UNFCCC

Insight to Action: Strengthening Monitoring, Evaluation and Learning (MEL) Systems for Adaptation

Informal summary report
by the UNFCCC Secretariat

Source: Unsplash, Hugh Whyte

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I. Key messages

- Monitoring, evaluation and learning (MEL) systems are widely recognized as essential components of the iterative adaptation process, serving as tools for assessing progress, evaluating impacts and informing decision-making in relation to adaptation.
- MEL systems must be tailored to national contexts, purpose-driven and integrated into planning and decision-making processes, particularly national adaptation plans (NAPs).
- In order to develop effective indicators of adaptation progress, relevant data, resource and capacity constraints must be addressed and quantitative metrics must be balanced with qualitative, context-specific insights.
- Inclusive engagement of diverse stakeholders enriches MEL systems through integration of multiple perspectives and knowledge systems.
- Emerging technologies, including artificial intelligence (AI) and machine learning, offer opportunities to enhance MEL systems, such as by improving data collection, enabling refinement of projections and supporting the development of proactive adaptation strategies, towards better addressing climate risks and informing decision-making.
- Integrating Indigenous values, worldviews and knowledge systems into MEL frameworks helps to enrich adaptation strategies by offering holistic, context-specific insights and ensuring that traditional practices are part of monitoring and reporting, leading to more effective, locally relevant climate adaptation solutions.
- MEL systems for transformational adaptation are required to go beyond traditional MEL approaches to enable and drive systemic change. MEL systems should be adaptable, flexible and context-specific to ensure that adaptation strategies remain adaptive and sustainable.
- In line with the mandate under the Nairobi work programme on impacts, vulnerability and adaptation to climate change (NWP) to enhance the provision and dissemination of information and knowledge to facilitate the scaling up of adaptation in countries and regions, there is an opportunity under the NWP to contribute to strengthening MEL systems for adaptation action and support, including transformational adaptation, by:
    - Facilitating the exchange of best practices, tools and methodologies, including innovative technologies such as AI and machine learning, for MEL, particularly for transformational adaptation;
    - Co-creating knowledge and know-how towards building systems and communities that are resilient to climate change impacts; strengthening the integration of Indigenous values, worldviews and knowledge systems into MEL frameworks, particularly in collaboration with the Facilitative Working Group of the Local Communities and Indigenous Peoples' Platform;
    - Cultivating and curating knowledge and know-how on using MEL to anticipate, plan for and respond to climate risks; especially, bridging the gap between knowledge producers and users to facilitate the translation, contextualization and dissemination of knowledge. This could entail making complex scientific information understandable and usable at the local level while also sharing insights from local contexts within national and global processes;
    - Facilitating the sharing of knowledge. This could entail making experience and best practices pertaining to the achievement of the targets referred to in paragraphs 9–10 of decision 2/CMA.5, on the global goal on adaptation.

II. Introduction

A. Mandate

The Subsidiary Body for Scientific and Technological Advice (SBSTA) requested the secretariat to organize an event on monitoring, evaluation, and learning (MEL) systems for all adaptation actions and support, including transformational adaptation under the Nairobi work programme.[1]

The event is aligned with the mandate of the NWP and its knowledge-to-action methodology in terms of facilitating achievement of the goals of the Convention and the Paris Agreement by supporting the delivery and enhancement of adaptation knowledge and action, particularly in developing country Parties, including the least developed countries and small island developing States.[2]

B. Context

According to Article 7, paragraph 9, of the Paris Agreement[3], each Party shall engage in comprehensive adaptation planning and implement relevant impactful actions, including developing and refining adaptation plans and policies. The Article underscores the importance of robust, continuous monitoring and rigorous evaluation of, and dynamic learning from adaptation measures.

The United Arab Emirates Framework for Global Climate Resilience was established to guide the achievement of the global goal on adaptation and includes a MEL target among the targets in relation to the dimensions of the iterative adaptation cycle; namely that by 2030 all Parties have designed, established and operationalized a MEL system for their national adaptation efforts and have built the required institutional capacity to fully implement it.[4]

The outcome of the first global stocktake reinforced the importance of the iterative adaptation cycle – comprising risk and impact assessment, planning, implementation, and monitoring, evaluation and learning – for building adaptive capacity, strengthening resilience and reducing vulnerability, as well as the need for means of implementation and support for developing country Parties at each stage of the cycle,[5] noting the importance of monitoring and evaluating outcomes in order to track the progress and enhance the quality and awareness of adaptation action.[6]

C. Objectives

This event provided a unique opportunity for Parties, experts on MEL systems and other stakeholders to deepen their understanding of existing, proven MEL systems for adaptation action and support, including transformational adaptation. Specifically, participants:

- Established a foundational understanding of MEL systems for adaptation action and support, including transformational adaptation;
- Shared insights on good practices, challenges and lessons learned in designing, establishing and operationalizing MEL systems, paying particular attention to the ethical integration therein of Indigenous values, worldviews and knowledge systems;
- Identified opportunities to strengthen and further develop MEL systems to better support adaptation action and support, including transformational adaptation, in response to future challenges and needs.

[1] FCCC/SBSTA/2023/4, para. 24(h).
[2] See document FCCC/SBSTA/2023/4, para. 20.
[3] See https://unfccc.int/process-and-meetings/the-paris-agreement.
[4] Decision 1/CMA.5, para. 64(d).
[5] Decision 1/CMA.5, para. 54.
[6] Decision 1/CMA.5, para. 48.

D. Scope

This informal summary report captures key messages and presents findings derived from the discussions and a literature review as well as case studies of MEL systems submitted by experts via a survey prior to the event.

E. Methodology

The NWP knowledge-to-action methodology[7] was applied with a view to addressing adaptation knowledge gaps and strengthening MEL systems for adaptation action and support, including transformational adaptation. Application of the knowledge-to-action methodology, facilitated the exchange of experience and lay the foundation for curating and cultivating knowledge and know-how in MEL systems.

Scope Knowledge and Know-How Needs

A literature review covering academic, policy and technical documents clarified the definition, scope and application of MEL systems in relation to adaptation, resulting in a comprehensive mapping of barriers, challenges, best practices and emerging opportunities relating to MEL systems.

Engage diverse group of stakeholders

Building on the literature review, a survey was conducted to actively engage Parties, experts on MEL systems and other stakeholders in designing the mandated event. The survey was distributed to NWP partners, UNFCCC national focal points and adaptation contact points, United Nations and other intergovernmental organizations, the United Nations inter-agency group on transformational adaptation[8] and experts identified through the literature review.

The survey received 48 responses, including 60 case studies[9] of MEL systems at various stages of development, implementation and operationalization. The responses provided valuable insights into good practices, operational challenges and knowledge gaps relating to MEL systems for adaptation action and support, including transformational adaptation.

Facilitate an Exchange of Knowledge for Strengthening MEL systems

Findings from both the literature review and the survey informed the design of the mandated event, which was held at COP 29. The event brought together over 100 experts on MEL systems, government representatives and stakeholders. Divided into three segments, the two-hour session featured nine panelists and facilitated dynamic, multi-stakeholder discussions.

[7] See https://www4.unfccc.int/sites/NWPStaging/Pages/Knowledge-to-Action.aspx#:~:text=%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8BThe%20NWP%20relies%20on,relevant%20topics%20and%20thematic%20areas.

[8] The group comprises participants in meetings convened by the secretariat to facilitate inter-agency exchanges on transformational adaptation. These participants include representatives of United Nations entities and other intergovernmental organizations. The meetings were held in response to the mandate in para. 46 of decision 2/CMA.5 requesting the secretariat to undertake work to examine how transformational adaptation is defined and understood at different spatial scales and sectors, and how progress in planning and implementing transformational adaptation approaches might be assessed at the global level.

[9] The case studies will be made available on the adaptation knowledge portal. A case study brief on MEL systems, offering an overview of key examples and insights, will be available soon.

III. Key Takeaways

Source: UNFCCC Secretariat

MEL systems are widely recognized as essential components of the iterative adaptation process, serving as tools for assessing progress, evaluating impacts and informing decision-making in relation to adaptation.

The Intergovernmental Panel on Climate Change defines monitoring and evaluation of adaptation as the systematic process of collecting, analysing and using information to assess the progress of adaptation and evaluate its effects, such as risk reduction outcomes, co-benefits and trade-offs, mostly during and after implementation.[10] While monitoring is viewed as a continuous process of tracking implementation and informing management to allow for corrective action, evaluation is described as a more comprehensive assessment of achievements, unintended effects and lessons learned.[11] Learning can be defined as a collective and deliberate process of acquiring, assessing and disseminating new knowledge that results in changed or reinforced knowledge, attitudes and behaviors relating to climate change adaptation.[12] Learning is commonly linked to monitoring and evaluation, and the design of systems for monitoring and evaluating adaptation can support learning by facilitating the gathering of relevant information and its dissemination in a way that is accessible and effectively linked to decision-making processes.[13]

[10] Intergovernmental Panel on Climate Change. (2022). Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. Chapter 17.5: Adaptation Success and Maladaptation, Monitoring, Evaluation and Learning. Available at https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/.
[11] As footnote 10 above.
[12] Beauchamp, E., Leiter, T., Pringle, P., Brooks, N., Masud, S., & Guerdat, P. (2024). Toolkit for Monitoring, Evaluation, and Learning for National Adaptation Plan Processes. NAP Global Network and Adaptation Committee. International Institute for Sustainable Development. Available at https://unfccc.int/topics/adaptation-and-resilience/resources/publications/toolkit-MEL-for-NAP-processes.
[13] As footnote 12 above.

MEL systems are an essential component of the iterative adaptation process and policy development cycle. The overarching aim of MEL systems is to inform policies and practices from the data and evidence generated by the iterative process of tracking, assessing and learning throughout the NAP and other adaptation planning processes.[14] MEL systems can provide a framework for assessing the effectiveness, cost-efficiency, inclusivity and impact of interventions in order to inform decision-making. MEL can be conducted across various time frames and from local and community-based initiatives to national and global adaptation strategies.

MEL systems must be tailored to national contexts, purpose-driven and integrated into planning and decision-making processes, particularly NAPs.

Over the past decade, significant progress has been made in integrating MEL into NAPs, with key milestones including the development of guidelines for monitoring and assessing progress, effectiveness and gaps in relation to the process to formulate and implement NAPs by the Least Developed Countries Expert Group[15] and the toolkit for MEL for NAP processes by the NAP Global Network[16]. Both contain guiding questions to help countries to define the purpose, content and use of their MEL systems.

Given that there is no one-size-fits-all approach, MEL systems must reflect each country's administrative, planning and cultural contexts. National geographical, socioeconomic, political and cultural factors shape their design and implementation. Clearly defining the purpose of MEL ensures that it supports effective adaptation while addressing context-specific needs. Ultimately, the success of MEL systems depends on their ability to inform planning, decision-making and implementation throughout the NAP process.

Source: McKinsey

[14] Njuguna, L., Uri, I., & Beauchamp, E. (2024). National monitoring, evaluation, and learning systems for adaptation: A comparative analysis of nine countries. International Institute for Sustainable Development. Available at https://www.iisd.org/publications/report/monitoring-evaluation-learning-systems-adaptation.
[15] Least Developed Countries Expert Group. (2015). Monitoring and assessing progress, effectiveness and gaps under the process to formulate and implement National Adaptation Plans: The PEG M&E tool. UNFCCC: Bonn. Available at https://unfccc.int/files/adaptation/application/pdf/50301_04_unfccc_monitoring_tool.pdf.
[16] As footnote 12 above.

In order to develop effective indicators of adaptation progress, relevant data, resource and capacity constraints must be addressed and quantitative metrics must be balanced with qualitative, context-specific insights.

> ***"It is important to have a clear vision of an indicator's role. Indicators can sometimes misguide us or have unintended consequences by focusing attention on a particular direction. Often, we prioritize what is easily quantifiable over what we truly need to understand."***
>
> Dr. Timo Leiter, Distinguished Policy Fellow of the London School of Economics and Political Science (LSE)

Many countries face difficulties in developing effective indicators of adaptation progress owing to limited high-quality data, financial constraints and technical capacity gaps. The added complexity of meeting international reporting requirements exacerbates these challenges.

Indicators must be carefully selected, as they shape adaptation priorities and strategies. Poorly chosen indicators can be misleading by focusing on what is easy to measure rather than on what is more meaningful. For instance, broad indicators (e.g. number of beneficiaries) may overlook the real impact of interventions. Countries should begin by identifying their information needs and selecting indicators that are relevant at the local, national and global level. Effective indicators must strike a balance between quantitative metrics and qualitative, context-specific insights. They should be linked to observed climate change impacts and aligned with existing MEL frameworks to minimize reporting burden and enhance coherence.

Case study 1: Inclusive monitoring, evaluation and learning system for engaging diverse stakeholders in sustainable forest management[18]

The aim of the Regional Model Forest Network – Asia, developed by the Regional Community Forestry Training Centre for Asia and the Pacific, is to foster learning and knowledge exchange in relation to eight model forests in the region. Focused on four pillars – ecosystems, human well-being, governance and production – the system monitors performance to promote informed decision-making and continuous improvement. A beta indicator framework includes mandatory core indicators and optional ones tailored to each forest's unique priorities. The system enhances data-driven decision-making, accountability, adaptive management and local community empowerment by facilitating knowledge-sharing on and engaging stakeholders in sustainable forest management.

Key success factors include stakeholder engagement, flexibility through optional indicators and capacity-building for data collection and application. Best practices involve collaborative learning platforms, standardized yet customizable indicators, and alignment with global assessment frameworks like LandScale. These approaches ensure comparability across forests, streamline data collection and highlight the Network's contributions to local and global sustainability goals. The system's adaptive nature and integration of technology further strengthen its capacity to support sustainable forest management.

[17] UNFCCC. (2023). Monitoring and evaluation of adaptation at the national and subnational levels: Technical paper by the Adaptation Committee. UNFCCC: Bonn. See https://unfccc.int/sites/default/files/resource/AC_TechnicalPaper_AdaptationMandE_2023.pdf.
[18] See https://imfn.net/about/regional-networks/regional-model-forest-network-asia/.

Inclusive engagement of diverse stakeholders enriches MEL systems through integration of multiple perspectives and knowledge systems.[19]

Establishing effective MEL systems requires data collection at the national, subnational and local level, and integration of insights from different stakeholders. Collaboration among communities, governments and the private sector strengthens adaptation measures by encouraging local ownership and mobilizing critical knowledge. By leveraging localized practices and fostering diverse stakeholder involvement in MEL systems, countries can strengthen their climate adaptation and resilience. In Colombia, for example, a localized approach to MEL systems[20] has led to the development of 66 indicators aligned with its national climate adaptation framework, which cover local farming practices and key value chains like coffee, cocoa and palm oil. In Uruguay, a subnational adaptation consultation facilitated the creation of a gender-sensitive indicator for rural, woman-led households, which was integrated into the national census and subsequently informed national adaptation budgets. This bottom-up approach, driven by the Ministry of Agriculture, Forestry and Rural Development, highlights the importance of stakeholder engagement and decentralized decision-making for effective MEL systems.

Emerging technologies, including AI and machine learning, offer opportunities to enhance MEL systems, such as by improving data collection, enabling refinement of projections and supporting the development of proactive adaptation strategies, towards better addressing climate risks and informing decision-making.

AI is transforming climate change responses by improving decision-making and climate risk management. It helps communities to predict and adapt to climate impacts, such as using satellite imagery to predict wildfire spread. For example, Google has partnered with wildfire authorities to deploy wildfire detection systems in over 20 countries and launch FireSat, designed to detect fires as small as five by five metres. AI can also be used to improve riverine flood prediction, forecasting floods up to seven days in advance, benefiting 700 million people in 100 countries. These tools are enabling the implementation of proactive adaptation strategies in communities.

Historically, data collection for environmental monitoring has been manual, but AI is now helping to improve efficiency. Google Earth Engine, a cloud-based platform, provides access to over 40 years of satellite imagery and geospatial analysis tools for researchers, non-governmental organizations and governments in over 160 countries. Combined with on-ground sensors, AI helps to fill data gaps, especially in regions most affected by climate change. By lowering barriers to data access, AI empowers stakeholders to better address environmental challenges. It also enables accurate analysis of both qualitative and quantitative data, thus preserving traditional knowledge in geographically remote regions, such as the Pacific Islands.

Source: European Environment Agency

[19] As footnote 12 above.
[20] See https://openknowledge.fao.org/server/api/core/bitstreams/f8e285f0-f6cc-4acf-87be-b7923ff86e7d/content.
[21] See https://openknowledge.fao.org/server/api/core/bitstreams/f8e285f0-f6cc-4acf-87be-b7923ff86e7d/content.
[22] See footnote 16 above.

Case study 2: New tools for monitoring, evaluation and learning systems: resilience maturity curve[21]

A new programme is being implemented as part of the European Union Mission on Adaptation to Climate Change aiming to strengthen the climate resilience of 150 European regions and communities. A consortium of 14 organizations, including International Institute for Applied Systems Analysis, the Red Cross Red Crescent Climate Centre and Deltares Technology, has been developing a resilience system for these regions. Over the last 20–30 years, the approach to adaptation has not yielded the desired results, leading to a shift in perspective towards treating adaptation as a property of a system, rather than a single outcome. The resilience maturity curve is a tool introduced to assess a system's resilience maturity at a territorial level, tracking its evolution from low to high resilience, and helping to determine where systems fall on the maturity scale.

The resilience maturity tool is dynamic and applicable across different scales, such as cities, governments and regions. It uses a self-assessment approach, relying on surveys to evaluate key dimensions like planning, stakeholder engagement, coordination, and inclusion of Indigenous and marginalized knowledge. The tool includes a beginner version with 28 questions and an advanced version with 100 factors, offering scores, identifying areas of strength and weakness, and designing actions to improve resilience. Under the European Union's Pathways2Resilience programme, strategies are customized on the basis of a region's resilience maturity and progress is evaluated over time. While concerns about bias in self-assessment tools are addressed through diverse stakeholder participation and database comparisons, the programme is designed to be scalable, complementing existing measures, and focusing on transformative adaptation as a product of systems.

Integrating Indigenous values, worldviews and knowledge systems into MEL frameworks helps to enrich adaptation strategies by offering holistic, context-specific insights and ensuring that traditional practices are part of monitoring and reporting, leading to more effective, locally relevant climate adaptation solutions.

Integrating Indigenous knowledge into MEL systems can help to enhance adaptation by preserving cultural heritage and capturing holistic and context-specific insights. Indigenous peoples play a key role in monitoring and validating indicators. Integrating Indigenous knowledge into MEL systems is essential to preserve cultural heritage and ensure comprehensive data collection. This involves incorporating qualitative, story-based knowledge alongside quantitative data, as Indigenous systems are often not easily integrated into traditional MEL frameworks.

Traditional knowledge systems use interconnected indicators – biological, atmospheric and spiritual – that MEL frameworks must capture for a holistic understanding of adaptation. In the Pacific, national indicators that blend scientific and traditional knowledge are used to track environmental changes. Inputs from Indigenous peoples and local communities shape adaptation responses, such as using alternative freshwater sources during droughts.

However, MEL frameworks often overlook unique measures used by Indigenous peoples, with terms like "indicator" varying across cultures. To bridge this gap, in the Pacific, governments, non-governmental organizations and national meteorological services are collaborating with Indigenous peoples to integrate local knowledge into national and international reporting. While not always explicitly identified in NAPs, traditional knowledge is often included through engagement processes and annexes. In Vanuatu, for example, traditional knowledge is formally integrated into monitoring of adaptation, ensuring locally relevant adaptation solutions.

[21] See https://www.climate-kic.org/wp-content/uploads/2023/11/P2R-Self-assessment-tool_Guidance-for-the-regions_final.pdf.

"When communities face extreme drought, they often rely on traditional knowledge to adapt, using multiple interconnected approaches rather than focusing on a single measure. However, many MEL systems fail to capture this holistic approach to monitoring environmental changes."

Siosinamele Lui, Climate Traditional Knowledge Advisor, Secretariat of the Pacific Regional Environment Programme (SPREP)

MEL systems for transformational adaptation are required to go beyond traditional MEL approaches to enable and drive systemic change. MEL systems should be adaptable, flexible and context-specific to ensure that adaptation strategies remain adaptive and sustainable.

MEL systems are essential for driving transformational adaptation, which involves changes in the fundamental attributes of a system in anticipation of climate change and its impacts and goes beyond adjusting existing practices.[22] Unlike conventional MEL systems, those tailored for transformational adaptation must evaluate paradigm shifts, changes in values and restructured goals. Key characteristics include adaptability to evolving conditions and flexibility to incorporate new insights and data to ensure that the systems remain relevant and effective in dynamic environments. Also, given the context-specific nature of transformational adaptation, MEL systems must be designed to evaluate not only the outcomes of adaptation efforts but also the contexts in which they succeed or fail. This requires a deeper level of inquiry beyond conventional MEL, focusing on the specific conditions and factors that influence adaptation success.

However, developing and implementing MEL systems for transformational adaptation presents several challenges. Systemic change is complex with multifaceted dimensions and requires long-term reporting to show measurable impacts, making it difficult to capture via traditional indicators and short-term reporting cycles. It involves unpredictable variables, making it difficult to establish fixed baselines and targets. Socioeconomic shifts and environmental feedback loops add further uncertainty. Also, transformational adaptation often involves intangible outcomes, such as shifts in governance, resilience, social cohesion or institutional practices, which are not easily quantified.

Source: Frontiers

[22] See document FCCC/TP/2024/8.

Several approaches can help to strengthen MEL systems for transformational adaptation by addressing its unique characteristics and the challenges it presents. Systems thinking should be adopted and cross-cutting indicators identified that reflect the interplay between social, environmental and economic factors. Mapping interconnected components of indicators can help to measure indirect impacts, such as spillover effects on communities, ecosystems and policies. A clear theory of change for transformational adaptation, considering multi-sectoral impacts and longer-term systemic shifts, can facilitate the mapping of the direct and indirect pathways of change. Also, a phased MEL approach can be used that includes intermediate milestones or proxy indicators aligned with long-term goals. This way, early progress on foundational changes, like increased adaptive capacity or shifts in governance, can still be reported within shorter reporting cycles while keeping the focus on transformational outcomes. In addition, since transformation requires flexibility to handle future uncertainties, MEL systems should include scenario planning, such as by tracking both projected and realized outcomes to see how well initiatives can adapt under different conditions. For systems operating on a large scale, analytics and modelling can provide foresight into potential outcomes of various adaptation pathways, helping to fine-tune MEL in a rapidly changing context.

IV. Strengthening MEL systems for Adaptation under the NWP

In line with the mandate under the NWP to enhance the provision and dissemination of information and knowledge to facilitate the scaling up of adaptation in countries and regions,[23] there is an opportunity under the NWP to strengthen MEL systems for adaptation action and support, including transformational adaptation. Key actions may include:

- Facilitating the exchange of best practices, tools and methodologies, including innovative technologies such as AI and machine learning, for MEL, including for transformational adaptation;[24]
- Co-creating knowledge and know-how towards building systems and communities that are resilient to climate change impacts; strengthening the integration of Indigenous values, worldviews and knowledge systems into MEL frameworks, particularly in collaboration with the Facilitative Working Group of the Local Communities and Indigenous Peoples' Platform;[25]
- Cultivating and curating knowledge and know-how on using MEL to anticipate, plan for and respond to climate risks; especially, bridging the gap between knowledge producers and users to facilitate the translation, contextualization and dissemination of knowledge. This could entail making complex scientific information understandable and usable at the local level while also sharing insights from local contexts within national and global processes;
- Facilitating the sharing of knowledge, experience and best practices pertaining to the achievement of the targets referred to in paragraphs 9–10 of decision 2/CMA.5,on the global goal on adaptation.[26]

[23] As per document FCCC/SBSTA/2022/6, para. 16.
[24] As footnote 23 above.
[25] As per document FCCC/SBSTA/2023/4, para. 24(d).
[26] As per decision 3/CMA.6, para. 33.