameworks are under development from a number of institutions. A common set of CC indicators has been recently published by UN Stats and provide valuable input for the development of tailored sets of indicators including a comprehensive benchmark of methodologies (see below).

[47] Berrang-Ford L, Wang FM, Lesnikowski A, et al. 2017. Towards the assessment of adaptation progress at the global level. In: A Olhoff, H Neufeldt, P Naswa et al. (eds). The Adaptation Gap Report: Towards Global Assessment. Nairobi: United Nations Environment Programme. pp.38
[48] UNFCCC. 2017. Opportunities and options for integrating climate change adaptation with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015-2030. Bonn: UNFCCC secretariat. Available at https://unfccc.int/files/adaptation/groups_committees/adaptation_committee/application/pdf/techpaper_adaptation. pdf

UN Stats CC indicators[49]

The United Nations Statistical Commission was tasked with the establishment of a common set of CC indicators in 2018. The report - published in 2022 - defines a global set a total of 158 indicators. The set is structured in 5 domains (IPCC axes: drivers, impacts, vulnerability, mitigation and adaptation), then broken down into 34 themes. Each indicators is categorized into 3 levels based on the following criteria: relevance, methodological robustness, data availability. The set includes primarily the biophysical indicators and statistics, but also human activities, and social and institutional aspects related to climate change. The links between policy and statistics are articulated according to the relevant articles of the Paris Agreement and the subsequent decisions of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement, as well as related Sustainable Development Goal and Sendai Framework indicators.

The global set of climate change statistics and indicators is accompanied by short metadata for each indicator. The metadata contain the following fields which describe that indicator or statistic: belonging to a predefined set of themes, topics and one of the Intergovernmental Panel on Climate Change areas; references to the relevant indicators or statistics of the Paris Agreement articles and subsequent decisions of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement, the Framework for the Development of Environment Statistics, the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015–2030, as appropriate; and a short definition and explanation of relevance to climate change policy. Further metadata details provide suggestions of national data sources, data collection methods, update frequency, category of measurement and potential aggregations and scales. References to available international data collections and the applicable methodological guidance are also provided.

A compilation of indicators, approaches, targets and metrics to use when developing an adaptation M&E framework more particularly for outcome-oriented indicators is included in Annex. It has been prepared by the Adaptation Committee[50] through the GGA process: SB 56 requested the secretariat, under the guidance of their Chairs, to compile and synthesize, by August 2022, indicators, approaches, targets and metrics that could be relevant for reviewing overall progress towards achieving the GGA, building on the 2021 technical paper by the Adaptation Committee, while also taking into account other relevant reports, communications and plans under the Convention and the Paris Agreement, UNEP, IPCC, the 2030 Agenda for Sustainable Development and the Sendai Framework, relevant multilateral frameworks and mechanisms, United Nations organizations and specialized agencies, and the discussions at the first workshop under the Glasgow–Sharm el-Sheikh work programme.

[49] https://unstats.un.org/unsd/ envstats/ClimateChange_areas_topics.cshtml
[50] UNFCCC, 2022, Compilation and synthesis of indicators, approaches, targets and metrics for reviewing overall progress in achieving the global goal on adaptation

4. Perspectives

4.1 The way toward common "metrics"

In a context where the adaptation community is still struggling in providing guidance to define/select relevant indicators for assessing the adequacy, effectiveness and sustainability of measures towards adaptation / resilience, the assessment of collective progress towards achieving the global goal on adaptation (GGA) is seen as a process of measuring the direction of travel in terms of enhancing adaptive capacity, strengthening resilience, and reducing vulnerability. These elements are related to efforts such as adaptation planning, and investing adequately in adaptation, and are therefore linked with efforts to understand progress in adaptation action in response to priorities and actions, adequate planning for adaptation, and support needs. Assessing adaptation progress is critical for understanding whether and how vulnerability is changing over time and across scales and dimensions, and how adaptation interventions (or a lack thereof) are influencing these changes[51].

Even if methodological challenges still complicate the effort to review progress towards the global goal on adaptation – combined to empirical challenges (the rarity of adaptation databases) and conceptual challenges (lack of agreement on what counts as adaptation)[52], a number of options are under consideration, including suggestions provided by entities consulted through the stocktake process. Specific attention is drawn on the potential synergy with the development of domestic monitoring, evaluation, and learning systems for adaptation - researchers are increasingly exploring avenues to assist countries in developing these systems such that these systems both meet domestic needs and are compatible with the information being sought under the UNFCCC[53], in order to facilitate the consolidation of multi-level information (local, national, global).

While data aggregation "is neither necessarily possible nor desirable[54], opportunities from a *collation* approach are highlighted: "the collation or bringing together of information across spatial scales and geographical boundaries, whether quantitatively or qualitatively"[55] may be considered if some common frameworks are used. Potential avenues include the use of standardized metrics applied consistently at different scales – as currently done by multilateral climate funds to assess the performance of their overall portfolio with some flexibility to select most relevant indicators from a larger set and the use of context-specific metrics related to common themes (e.g. ecosystem preservation, ...) [56].

Aggregation versus collation[57]

While "aggregate" means "to combine into a single group or total," "to bring different things together," or "to add different prices, amounts, etc. in order to get a total.", "collate" will " bring together different pieces of written information so that the similarities and differences can be seen"

[51] UNFCCC, 2021, Approaches to reviewing the overall progress made in achieving the global goal on adaptation - Technical paper by the Adaptation Committee
[52] Craft B and Fisher S. 2018. Measuring the adaptation goal in the global stocktake of the Paris Agreement. Climate Policy. 18(9): pp.1203-1209
[53] UNFCCC, 2021, Approaches to reviewing the overall progress made in achieving the global goal on adaptation - Technical paper by the Adaptation Committee
[54] Adjusted from: Dilling L, Prakash A, Zommers Z, et al. 2019. Is adaptation success a flawed concept? Nature Climate Change (9): pp.570-574.
[55] Berrang-Ford L, Wang FM, Lesnikowski A, et al. 2017. Towards the assessment of adaptation progress at the global level. In: A Olhoff, H Neufeldt, P Naswa et al. (eds). The Adaptation Gap Report: Towards Global Assessment. Nairobi: United Nations Environment Programme. pp.38.
[56] Leiter T. 2015. Linking monitoring and evaluation of adaptation to climate change across scales: avenues and practical approaches. New Directions for Evaluation. pp. 121-122
[57] UNFCCC, 2021, Approaches to reviewing the overall progress made in achieving the global goal on adaptation - Technical paper by the Adaptation Committee

or "bring together different pieces of information in order to study and compare them." Therefore, whereas a framing of aggregation may steer the task towards a pursuit of one ultimate total or overarching conclusion—and may thus privilege quantitative or easily comparable information—a framing of collation leaves more room to consider various types of adaptation information, including disparate types of qualitative information. To help advance an understanding of global adaptation efforts, however, such a collation must be systematic and clearly structured.

(Source: Cambridge Dictionary https://dictionary.cambridge.org/)

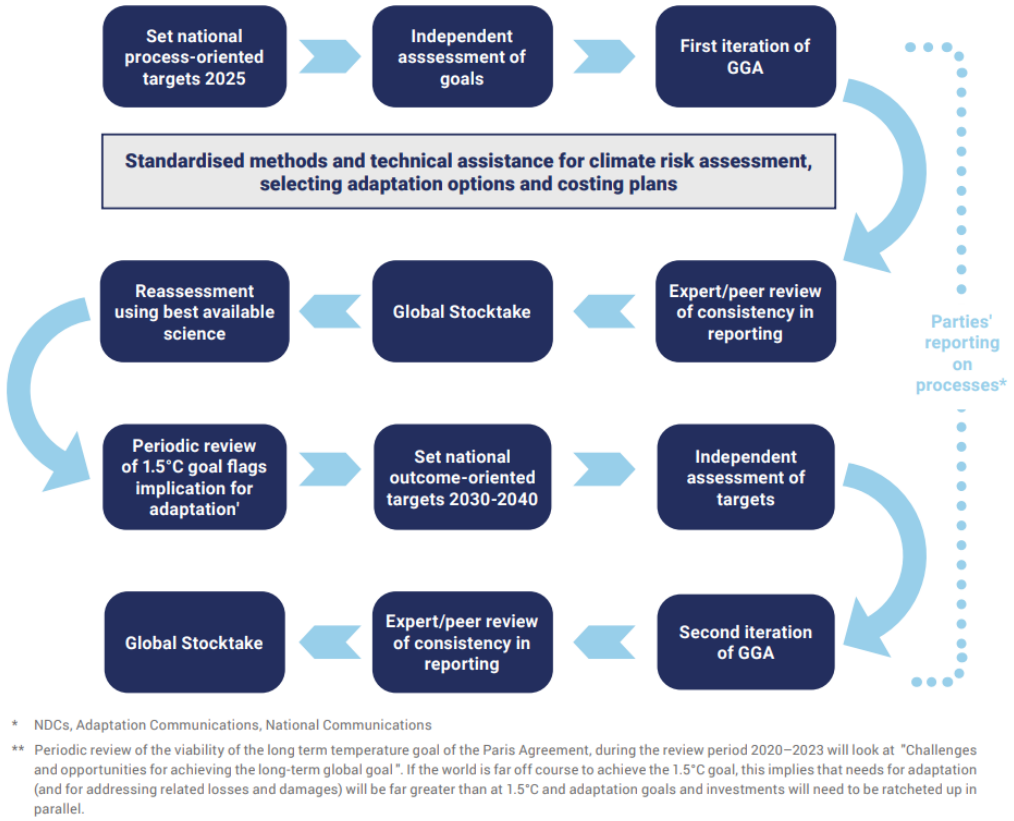
4.2 The Proximity to Target approach

UNFCCC provisional recommendations for a common framework to report against a Global Adaptation Goal introduces a potential proximity-to-target approach[58] that assesses whether Parties have fulfilled, or are on track to fulfilling, the targets and actions they set out for themselves. A combination of evaluative and descriptive components is beneficial because while descriptive assessments are better suited to tracking progress objectively over time, evaluative assessments, though more subjective, can potentially capture more meaningful snapshots of adaptation progress. An overarching conceptual framework for systematically tracking global adaptation efforts should be both flexible and sensitive to national contexts on the one hand, but also scalable and suitable to diverse contexts on the other hand; it may include an evaluative assessment in three areas: sufficiency of goals and targets, sufficiency of adaptation efforts, and attribution and contribution of adaptation efforts[59]. The 2017 UNEP Adaptation Gap Report, which focused on the topic of global assessment of adaptation, concluded that frameworks for assessing adaptation progress that follow a proximity-to-target approach "have the greatest potential to respect a diversity of national contexts while facilitating global assessment of progress".

This conceptual framework is consistent with some suggestions issued by consulted bodies: as highlighted in an ODI working paper[60], a country-driven approach is recommended for the GGA, whereby governments set their own goals for adaptation – for example, by 2025-2030 and by 2030-2040 – and the GGA is a collation and aggregation of these. It is proposed to implement a progressive approach including a first iteration focusing on the collation of process goals – i.e. plans developed, actions implemented, numbers of people being trained etc. across a specified number of priority sectors, and a second iteration for the period 2030–2040 which should be outcome-focused and an aggregation of ratcheting of ambition in national goals which, in turn, are based on the use of standardised scientific methods to identify climate risks and adaptation and based on a better understanding of process[61] – as summarized in the figure below.

Figure 13. A step by step process towards a Global Goal on Adaptation

[58] UNFCCC, 2021, Approaches to reviewing the overall progress made in achieving the global goal on adaptation - Technical paper by the Adaptation Committee
[59] Neufeldt H and Berrang-Ford L. 2017. Considerations for a future framework for assessing adaptation progress at the global level. In: A Olhoff, H Neufeldt, P Naswa et al. The Adaptation Gap Report: Towards Global Assessment. Nairobi: United Nations Environment Programme.
[60] ODI, 2021, The Global Goal on Adaptation: a SIDS Perspective
[61] ODI, 2021, The Global Goal on Adaptation: a SIDS Perspective



Source: ODI, 2021

Such an approach would help provide insight into the progress made i.e. whether goals and targets are aligned with the vulnerability profile and context, whether the government's adaptation efforts are aligned with its own goals and targets, and, in turn, whether there is evidence that vulnerability changed as a result of the government's efforts or whether the results meet the goals and targets specified. A number of recently developed tools and methodologies can be used to operationalize such an approach – see the example of Gap-Track in the box below.

The Global Adaptation Progress Tracker (Gap-Track)[62]

The Gap-Track approach proposes a common framework for assessing progress at a country level based on key *Representative Adaptation Challenges*. It provides a common questioning grid and methodology - experts carrying out the assessment are required to have scientific and policy expertise, and accumulated experience on the ground on the Representative Adaptation Challenge, and suggests a common categorization of systems to be covered – which may facilitate the collation of information through the Global Stocktake report.

The questioning encompass six important dimensions of adaptation: (1) Knowledge about current and future climate risk; (2) Adaptation planning and policy tools; (3) Adequacy of adaptation actions in place; (4) Institutional, technical, and financial capacities; (5) Evidence of progress towards actual climate risk reduction; and (6) Consideration of pathways for long-term adaptation planning. Each question is described by a set of 3-4 sub-questions and then informed by an expert judgment exercise using multiple rounds of assessment and a collective discussion.

[62] IDDRI, 2021, Global Adaptation Progress Tracker (GAP-Track)

4.3 On the way to COP28

On June 15th 2023, during the intermediate negotiations in Bonn, the discussions relating to the Glasgow-Sharm el-Sheikh work programme, established during the COP26 to study a Global Goal on Adaptation (GGA), came to an end. An agreement was reached out of the intermediate negotiations, which consists in a draft framework for the final decision on the Global Goal on Adaptation to be taken on the COP28 GGA[63]:

- A. Preamble
- B. Acknowledgement of progress and conclusions under the Glasgow–Sharm el Sheikh work programme on the GGA
- C. Establishment of the framework for the GGA
- D. Elements of the framework for the GGA
  - D1: Purpose
  - D2: Dimensions
  - D3: Themes
  - D4: General and cross-cutting considerations
  - D5: Option 1: Enabling conditions; Option 2: Means of implementation
  - D6: Reporting
- E. Option 1: Overarching targets and specific targets, indicators and metrics; Option 2: Shared adaptation priorities under the framework for the global goal on adaptation
- F. Link to the global stocktake
- G. International cooperation and the role of stakeholders
- H. Option 1: Follow-up work Option 2: No section on follow-up work
- I. Option 1: Finance and budgetary provisions; Option 2: No section on finances and budgetary provisions

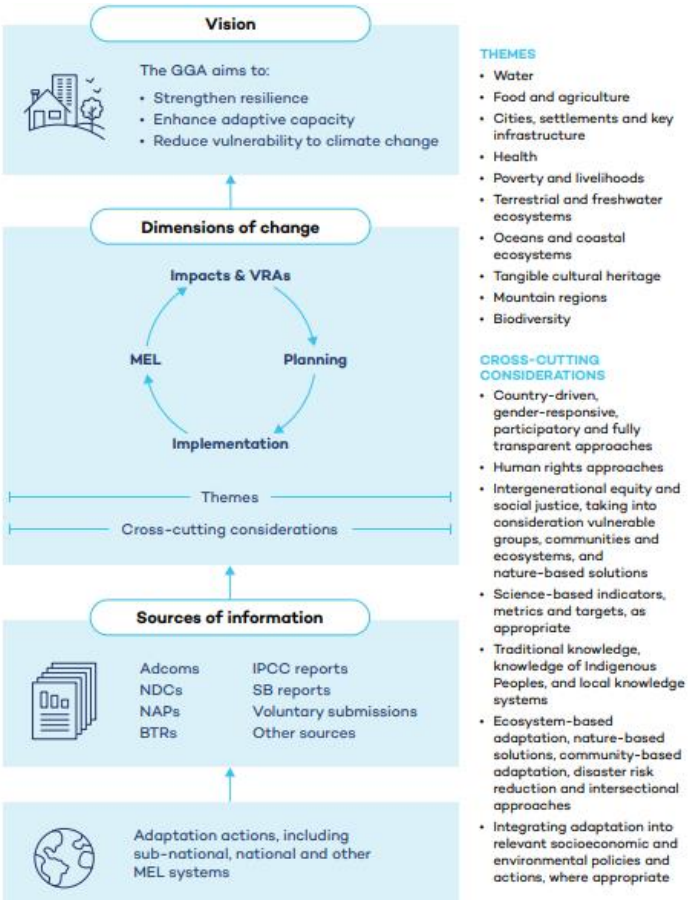
During the workshop held at Buenos Aires in August 2023, specific attention was drawn on the following themes[64]:

- The development and use of targets, indicators and metrics, and global adaptation priorities
- Linkage with the global stocktake
- International cooperation and the role of stakeholders
- Possible structural elements of the GGA framework (based on elements as previously agreed – see above

Potential MRE framework attached to the GGA has not been defined to date (October, 2023), even if some provisional elements can be highlighted as summarized in the figure below.

Figure 14. A global MEL system for adaptation under the GGA framework

[63] ADAPTATION: DRAFT INDEX FOR THE GLOBAL GOAL ON THE WAY TO COP28 | Italian Climate Network (italiaclima.org)
[64] UNFCCC, 2023, Concept note by the Chairs of the subsidiary bodies on the seventh workshop under the Glasgow–Sharm el-Sheikh work programme on the global goal on adaptation



Source: IISD, 2023[65]

[65] IISD, 2023, Next Steps for Defining a Monitoring, Evaluation, and Learning System for the Global Goal on Adaptation by COP 28 May 2023

5. ANNEX

5.1 Composite indicators: pilot experiences

Composite indicators

The construction of composite indices on adaptation and resilience takes into account the multidimensional nature of the situations to be assessed. Index scores are often used to visualize trends, differences on maps (e.g., vulnerability maps) or to compare countries, target populations or entities. Their design requires multiple normative and country-specific choices, ranging from composition and weighting to calculation method and data requirements; each of these choices influences the index results, so that indices that claim to measure the same subject can lead to very different results, as can be seen in national vulnerability indices. Insight into innovative composite resilience indicators will be provided as an exploratory approach.

5.1.1 European adaptation preparedness scoreboard[66]

Action 1 of the EU Adaptation Strategy is to encourage all Member States to adopt comprehensive adaptation strategies; it states that the Commission will develop an adaptation preparedness scoreboard, including key indicators for measuring the level of readiness of Member States. While this process does not entail formal reporting requirements for European countries, countries have been consulted in the process of developing the scoreboard and have an important role in the information generation and collection. A first draft of the scoreboard was prepared by the European Commission in 2014 and the first round of templates was filled for all 28 Member States in 2014-2015. Based on experiences in the first round and input from Member States, the scoreboard has since been revised. In 2017 the revised scoreboard was used by the European Commission to collect information from Member States primarily for the ongoing evaluation of the EU Adaptation Strategy. Overall, the scoreboard facilitates developing an overview of progress on adaptation policy-making and implementation at national level in EU Member States.

The adaptation scoreboard has a process-based approach. Its indicators focus on different steps of the adaptation policy-making process, starting with (1) preparing the ground for adaptation, (2) assessment of risks and vulnerabilities, (3) identification of adaptation options and (4) their implementation through to (5) monitoring and evaluation. For each step, main areas of performance are specified and each is broken down to various key domains of relevance.

The scoreboard indicators are supported by country fiches that provide detailed information related to aspects of adaptation policymaking process covered in the scoreboard. The scoreboard and the draft country fiches have been made publicly available by the Commission as part of the public consultation on the evaluation of the EU adaptation strategy, which will also enhance opportunities for learning across countries. The assessments in the scoreboard (yes / no / in progress) need to be read in conjunction with the narrative that accompanies them. The scoreboard assesses the state of play within a country and the assessments should not be directly compared across countries although effort has been made by the European Commission and its consultants to ensure coherence.

5.1.2 Resilience indicators

[66] EEA, Indicators for adaptation to climate change at national level -Lessons from emerging practice in Europe, 2018

5.1.2.1 International frameworks: the WB Resilience Rating System (RRS)[67]

The RRS evaluates the resilience of the project design and resilience through project outcomes. Resilience of the project design (or simply, resilience of the project) is the extent to which a project's assets have considered climate and disaster risks in their design. This includes incorporating appropriate adaptation measures—for example, a road with improved drainage designed to prevent washouts—and accounting for climate and disaster risks in the economic and financial analysis demonstrating the viability and value of the project. The resilience of project design measures how climate and disaster risks have been included in the assessment of the project value and performance. Resilience through project outcomes (or simply, resilience through the project) reflects whether a project's objective is to enhance the targeted sector's and beneficiaries' climate resilience through its interventions—for example, project activities aimed at improving watershed management in a flood or drought-prone area.

5.1.2.2 National frameworks: the Ghana CCV[68]

During the preparation of NC4, an assessment was conducted to calculate CCV (Climate Change Vulnerability) for the administrative districts of Ghana quantitatively. The assessment was built on the workflow and data generated from the study on climate-resilient landscapes for sustainable livelihoods in Northern Ghana. Data for the assessment was obtained from national institutions that have the mandate to publish government data, literature and inter-governmental bodies. The data was processed and used to generate parameters to quantify the variables for exposure, adaptive capacity, and sensitivity components of CCV.

Exposure was divided into current exposure to climate change and variability; and predicted future exposure to climate change and variability. Three parameters on the present shift in temperature and rainfall were used to quantify the current exposure of each district in Ghana. For future exposure scores, nine rainfall and temperature parameters were split into a total of thirty-six sub-parameters to account for predicted medium and long-term changes (2060 and 2080) under two different scenarios (RCP 2.6 and RCP 8.5) of future climate change. The districts in the country were ranked for every parameter and sub-parameter relating to exposure to current and predicted absolute changes in climate.

Sensitivity to current and future climate change was quantified as a percentage of the population per administrative region currently employed in the agricultural sector. It was assumed that people operating in this sector would be the most sensitive to changes in the climate (as reflected in increasing temperatures and decreasing and variable rainfall patterns) as the agricultural sector rain-fed and inherently climate-dependent. Employment information was only available at the regional level, and therefore, all districts within a region received the same sensitivity score in the assessment. No data were available to predict future sensitivity based on projected changes in agricultural employment. Therefore, it was assumed that sensitivity would remain relatively constant in the coming decades. Districts were ranked according to percentage agricultural employment, where a more significant percentage suggested a higher sensitivity to climate change.

The adaptive capacity of people within each district in Ghana was quantified using seven parameters relating to (i) economic activity; (ii) education, (iii) sanitation, (iv) rural water availability, (v) health, (vi) security and governance effectiveness; and (vii) poverty. As for exposure and sensitivity, each district received adaptive capacity ranks for each of the seven parameters. No data were available to predict future adaptive capacity based on projected changes in economic activity, district development or poverty. Therefore, it was assumed that adaptive capacity would remain relatively

[67] WB, 2021, Resilience-Rating-System-A-Methodology-for-Building-and-Tracking-Resilience-to-Climate-Change
[68] Ghana Government, NC4, 2020

constant in the coming decades. District-specific exposure, sensitivity and adaptive capacity were calculated as the sum of the ranks of parameters divided by the maximum possible component score.

District-specific CCV was calculated using the IPCC equation. The resulting CCV scores range from -1 (low vulnerability) to 1 (high vulnerability).

5.1.2.3 Project's frameworks: the AFD Caximba project

As part of on AFD project in Brazil (urban adaptation), an integrated resilience indicator has been constructed, calculated from an arithmetic and standardized average of sub-indicators, which is intended to monitor results in terms of resilience to climate risks – see table below.

Table 4: Resilience indicator Caximba project

Indicator type	Indicator	Calculation formula	Unit of measure	Baseline	Target
General	**Resilience Index for Climate Risks**	**Simple arithmetic mean of the partial indices of each component, calculated from the linear normalization of the values of each indicator (general method or distance method)**	**Ut.**	**O**	**1**
Specific	Percentage of homes in the flood risk area	Ratio of the number of households in flood-prone areas to the total number of households covered by the program, multiplied by 100.	%	100%	0% of homes in flood risk areas
Specific	Average frequency of flooding, flooding, erosion and siltation	Sum of the number of incidents recorded by the Civil Defense divided by the number of years.	Ut.	1.75	1
Specific	Percentage of municipal solid waste - MSW collected in the flood risk area	The ratio of the volume of municipal solid waste collected to the total volume of solid waste located in the flood hazard area, multiplied by 100.	%	0%	50% of the total volume of municipal solid waste - MSW collected in the flood risk area
Specific	Percentage of native vegetation cover in the ecological corridor	The ratio of the area of native vegetation cover within the ecological corridor to the area of the ecological corridor, multiplied by 100.	%	17.45%	25% of the ecological corridor covered by vegetation
Specific	Percentage of families participating in social, economic and environmental development activities	Ratio of the percentage of families participating in social, economic and environmental development actions to the total number of families covered by the program, multiplied by 100.	%	0%	0% of families participating in the planned actions
Specific	Percentage of households served simultaneously by water supply, wastewater collection and treatment, electricity and solid waste collection	The ratio of the number of households simultaneously served by water supply, wastewater collection and treatment, electricity and solid waste collection to the total number of households covered by the program, multiplied by 100.	%	0%	100% of households are served simultaneously by water supply, wastewater collection and treatment, electricity and solid waste collection

Indicator type	Indicator	Calculation formula	Unit of measure	Baseline	Target
Specific	Percentage of paved roads	Ratio of the extension of paved roads (permanent or alternative pavement; excluding gravel roads) to the total extension of roads.	%	14.30%	90% of paved roads

Source: AFD

5.2 Examples of adaptation information platforms / tools

We identified some examples of on-line platforms providing explicitly adaptation-related information and presenting tracking systems/indicators. It is to be noted that such platforms are still scarce and differ significantly in their content / format (see box below). We could get access only to platforms with open access; regarding examples of internal reporting systems, we comment the Tunisian example under development (based on Terms of Reference). Examples are summarized below; lists of indicators presented in those platforms are included in annex 3.

Information / transparency / reporting /communication system ?
Different types of national "information systems" are currently being developed by a number of countries - to help disseminate information on climate change in general and on adaptation in particular. Their content, design, functionalities depend on the target users of the specific purpose(s) of the system.
We propose to differentiate: i) systems to support decision-making (notably for vulnerability assessments, to be used by projects' developers and policy-makers), ii) MRV/M&E platforms (tracking and reporting on the implementation of activities – mostly internal use for the government), iii) communication platforms (all audiences), iv) operational tools - e.g. early warning systems (to be used by the actors involved in the issue/threat to address). It is to be noted that a dual approach combining one communication portal with one reporting portal is under implementation in some countries (e.g. Tunisia, Moldova).

Systems aimed at reporting (ii category) – our scope in this project - are meant to provide a tool to monitor and track actions and results in the long term. They focus on the management of "data" flows – in alignment with ETF requirements; "data" comprising quantitative but also qualitative data, as well as documentation if relevant.

5.2.1 France

In France, information related to adaptation is disseminated through different websites and sets of on indicators, providing complementary information/data. Indicators monitored are listed in annex 3.

ONERC (National Observatory on the Effects of Global Warming): climate impacts

Created in 2001, ONERC's main missions are to collect and disseminate information on the risks related to global warming, to formulate recommendations on adaptation measures to be considered in order to limit the impacts of climate change and to liaise with the IPCC. ONERC works on the impacts of climate change and the measures to adapt to it.

In order to describe the state of the climate and its impacts in France, ONERC has developed ***a set of 29 indicators to describe and track climate change and related impacts***. Numerous scientific studies carried out in research laboratories in France and abroad have made it possible to detect objectively whether these indicators have changed in a singular way over the past few decades and, in some cases, to attribute these changes to anthropogenic GHG emissions. Values and qualitative information on those 29 indicators are published through the ONERC website[69].

DRIAS (DRIAS, Les futurs du climat) : downscaled climate projections

[69] https://www.ecologie.gouv.fr/observatoire-national-sur-effets-du-rechauffement-climatique-onerc

The Drias project was conducted in association with the Climatology and Climate Services Department of Météo-France and climate research laboratories (CERFACS, CNRM, IPSL), to combine expertise in climate production and climate science. The Drias les futurs du climat service is provided by Météo-France with the support of the laboratories.

The Drias website[70] aims to provide downscaled climate projections based on French modelling research (IPSL, CERFACS, CNRM). The climate information is delivered in different graphical or numerical forms. The website offers a three-step approach: the Support Space presents a user guide and best practices for climate projections, the Discovery Space allows users to visualize and geolocalize climate projections in France and overseas, the Data and Products area allows downloading climate parameters and indicators in digital form. The website also includes an "Impact" section to present the main impacts expected by sector of activity in France - presenting datasets made available by DRIAS and case studies – covering the following sectors: agriculture, energy in terms of consumption, water resources with the consequences of agricultural droughts, natural risks with the issue of forest fires, winter tourism and snow cover.

Météo France : climate information and short term forecasts

The Météo France[71]*:* website provides comprehensive information on climate with a view to help "understand the climate", by explaining the functioning of the world climate, in France, and the study of the past climate. Climate change is discussed under different themes: global, in France, mediterranean episodes, snowfall, forest fires, sea level rise, drought, heat waves, cold in the face of climate change, ocean, cyclones, storms.

The website provides seasonal forecasts: quarterly average of meteorological parameters (temperature, precipitation) for the coming months, on the scale of an area such as Western Europe. These forecasts indicate the most likely scenario among three predefined scenarios: close, below or above average. This gives for temperature "hot", "normal" or "cold", and for precipitation "wet", "normal" or "dry". Weather forecasts are provided at daily, weekly, bimonthly and trend. It is divided into four parts between global forecasts, beach weather, marine weather and mountain weather.

PNACC (Plan National d'adaptation au changement climatique) : action plan implementation tracking

In 2011, France adopted its first National Plan for Adaptation to Climate Change (PNACC) for a period of 5 years. A second Plan (PNACC-2) was published in 2018[72].

PNACC-2 established a set of 150 indicators divided into three groups: context indicators, action indicators, outcome indicators.

CRACC (Centre de ressources sur le changement climatique)

The CRACC website[73] is a knowledge platform set up in 2021 to support wide-scale dissemination of information and sensitization as well as operational information to support decision-making. It does not provide indicators / tracking systems to date.

5.2.2 Guatemala

[70] DRIAS, Les futurs du climat - Accueil (drias-climat.fr)
[71] https://meteofrance.com/climat
[72] Adaptation de la France au changement climatique | Ministère de la Transition écologique (ecologie.gouv.fr)
[73] Centre de ressources pour l'adaptation au changement climatique, agissez et prenez l'initiative pour votre territoire (adaptation-changement-climatique.fr)

The SNICC[74] is an information system on climate change in Guatemala, developed as part of the REDD+ Strategy Consolidation Project in coordination with the Ministry of Environment and Natural Resources of Guatemala.

The content is organized as follows:

- Section on the Presentation of the MRV system (forestry sector as part of the National Strategy for the Reduction of Forestry Emissions - ENREDD+).
- Section on Climate Science: the section presents historical and projected climate parameters, climate variability parameters, and indicators or indices characterizing biophysical changes related to the vulnerability of people and resources to climate change - e.g., modeling changes in species, crop, or living area distribution.
- Section on vulnerability and adaptation: information on aspects related to quantifying the impacts of climate change on people and their resources. It also includes parameters related to the generation of knowledge on vulnerability and non-climatic factors related to vulnerability, such as socio-economic factors and the status of critical resources such as water, soil and forests. Indicators monitored are included in annex 3.
- Section on mitigation: information on the quantification of greenhouse gas emissions and removals in different sectors, as well as trends in these sectors that influence their emissions. Information is presented on the impacts of different mitigation measures that the country has implemented, such as: energy efficiency, renewable energy, implementation of efficient transportation, waste recycling, forest cover management.
- Section on the GHG Inventory : GHG emissions and removals are reported for sectors such as energy, industrial processes and product use, AFOLU and waste.
- Section on Tools: presentation of tools to help to generate data with interactive and automated visualization through a graphical-digital interface targeting on the one hand the GHG emissions and removals issues for the different sectors (energy, waste, AFOLU, transport and industrial processes) and on the other hand, climate change and MRV systems for REDD+ activities (Safeguard Information System (SIS), Benefit Sharing System (BSS), REDD+ project registry system, Non-Carbon Benefits Tracking System (NCTS) and the Complaints Information and Attention Mechanism (CIAQ). One of the tools visualizes historical and current climate scenarios. It is a mapping system of climate and topographic variables. The tool makes available different information corresponding to climate science and a series of information on physiological variables that can provide analysis and management of vulnerability.
- Section on dissemination: links to different types of resources that aim to promote and develop knowledge on issues related to climate change. Videos, documents, infographics.

5.2.3 California

The Office of Environmental Health Hazard Assessment (OEHHA) is the lead state agency for the assessment of health risks posed by environmental contaminants. OEHHA's mission is to protect and enhance the health of Californians and our state's environment through scientific evaluations that inform, support and guide regulatory and other actions, including the identification and tracking of Indicators of Climate Change in California.

OEHHA researches and presents indicators in periodic reports describing how California's climate is changing and how these changes are affecting the state. The 2018 report compiles 36 indicators grouped into four categories: human-influenced drivers of climate change, such as greenhouse gas emissions; changes in the state's climate; impacts of climate change on physical systems, such as

[74] http://snicc.marn.gob.gt/

oceans and snowpack; and impacts of climate change on biological systems – humans, vegetation and wildlife[75] (list is presented in annex 3).

5.2.4 Marocco

4C Maroc (Climate Change Competence Center of Morocco) [76] is a national platform for dialogue and capacity building and a hub for climate change information open to its regional, African and international partners. In its actions, priority is given to support the National Commission on Climate Change, the 4 member platforms ("colleges") of 4C Maroc, and the 3 Climate Commissions in Africa. Four missions are covered by 4C Maroc to help meet the different needs of the beneficiaries in terms of strengthening resilience to the adverse effects of climate change: (i) contribute to building the capacity of national actors in climate change, (ii) develop support tools for decision making in matters related to climate change, (iii) capitalize information / knowledge / know-how on vulnerability, adaptation, mitigation and finance related to climate change, (iv) contribute to the global effort on climate change by networking, sharing experiences and establishing a technological and scientific watch. In line with its international commitments under the United Nations Framework Convention on Climate Change (UNFCCC), including enhancing the transparency of actions to mitigate greenhouse gas (GHG) emissions, Morocco has set up, since 2015, a National System of Inventory of GHG called "SNI-GES".

The department in charge of the Environment is committed to the establishment of a Regional Information System on the Environment and Sustainable Development (SIREDD). The overall goal is to have a decision support and a strategic policy monitoring tool for environmental management and protection and sustainable development at the regional level. Regional SIREDD are carried out in consultation with regional partners and offer a framework for sharing data that is transparent and open to citizens. It allows the management of three forms of alphanumeric, geographic and documentary information in a single structured database. It offers the following functionalities: addition of new themes (climate change) and new indicators, setting up geographic layers, creation of new services (Applications, requests, analyzes), thematic and spatial research, comparative, thematic and spatio-temporal analysis.

Regional platforms have been developed for two regions: Souss-Massa[77] and Tanger Tétouan El-Hoceima[78]. Those platforms cover all thematics related to environment and sustainable development; they have their own structure content. Climate change information is expected to be addressed through a number of sub-thematics as follows:

- climate change categories defined under the Tangier platform: extreme events, loss and damage, finance and climate, adaptation, mitigation, exposure to climate change, sensitivity to climate change, impacts of climate change, climate governance
- climate change categories defined under the Souss Massa platform: climate finance, adaptability, mitigation of climate change, aggregated indicators, climate governance, impacts of climate change, non-climatic sensitivity of the territory, exposure to climate change

Indicators should be made available under those categories, differentiating: indicator driving factor, impact, response, condition and pressure. However, to date, no information is displayed on corresponding requests.

[75] https://oehha.ca.gov/climate-change/document/indicators-climate-change-california
[76] http://www.4c.ma/donnees-nationales-cc
[77] SIREDD de la région Souss Massa (environnement.gov.ma)
[78] SIREDD de la région TANGER TETOUAN ALHOCEIMA (environnement.gov.ma)

5.2.5 Tunisia

Terms of Reference were published in 2020 by the GIZ for Tunisia, with the objective of developing in parallel two information systems:

- one portal to track the implementation of the adaptation portfolio: its specific objective is to develop an information system on adaptation policies, programs, projects and actions carried out and under implementation in the country; this system will make it possible to collect, process and archive all the information relating to with what is done in the field of adaptation and will serve as a tool to produce all reports necessary as required by the ETF.
- one communication portal on climate change – to help sensitize all users: it may correspond to the adaptation knowledge platform to be developed under the NAP process in Pakistan.

5.2.6 Pakistan

5.2.6.1 Climate Smart Agriculture web-based tool[79]

A Climate Smart Agriculture web-based tool has been developed in Pakistan under a FAO project conducted by Alliance of Biodiversity and CIAT (International Centre for Tropical Agriculture). National partners such as the Pir Mehar Ali Shah (PMAS) Arid Agriculture University Rawalpindi, the University of Agriculture Peshawar, and the Directorate Training and Research for Agriculture Engineering and Water management Sindh supported the project in each of the three provinces covered (Punjab, Sindh, and Khyber Pakhtunkhwa).

The tool presents a series of District Climate Risk Profiles (DCRP's) and Climate Smart Village (CSV) plans, covering 13 districts and 43 villages from the 3 provinces covered. The website is separated in different tabs providing information on the following topics:

- **Site selection**: information can be consulted either for Pakistan as a whole, for provinces or districts. Areas can be selected from a map or from a list. The list groups the villages considering the district in which they are located.
- **Cropping systems**: district level data on production area, volume for major crops and livestock headcount. Provides information on the cropping calendar by month of the year (breeding, growing, harvesting, planting) for different commodities. Calendar for climate change induced hazard is also provided, with the following features: **+**: minor severity; **++**: moderate severity; **+++**: major severity; **>**: decreasing frequency; **<**: increasing frequency. **Climate**: Climate modelling has been conducted using monthly precipitation data, temperature range, future annual mean temperatures and precipitation using Global Circulation Models, and historic and future time series data regarding climate indicators impacting agricultural production. These indicators are described below:

Indicator	Unit	Hazard
Drought spell	Maximum number of consecutive dry days (precipitation < 1 mm day)	Drought: there is a long drought spell during the growing season which reduces productivity or causes crop failure.
Moisture spell	Number of days with ratio of actual to potential evapotranspiration ratio below 0.5.	Drought: crops experience wilting due to constantly low soil moisture levels during the growing season.
Irrigation water requirement	Total amount of required irrigation water to satisfy crop demand	Water scarcity: greater water requirements put greater pressure on aquifers and rivers.
Flooding	Maximum 5-day running average precipitation	Flooding: too much rainfall during a week causes flooding, which causes crops to wilt

[79] https://ciatph.github.io/alliance-csa-pakistan/#

Indicator	Unit	Hazard
Heat stress	Number of days with temperature above 35°C	Heat stress: many hot days during the growing period slow crop growth, hinder grain filling and can lead to low productivity
95th percentile of daily precipitation	Shows the level of precipitation recorded for extreme events	Flooding: Peak rainfall events increasing in intensity may result in flash flooding

- **Climate risk** : via responses from agricultural experts in each of the districts covered in the study, information about the frequency (every year; every other year; every 5 years; every 10 years) and severity (minor (<10% losses); moderate (10-30% losses); major (30-50% losses); severe (>50% losses)) of major climate risks (from the table above) is presented through a risk matrix as follows :

Severity / Frequency	Minor severity (<10% losses)	Moderate severity (10-30% losses)	Major severity (30-50% losses)	Severe severity (>50% losses)
Every 10 years				
Every 5 years				
Every second year				
Every year				

- **Climate impacts**: the results of the climate impact analysis conducted by value chain experts on districts' key commodity value chains are presented. These include 4 steps at which the value can be impacted: input (e.g. fertilizers); on-farm; harvesting, storage and processing; marketing.
- **Practices** : presents the types of Climate Smart Agricutlure (CSA) practices (31 practices) prioritised by experts in the district, as well as with the areas where they have an impact (soil and nutrient; yield/income increase; water; CO_2 emissions reduction; crop and livestock suitability; plant and animal health; biodiversity; pollution; landscape) , the hazards they address (temperature; drought; flooding; pest; salinization; rainfall), and the barriers to adoption (lack of training and information; policy and instrument issues; economic issues; market issues; labour issues).
- **Enablers**: CSA enablers provide essential services and build core capacities, empowering individuals and agrarian communities to better manage their response to climate related pressures. This section looks at which types of enablers are prioritised in each of the districts. 28 enablers are dispatched among 6 sectors (market; institutions/organisations; information and advisory; labour; gender; finance).

5.2.6.2 Punjab Adaptation to Climate Tool (PACT)developed by Oxford policy management for Planning and Development Department Punjab

The Climate and water risk screening tool for agriculture energy and irrigation sectors in Punjab was developed under the Action on Climate Today (ACT) programme in 2018. The tool aims at **mainstreaming the analysis of water-related climate risk** (present and future) **during the project development and helps implement more sustainable and climate-resilient projects in Punjab** province.

Methodology: It is based on the concept of risk from the IPCC's fifth Assessment report. Risk results from the interaction of vulnerability, exposure and hazard. Each step of the tool corresponds to a component of risk (Step 2 = hazard, Step 3 = Exposure , Step 4 = Vulnerability.

The tool focuses on **finding adaptation options which reduce vulnerability to past and present climate variability** (as well as "non-climatic pressures"). The aim is to identify adaptation options

which perform well over a wide range of conditions experienced now and potentially in the future. while addressing current development priorities ("low regret" actions).

Indicators: The Climate and water risk screening tool includes a total of 15 indicators representing various climate-related hazard and variables. A selection of key indicators was made based on their relative importance in the context of Punjab, data availability, and ease of understanding and use by a non-climate expert. The list of indicators are presented below with a short description and data sources:

Indicator (climate hazard/variable)	Description	Data sources (current exposure, national)	Data sources (current exposure, international)
Annual average temperature	The monthly average surface air temperature (temperature of the air near the surface of the earth) over 1 year	PMD SUPARCO MoCC	ADB (2017), Climate Change Profile Pakistan World Bank, Climate Change Knowledge Portal Hindu Kush Himalayan (HKH), Climat and Hydrology Visualization and Acess Portal (HI-CHAP)
Heat waves (frequency and intensity assessed separately)	A period a abnormally and uncomfortably hot weather Frequency refers to the rate at which such an even occurs in a given period of time. Intensity refers to the magnitude of such an event In Pakistan, heat waves are defined as spikes in temperatures beyond 45°C in plains areas, and beyond 40°C in hilly areas. Average maximum temperatures of 42°C which a 5-6° rise lasting 8 days or more are also considered heat waves	PMD SUPARCO MoCC	ADB (2017), Climate Change Profile Pakistan
Average annual rainfall (change)	The monthly average rainfall occurring over 1 year		ADB (2017), Climate Change Profile Pakistan World Bank, Climate Change Knowledge Portal Hindu Kush Himalayan (HKH), Climat and Hydrology Visualization and Acess Portal (HI-CHAP)
Summer rainfall (change)	Change in the period and/or pattern of the South-west monsoon that occurs from mid-June to mid-September		ADB (2017), Climate Change Profile Pakistan
Winter rainfall (change)	Change in the period and/or pattern of the north-east monsoon that occurs from December to March		ADB (2017), Climate Change Profile Pakistan
Extreme rainfall (frequency and intensity assessed separately)	A period of abnormally high rainfall. Frequency refers to the rate at which such an event occurs in a given period of time. Intensity refers to the magnitude of such an event.		ADB (2017), Climate Change Profile Pakistan
Flood	Floods include river floods, flash floods, urban floods,	Irrigation Department	Global Flood Analyzer

Indicator (climate hazard/variable)	Description	Data sources (current exposure, national)	Data sources (current exposure, international)
	pluvial and sewer floods and glacial lake outbursts.	Provincial Disaster Management Authority (PDMA) National Disaster Management Authority (NDMA) PMD (e.g. Flood Forecasting Division)	
Water stress	Water stress occurs when the demand for water exceeds the amount available during a certain period, or when poor quality restricts its use	Agriculture Department Irrigation Department	Aqueduct Water Risk Atlas
Drought	Drought refers to a prolonged period of below-average rainfall in a given area, leading to water shortage	Agriculture Department Irrigation Department PMD (e.g. Drought Monitoring Centre)	Aqueduct Water Risk Atlas
Maximum wind speed	Wind speed is the rate of movement of air around the earth from areas of high pressure to low pressure	PMD	Global Wind Atlas
Ground water level	Level at which rock or soil is saturated (also referred to as the water table), and one of the variables that indicates the quantity of groundwater. Variations in groundwater quantity are influenced by precipitation and temperature on the surface of the soil (FOEN).	Irrigation Department (for irrigation purpose only) Agriculture Department (for agriculture purpose only)	
Groundwater quality	Level of contamination in the underground water source	Agriculture Department (for agriculture purpose only)	
Surface water quality	Level of contaminants present in surface water sources (lakes, rivers, streams, ponds, etc.)	Irrigation Department Environmental Protection Department (EPD)	

Remark: Solar radiation and relative humidity indicators were excluded.

Institutional process and tool implementation: The tool was designed to fit within existing institutional processes to facilitate the integration of climate risk into decision making (agriculture, energy and irrigation). The tool is used at different stages of the project development and approval process: (i) project identification, (ii) project concept 1 preparation and submission to planning departments, (iii) feasibility study required for all infrastructure projects or project appraisal (iv) along with the environment impact assessment, and (v) project approval.