IPAM
International Platform on Adaptation Metrics

POLICY PAPER

Accelerating Global Climate Resilience through Robust Adaptation Metrics

This policy paper summarizes a comprehensive IPAM research document on measuring climate change adaptation. The document aims to be of interest to all parties involved in adaptation measurement. All authors, as listed below, are members of the International Platform on Adaptation Metrics.

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List of acronyms

- **AF**: Adaptation Fund
- **AI:** Artificial Intelligence
- **AMME:** Adaptation Metrics Mapping Evaluation
- **BRACED:** Building Resilience and Adaptation to Climate Extremes and Disasters
- **CBD:** Convention on Biological Diversity
- **CCD:** Convention to Combat Desertification
- **CIF:** Climate Investment Funds
- **CMA:** Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
- **COP:** Conference of the Parties
- **CRM:** Climate Risk Management
- **DSS:** Decision Support System
- **EbA:** Ecosystem-based Adaptation
- **EU:** European Union
- **FGCR:** UAE-Facility for Global Climate Resilience
- **GACSA:** Global Alliance for Climate-Smart Agriculture
- **GCF:** Green Climate Fund
- **GEF:** Global Environment Facility
- **GESI:** Gender Equality and Social Inclusion
- **GGA:** Global Goal on Adaptation
- **GIS:** Geographic Information System
- **GST:** Global Stocktake
- **IIED:** International Institute for Environment and Development
- **IMF:** International Monetary Fund
- **IoT:** Internet of Things
- **LDN:** Land Degradation Neutrality
- **M&E:** Monitoring and Evaluation
- **MEL:** Monitoring, Evaluation, and Learning
- **MENA:** Middle East and North Africa
- **NAP:** National Adaptation Plan
- **NBSAP:** National Biodiversity Strategies and Action Plans
- **NDC:** Nationally Determined Contribution
- **OECD:** Organisation for Economic Co-operation and Development
- **PPCR:** Pilot Program for Climate Resilience
- **RDI:** Research Development and Innovation
- **SDG:** Sustainable Development Goal
- **SMART:** Specific, Measurable, Achievable, Relevant, Time-bound
- **SPCR:** Strategic Program for Climate Resilience
- **SQL:** Structured Query Language
- **TAMD:** Tracking Adaptation and Measuring Development
- **TCFD:** Task Force on Climate-related Financial Disclosures
- **ToC:** Theory of Change
- **UAE:** United Arab Emirates
- **UN:** United Nations
- **UNEP:** United Nations Environment Programme
- **UNFCCC:** United Nations Framework Convention on Climate Change
- **USAID:** United States Agency for International Development

Glossary

A

- **Adaptation (Climate Change Adaptation):** The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities.
- **Adaptation Fund (AF):** A fund established under the Kyoto Protocol of the UNFCCC to finance concrete adaptation projects and programs in developing countries that are particularly vulnerable to the adverse effects of climate change.
- **Adaptation Metrics:** Quantitative or qualitative measures used to track, evaluate, and communicate the process, outputs, outcomes, and impacts of climate change adaptation actions.
- **Aggregation (Cross-scale Aggregation):** The process of combining or synthesizing adaptation data and indicators from lower levels (e.g., local, project) to higher levels (e.g., national, global) to provide a summarized view of progress.
- **AMME Framework (Adaptation Metrics Mapping Evaluation):** A systematic framework developed by IPAM for identifying and selecting context-specific adaptation metrics.
- **Artificial Intelligence (AI):** The simulation of human intelligence processes by machines, used in the context of adaptation for data analysis, risk modeling, and generating real-time indicators.

B

- **Blockchain:** A decentralized digital ledger technology that can be used to track financial flows and adaptation actions with high transparency and auditability.
- **Blended Finance:** The strategic use of public or philanthropic capital to mobilize private investment for development and climate-related projects, including adaptation.

C

- **C40 Cities:** A network of nearly 100 mayors of the world's leading cities collaborating to confront the climate crisis.
- **CBD (Convention on Biological Diversity):** An international treaty for the conservation of biological diversity, the sustainable use of its components, and the fair and sharing of benefits.
- **CCD (Convention to Combat Desertification):** An international treaty to combat desertification and mitigate the effects of drought through national action programs.
- **Context-Sensitivity:** A principle for adaptation metrics, meaning they should reflect diverse national and local circumstances, vulnerabilities, and priorities while still enabling broader comparison.

D

- **Decision Support System (DSS):** A computerized tool, such as the one mentioned for the GGA indicators, that helps experts and negotiators analyze and select indicators by illustrating implications for target coverage and data availability.

E

- **Ecosystem-based Adaptation (EbA):** The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change.
- **Equity:** The fair and just inclusion in a society where all can participate, prosper, and reach their full potential. In adaptation, it refers to ensuring that adaptation efforts do not disproportionately burden vulnerable groups.

F

- **Flexibility (in Resilience):** A system's capacity to persist in the face of shocks and maintain essential functions. One of the three outcome/impact classifications proposed in the document.

G

- **GACSA (Global Alliance for Climate-Smart Agriculture):** A voluntary alliance that aims to improve food security, nutrition, and resilience through climate-smart agriculture.
- **GCF (Green Climate Fund):** A global fund created to support the efforts of developing countries to respond to the challenge of climate change, with a balanced allocation between mitigation and adaptation.
- **GEF (Global Environment Facility):** A partnership for international cooperation that provides funding to address global environmental issues.
- **GESI (Gender Equality and Social Inclusion):** An approach that ensures adaptation planning and metrics consider and address the needs, capacities, and rights of all genders and social groups, including the most marginalized.
- **GGA (Global Goal on Adaptation):** Established under the Paris Agreement, the GGA aims to enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate change.
- **GST (Global Stocktake):** A process under the Paris Agreement to assess collective progress towards achieving its long-term goals, including the GGA, every five years.

I

- **Impact Metrics:** Metrics that measure the enduring, long-term transformations in well-being, ecosystems, and economies that result from successful adaptation. They represent the ultimate goal of adaptation actions.

- **Input Metrics:** Metrics that measure the resources mobilized for adaptation, such as financial funding, human capacity, or technology.
- **Internet of Things (IoT):** The network of physical objects ("things") embedded with sensors and software to connect and exchange data with other devices over the internet. Used in adaptation for real-time environmental monitoring.
- **IPAM (International Platform on Adaptation Metrics):** A global network of adaptation experts focused on advancing the standards and role of metrics in the climate adaptation field.
- **Interoperability:** The ability of different data systems, tools, and frameworks to work together, exchange information, and use the exchanged information.

L

- **LDN (Land Degradation Neutrality):** A state under the CCD where the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase.
- **Longitudinal Consistency:** A principle for adaptation metrics, meaning they should enable progress tracking over time through stable definitions and methodologies.

M

- **Maladaptation:** Actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future.
- **Means of Implementation:** Under the Paris Agreement, this refers to the finance, technology development and transfer, and capacity-building support that developed countries should provide to developing countries.
- **Memory (in Resilience):** The accumulation of learning and institutionalization of practices, reflecting adaptive capacity based on past experiences. One of the three outcome/impact classifications.
- **MEL (Monitoring, Evaluation, and Learning):** A systematic framework for tracking data (Monitoring), assessing effectiveness (Evaluation), and using findings to inform future decisions and improve performance (Learning).
- **Metrics:** Standardized measurements or indicators used to assess performance, progress, or effectiveness.

N

- **NAPs (National Adaptation Plans):** A process for developing and implementing strategies and programs to address medium- and long-term adaptation needs.
- **NDCs (Nationally Determined Contributions):** Climate action plans submitted by each country under the Paris Agreement, outlining their commitments to reduce emissions and adapt to climate impacts.
- **Non-State Actors (NSA):** Entities that are not national governments, such as cities, regions, companies, investors, and civil society organizations, which play an increasing role in climate action.

O

- **Outcome Metrics:** Metrics that reflect the medium- to long-term effects of adaptation interventions on reducing vulnerability and enhancing adaptive capacity.
- **Output Metrics:** Metrics that measure the immediate, direct results of adaptation interventions, such as the number of projects implemented or people trained.

P

- **Process Metrics:** Metrics that capture the activities, governance mechanisms, and institutional arrangements put in place to support adaptation (e.g., plans developed, policies adopted).

R

- **Race to Resilience:** A global campaign under the UNFCCC Climate Champions to catalyze a step-change in global ambition for climate resilience, aiming to build the resilience of 4 billion people by 2030.
- **Resilience (Climate Resilience):** The capacity of social, economic, and environmental systems to cope with a hazardous event, trend, or disturbance by responding or reorganizing in ways that maintain their essential function, identity, and structure.

S

- **SDGs (Sustainable Development Goals):** A collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all" by 2030, adopted by all United Nations Member States.
- **Scale-specific:** Designed or applicable to a particular level of governance or geography, such as local, sub-national, national, or global.
- **Scorecard:** A tool used in MEL systems to aggregate qualitative and quantitative data into a standardized format (e.g., using scores or ratings) to facilitate comparison and aggregation across different scales or sectors.
- **Self-Transformation (in Resilience):** The ability of systems to fundamentally reconfigure their structures, identities, and functional relationships when conditions demand. One of the three outcome/impact classifications.

- **Sendai Framework:** A 15-year international agreement adopted in 2015 that aims to achieve a substantial reduction of disaster risk and losses in lives, livelihoods, and health.
- **Systems Thinking:** An analytical approach that focuses on how the constituent parts of a system interrelate and how systems work over time and within the context of larger systems.

T

- **TCFD (Task Force on Climate-related Financial Disclosures):** An organization that develops a framework for companies and other organizations to disclose climate-related financial risks and opportunities.
- **Theory of Change (ToC):** A comprehensive description and illustration of how and why a desired change is expected to happen in a particular context. It maps out the causal pathways from activities to outcomes and impacts.
- **Transformational Adaptation:** A fundamental, systemic change in a social-ecological system in response to climate change and its impacts, which alters the essential attributes of the system.

U

- **UAE-Belém Work Programme on Adaptation Indicators:** A two-year work program (2024-2025) under the UNFCCC aimed at developing a coherent set of indicators to measure progress toward the Global Goal on Adaptation (GGA).
- **UNFCCC (United Nations Framework Convention on Climate Change):** The international environmental treaty adopted in 1992 to combat "dangerous human interference with the climate system." The Paris Agreement is made under this convention.

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Executive Summary

1. **Persistent gaps in coordination, measurement, and attribution hinder coherent integration of adaptation across global frameworks (SDGs, Sendai, CBD, CCD), underscoring the need for harmonized, adaptive, and inclusive metrics**. Metrics often remain siloed and focused on static or targets not directly connected with outcomes, which hinders aggregation and cross-framework consistency. Strengthening alignment through harmonized indicators, adaptive metrics, and improved coordination—particularly integrating non-state actors—is essential to achieve coherent global adaptation tracking **(Section II)**.

2. **Adaptation measurement remains fragmented, requiring scalable, systems-based frameworks that link sectoral outcomes and enable meaningful aggregation**. This limits aggregation and obscures cross-scale dynamics. To address this, a systems-thinking approach and scale-specific MEL frameworks that link sectoral outcomes and enable aggregation from local to global levels are needed. The UAE–Belém Work Programme's 100 indicators mark progress on this but remain process-heavy, requiring further work to capture outcomes and ensure comparability **(Section III)**.

3. **Adaptation tracking is fragmented, requiring stronger institutions, interoperable data, and innovative, participatory approaches for effective, accountable monitoring**. Political, institutional, and financial constraints—alongside limited capacity and inclusivity—undermine robust monitoring and evaluation. Strengthening institutional capacity, ensuring data interoperability, linking finance to measurable outcomes, and investing in open-access systems are key priorities. Mixed-method approaches combining quantitative and qualitative data, participatory co-design, and technological innovation (Artificial Intelligence (AI), Internet of Things (IoT), blockchain) can substantially enhance adaptation metrics' effectiveness and accountability **(Section IV)**.

4. **Six principles—aggregable, transparent, consistent, realistic, coherent, and context-sensitive metrics—combined with a ToC-based, scale-specific MEL framework, can reduce fragmentation and link local actions to global goals**. Metrics should, ideally, be aggregable, transparent, longitudinally consistent, realistic, coherent, and context-sensitive to ensure comparability and local relevance. A functional typology (inputs, processes, outputs, outcomes/impacts) clarifies causal chains and strengthens accountability. A Theory of Change (ToC)-based, scale-specific MEL framework enables aggregation while maintaining contextual nuance, linking local actions to the Global Goal on Adaptation (GGA). Operationalizing this framework requires institutionalized stakeholder participation, integration of GESI, and global support for bottom-up aggregation and learning-oriented systems **(Section V)**.

5. **Effective implementation needs sustained funding, coordination, iterative learning, and a permanent platform to ensure coherent, credible, and actionable adaptation metrics**. Regular updating of indicators, clear methodological guidance, and integration with financial and governance frameworks are critical to ensure metrics remain relevant, credible, and actionable. Establishing a permanent international platform or expert group on adaptation metrics could sustain coherence, comparability, and innovation across scales and frameworks **(Section VI)**.

I. Context and rationale

COP22 in 2016 put a spotlight on a critical imbalance in climate adaptation and mitigation finance. While the annual target of USD 100 billion remained unmet, 84% of available funding was allocated to mitigation, leaving only 16% for adaptation. In 2023, (**Adaptation Gap report, 2025**), the International public climate finance commitments from developed countries towards developing countries reaches 98,8 billion adding adaptation finance at 25,9 billion USD (26%), mitigation finance at 58,1 billion USD (59%) and cross-cutting finance at 14,8 billion USD (15%). Moreover, multiple assessments have revealed that while adaptation is progressing, it is doing so at a slower pace than anticipated, and many challenges remain in governance, capacity, effectiveness, and equality, among others. A key reason for the imbalance in finance flow was the lack of standardized metrics to track and evaluate adaptation efforts.

Presenting IPAM at the International conference, 2025

To address this gap, Morocco hosted three pioneering international conferences between 2016 and 2018—the first global events dedicated exclusively to adaptation metrics. These efforts led to the creation of the **International Platform on Adaptation Metrics (IPAM) in 2020**, now a global network of 162 adaptation experts from 43 countries across five continents. Since then, IPAM has developed a noticeable presence as a reference platform for adaptation metrics and succeeded in creating a lively and expert membership from across the world engaged in advancing the standard and role of metrics in the climate adaptation field.

In early 2025, a working group of 21 IPAM experts convened to write a policy document aiming to be of interest to all parties involved in the measurement of adaptation related to climate change. The **2025 International Conference on Adaptation Metrics** (Rabat, 29 September to 1 October 2025) was part of this initiative and provided a space to further develop and exchange ideas on advancing adaptation metrics with different actors (see Annex 8.1 on Methodology).

The present policy document has been framed within the UNFCCC context, supporting the implementation of the **Global Goal on Adaptation (GGA)**, the **UAE-Belém Work Programme on Adaptation Indicators**, the path towards the second **Global Stocktake (GST)**, and the **National Adaptation Plans (NAPs)**. Although primarily with this in mind, the proposed recommendations found in this document also apply more broadly to other global goals for adaptation metrics and related processes.

This policy paper seeks to advance understanding and guide action on climate change adaptation metrics. Specifically, it aims to (1) define their role and purpose

in tracking progress toward resilience, (2) examine existing tools and mapping approaches, (3) identify the key factors shaping their development, and (4) propose guiding principles for their effective application.

The document is organized into five main sections. **Section II** situates adaptation metrics within broader global goals and frameworks, emphasizing persistent measurement gaps and coordination challenges across international agendas. **Section III** examines cross-scale and cross-sector dynamics, highlighting the difficulties of developing indicators that capture both local specificity and systemic linkages. **Section IV** reviews existing tools and methodologies, identifying best practices and lessons learned from diverse adaptation monitoring experiences. **Section V** outlines a vision for the desired evolution of global adaptation metrics, proposing principles and structures that reconcile comparability with contextual relevance. Finally, **Section VI** presents key recommendations and enabling conditions for the effective implementation and continuous improvement of adaptation metrics.

Group picture at the IPAM international conference in Morocco, September 28, 2025

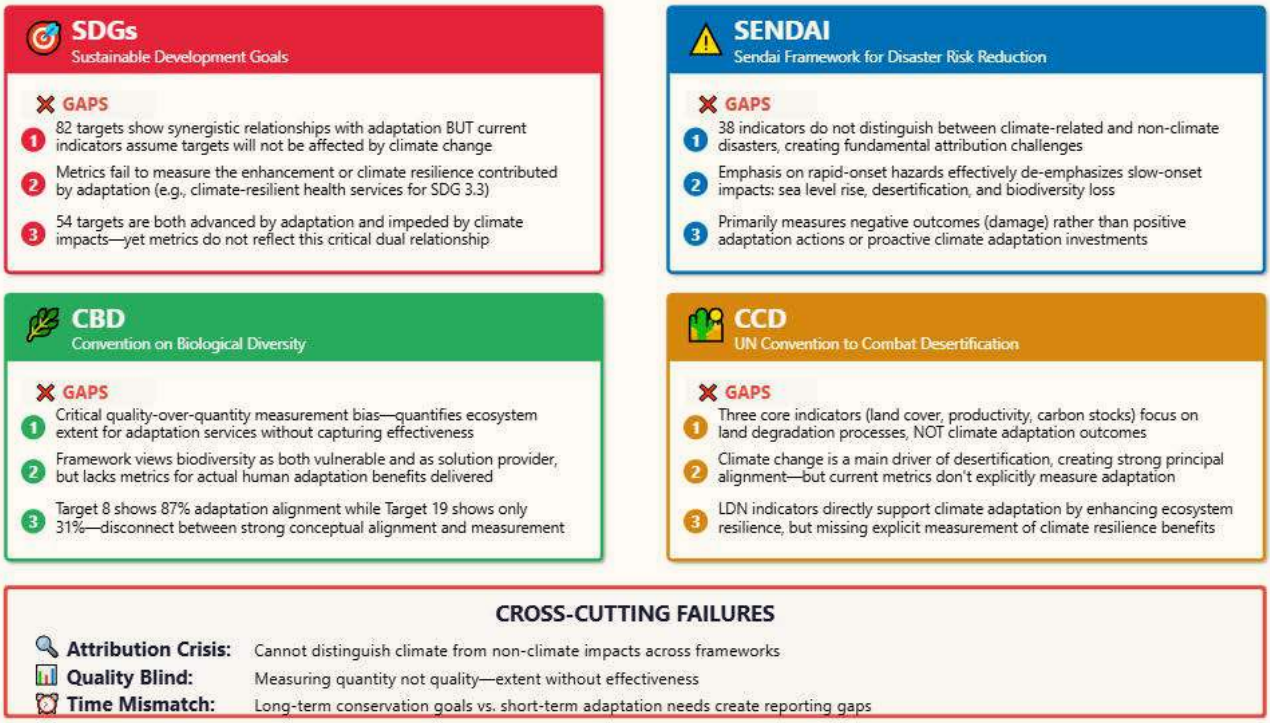
II. Adaptation targets: position within broader global goals and alignment challenges

Adaptation metrics are essential for tracking climate resilience progress across global frameworks. However, despite strong alignment between adaptation and major UN frameworks (including the Sustainable Development Goals (SDGs), the Sendai Framework for Disaster Risk Reduction, the Convention on Biological Diversity (CBD), and the Convention to Combat Desertification (CCD)), significant measurement gaps in coverage and coordination challenges persist, which limit their collective effectiveness **(Figure 1)**. While most goals and targets across these frameworks demonstrate synergistic relationships, that is not so with regard to adaptation, where they largely operate in separate silos (Chatterjee, 2024; Fuldauer et al., 2020). This creates both opportunities for complementary measurement and challenges for coherent global assessment.

Figure 1.

Adaptation measurement gaps across major global climate frameworks.

Source: Own preparation.



Workshop on the adaptation targets

Analysis of global frameworks reveals that adaptation serves a dual role: advancing targets through direct synergies and enhancing targets by building climate resilience. The **SDG**s demonstrate strong alignment with adaptation, with 82 targets showing synergistic relationships (Pradhan et al., 2025). However, the current SDG indicators do not explicitly incorporate assumptions on how targets will be affected by climate change and fail to measure the enhancement or climate resilience contributed by adaptation. For example, while climate-resilient health services advance SDG 3.3 (ending epidemics), existing indicators do not capture the resilience element that adaptation provides. This is a critical gap, as 54 targets are both advanced by adaptation and potentially impeded by climate impacts, yet their metrics do not reflect this.

The **Sendai Framework** shows variable alignment with adaptation across its seven targets, ranging from 70% alignment for early warning systems to 37% for economic losses: that is, many RRD actions can also be considered adaptation actions. Despite acknowledging climate change as an underlying risk driver, the 38 indicators in the framework do not distinguish between climate-related and non-climate-related disasters, which creates fundamental attribution challenges. Moreover, their emphasis on rapid-onset hazards effectively de-emphasizes monitoring of slow-onset impacts such as sea level rise, desertification, and biodiversity loss—creating measurement gaps central to adaptation concerns. This methodological mismatch limits the framework's utility for tracking proactive climate adaptation investments, as it primarily measures negative outcomes rather than positive adaptation actions.

In a similar vein, the **CBD framework** offers a unique dual approach, viewing biodiversity both as vulnerable to climate impacts and as a solution provider through Ecosystem-based Adaptation (EbA), which might offer a strong enhancement to climate action, further strengthened by the explicit attempts at cooperation between the two conventions, such as through the Climate-Nature Cooperation Platform launched at COP28. However, analysis reveals a significant disparity in terms of alignment with climate goals: for instance, Target 8 (climate solutions) shows 87% adaptation alignment, while Target 19 (financial resources) shows only 31% alignment. However, the framework faces a critical quality-over-quantity measurement bias—it quantifies ecosystem extent for adaptation services without adequately capturing the effectiveness of ecosystem-based interventions or their actual human adaptation benefits (Reid et al., 2019). This creates a disconnect between the strong conceptual alignment and measurement practice, particularly in assessing the resilience contribution of nature-based solutions.

Finally, the **CCD framework** focuses on Land Degradation Neutrality (LDN), employing three core indicators: land cover change, land productivity dynamics, and soil organic carbon stocks. These indicators, potentially, can strongly support climate adaptation by enhancing ecosystem resilience, improving water retention, and building adaptive capacity in vulnerable dryland communities. Climate change is a main driver of desertification, creating strong principal alignment between CCD goals and adaptation outcomes. However, current CCD metrics focus primarily on land degradation processes rather than explicitly measuring climate adaptation outcomes, representing a gap between strong conceptual alignment and measurement practice.

Beyond formal frameworks, Non-State Actors (NSA) play instrumental roles in implementing adaptation goals, operating outside treaty systems with greater flexibility and innovation. Key examples include the Race to Resilience campaign (targeting the resilience for 4 billion people by 2030), C40 Cities (aiming for comprehensive adaptation plans in member cities by 2025), TCFD (providing four-pillar framework for climate risk disclosure), and GACSA (targeting 500 million farmers adopting climate-smart practices by 2030). NSAs demonstrate greater agility compared to negotiated UN frameworks, often pioneering more dynamic and responsive measurement approaches that can quickly mobilize non-governmental resources to address particular adaptation needs. However, the multiplication of initiatives and their corresponding targets also runs the risk of duplicating, fragmenting, and diluting efforts. It also increases reporting burdens - considering that many actors take part in more than one of these initiatives at once.

It is clear, therefore, that critical alignment gaps persist across all major global frameworks. The challenge of attributing climate from non-climate impacts remains unresolved, while 'quality versus quantity' issues confound ecosystem assessment. In addition, temporal misalignments between long-term conservation goals and shorter-term adaptation needs create reporting difficulties. The institutional architecture also varies significantly—from centralized reporting (Sendai Monitor) to decentralized systems (CBD's NBSAPs) to voluntary market-driven approaches (TCFD) which raises questions over enhanced coordination or consolidation. Current targets across all the analysed frameworks, as well as their associated metrics, often tend to operate as static rather than dynamic measures and, as a result, critical dimensions such as locally led processes, trans-boundary risks, and transformational adaptation remain poorly tracked.

These findings point to an urgent need to enhance coordination and alignment of adaptation targets with other global goals and across frameworks, focusing specifically on harmonizing metrics, indicators, and data collection. This includes, for instance, developing indicators that measure both adaptation enhancement (building climate resilience) and advancement (facilitating progress), examining how contributions of specific adaptations toward different objectives can be effectively measured. Adaptive metrics that can evolve with changing conditions are crucial; mechanisms to regularly review and update adaptation indicators should be embedded to ensure they remain fit for purpose as climate impacts, institutional capacity, and understanding of adaptation effectiveness evolve. Finally, better integration of non-governmental approaches with formal multilateral measurement systems is essential, preserving their adaptive capacity and responsiveness while informing formal frameworks. IPAM and similar organizations can play a catalytic role in facilitating such coordination through regular coordination meetings among framework secretariats, supporting the development of standardized approaches to attribution challenges, and creating methodological bridges between different measurement systems.

Workshop on cross-scale and cross-sector dynamics

III. Cross-scale and cross-sector dynamics

Measuring adaptation progress under the Global Goal on Adaptation (GGA) presents fundamental challenges: defining an all-purpose set of indicators for measuring adaptation across different scales (local, sub-national, national, global) and sectors (water, health, agriculture, ecosystems, infrastructure, socio-economic) clashes with the highly context-specific nature of adaptation, with indicators and metrics valid at one scale or sector often losing relevance at another (New et al., 2022).

While many adaptation indicators have been developed for Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), financial mechanisms, and global frameworks such as the Sustainable Development Goals (SDGs) and the Sendai Framework, most frameworks currently follow a top-down approach, in which indicators are first developed at the global level, and all countries must then report through their national Monitoring, Evaluation, and Learning (MEL) systems. While local and subnational actors often provide data into this process, they are often not included in the framework and metric design process, leading to indicators that are sometimes not very well suited for local contexts (Beauchamp et al., 2024; Leiter et al., 2019; Christiansen et al., 2018). In this context, the lack of mechanisms to translate global indicators to local contexts may hinder effective measurement as well as its appropriation by local actors (Pimenta et al., 2024; Kumar et al., 2015).

On top of this, the frameworks and metrics reviewed as part of this work show that scalar fragmentation and mismatches are quite common, creating substantial barriers to effective adaptation measurement. Metrics at local, national, and global levels rarely align (e.g.,local flood response indicators may track daily changes while national adaptation policy focuses on annual progress). For instance, in the case of the water sector, metrics demonstrate distinct characteristics depending on scale—ranging from highly localized parameters (municipal water supply reliability or flood risk for specific communities) to broad global indicators (comparative assessments and tracking overall progress). This kind of silos and mismatches among territorial, socio-ecological, and institutional scales are evident across the frameworks reviewed, as most of the metrics identified are scale-specific and are applied at the level of policy implementation such as the household level, local or project level, depending on the case (Pringle, 2011; Olivier et al., 2013; CARE, 2014; BRACED, 2015; Leiter, 2016).

This may prevent coherent aggregation, as indicators applicable at the project or local level might not be appropriate for national-level tracking due to the context-specificity of climate risk and adaptation interventions.

Similarly, cross-sectoral interdependencies are significant and pervasive. Existing literature shows that adaptation metrics across different sectors are fundamentally interlinked, creating both synergies and trade-offs as well as possible cascading effects (Argyroudis et al., 2020;; Beevers et al., 2022). For example, irrigation efficiency affects agricultural productivity and water allocation; health outcomes depend on water supply, sanitation, and infrastructure; social protection spans multiple systems. Nature-based solutions can simultaneously benefit water, biodiversity, and health, while dams may improve water supply but harm ecosystems. Similarly water metrics exhibit complex interactions with agriculture (irrigation efficiency, drought-resistant crops, soil moisture management), energy (hydropower resilience, cooling water availability, pumping efficiency), health (water quality affecting disease rates), ecosystems (watershed-level water balance), and infrastructure (flood risk influencing design decisions), among others.

Accordingly, science has been proposing or piloting relational or interdependent approaches to adaptation, integrating sectors as components of broader socio-ecological, urban or territorial systems (Liu et al., 2023; Beceiro et al., 2022; Cradock-Henry et al., 2021), or focusing on multi-sector processes such as urban services, public health, urban metabolism or ecosystem services (Beceiro et al., 2022; Xiao et al., 2024; Zommers et al., 2020).

However, the implementation of these approaches in real-world, policy-driven contexts is only incipient, and most of the frameworks and metrics analysed in this study were found to be mostly sector-specific, with almost no evidence of sectoral evaluation across scale and even less on cross-sectoral evaluation frameworks. While this may respond to the context specificity of climate risk and adaptation interventions, and the sectoral difference in policies, priorities, and enabling factors (Christiansen et al., 2018; OECD, 2024), it also hinders aggregation. In general, at the level of policy and M&E design, there appears to still be a lack of conceptual reflection in metrics development in terms of the causal linkages between sectors and scales involved in adaptation.

As a consequence, major challenges in cross-scale and cross-sector aggregation persist across multiple dimensions. Standardized indicators fail to capture local context, masking underlying drivers of change and, when applied mechanically across scales and sectors, they miss context-specific changes in climate impacts and risk at each level and fail to capture cross-scale dynamics. Single composite indices mask important details on how, why, and what is causing changes, as the importance and contribution of individual indicators become obscured. This defeats the purpose of the learning component of MEL systems, making it difficult to track progress, set accountability, or rectify problems. Efforts to develop global indices using national level indicators (e.g., ND-GAIN index) lack context-specificity due to overly generalized adaptation indicators and dependence on quantitative data, rendering them unfit for documenting adaptation progress by national governments. The selection of indicators for such indices is often driven by data availability and ease of computation rather than adaptation theories, with poor proxies for adaptation serving as trade-offs for aggregation and feasibility.

In addition there are significant limitations that undermine effective adaptation tracking. Most of these approaches emphasize processes and outputs (e.g., number of projects) rather than outcomes and impacts (e.g., reduced vulnerability, enhanced resilience). Also, gender equality, equity, and social inclusion (GESI) dimensions and transformational adaptation are poorly integrated, while learning as a feedback loop remains

neglected despite being crucial for iterative adaptation in view of changing baselines and uncertainty. Finally, many of the revised indicators are qualitative and tend to focus on inputs and outputs (i.e., the immediate results of an action) rather than the outcomes (i.e., the impact of long-term changes).

The result of these gaps is a fragmented measurement landscape marked by inconsistencies in data quality, limitations in comparability, and challenges in coherence across frameworks. However, there are some important strengths such as a growing integration of adaptation and development objectives and the diversity of sectoral approaches, which together enhance policy coherence and cross-sectoral learning.

In the face of this, it is imperative to come up with a pragmatic MEL framework that can capture cross-scale and cross-sector dynamics while, at the same time, enable aggregation to inform national adaptation planning and the Global Stocktake (GST) (see proposal in Figure 6, within Section V). Conceptual approaches based on systems thinking that link scales and sectors would help combining sector-specific resilience with relational resilience across interdependent systems, and integrating scales beyond fixed administrative levels—including territorial, ecological, and institutional scales. This whole-system perspective enables metrics that capture both subsystem robustness and cross-scale, cross-sector dynamics, while also acknowledging that the collective impact of local actions can be more than the sum of their parts. The methodological challenges of building multi-scalar indicators without sacrificing contextualization and a framework that could integrate sectoral resilience across scale reiterates the need for scale-specific metrics and frameworks. We will take this challenge up in **Section V.**

View of the assistance at plenary session, IPAM international conference 2025

BOX: Indicators for the GGA: Reflections on the UAE-Belém Work Programme

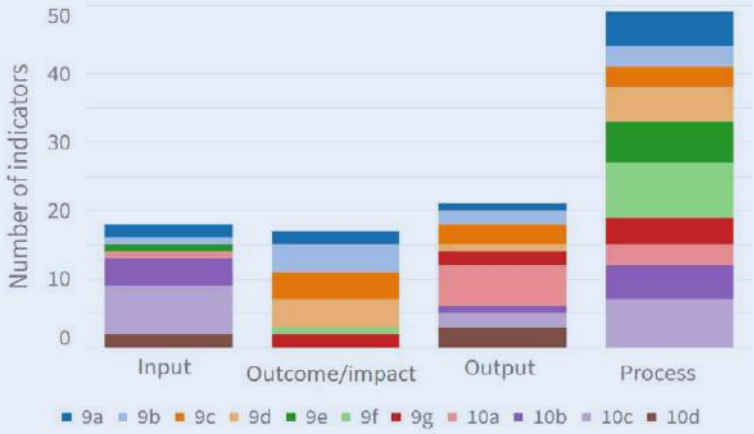
Much attention at COP30 will be on the results of the UAE–Belém Work Programme (2024–2025), which seeks to consolidate more than 9,000 existing indicators into a coherent set of approximately 100 for evaluating progress toward the Global Goal on Adaptation (GGA). The process of this consolidation followed five main steps: unpacking targets, clustering indicators, identifying gaps, refining and prioritizing, and finally validating results. The final output is 100 indicators, although some of these several slightly different variants (one of which will be selected by parties after negotiations). The total count is 105 if all variants are counted.

The 100 GGA indicators represent a great technical achievement — a globally balanced, scientifically grounded set of measures for adaptation progress (Figure 2). But they are not yet operational because they rest on incomplete definitions of support, inconsistent methodologies, and uneven data capacity. Overall, the indicator framework remains dominated by process (47%) and output (20%) metrics, with inputs accounting for about 17%. Only around 16% of indicators capture outcomes or impacts, highlighting that the framework still focuses more on actions and resources than on assessing real effectiveness or long-term adaptation results.

Figure 2.

Number of indicators in the final set of 100 indicators by target (9a = water resilience and climate-induced water scarcity; 9b = climate-resilient food systems; 9c = health resilience; 9d = ecosystem and biodiversity resilience; 9e = resilient infrastructure and human settlements; 9f = adaptive social protection and livelihoods; 9g = cultural heritage resilience; 10a = impact, vulnerability, and risk assessment; 10b = adaptation planning; 10c = implementation of adaptation actions; 10d = monitoring, evaluation, and learning).

Source: Own preparation.



While it is claimed that the list carefully balances Impact-oriented indicators and action-oriented indicators, functional analysis shows that outcome/impact indicators are underrepresented overall, and that repartition by target is unequal: only 4 targets have impact/outcome indicators, and not all targets have every type of indicator (e.g., 9d does not have any input indicators). The post-COP30 phase must therefore focus less on creating new indicators and more on making the existing ones measurable, comparable, and implementable for all Parties—especially those with the least capacity. The analysis of the shortcoming of the set of 100 indicators underscores the need for a selection framework that can transparently and equitably guide experts and negotiators in the reduction of the number of indicators while ensuring that all dimensions of the GGA remain covered without losing analytical depth or functionality. Such a tool would be critically relevant before and during COP30 as parties are still struggling to decide whether the list of 100 should be kept globally or further reduced to a core set. A Decision Support System that would apply functional analysis to a potential core set of indicators may be useful during the negotiations at COP30 in Belem. An example of such DSS is available at https://gga-indicator-refinement.streamlit.app/.

Which applies functional analysis to any subset of indicators among the 100 to illustrate the implications in terms of target coverage and data availability. The tool can be extended to subtarget coverage and metadata availability, among others.

IV. Climate adaptation metrics tools: experiences, best practices and lessons learned

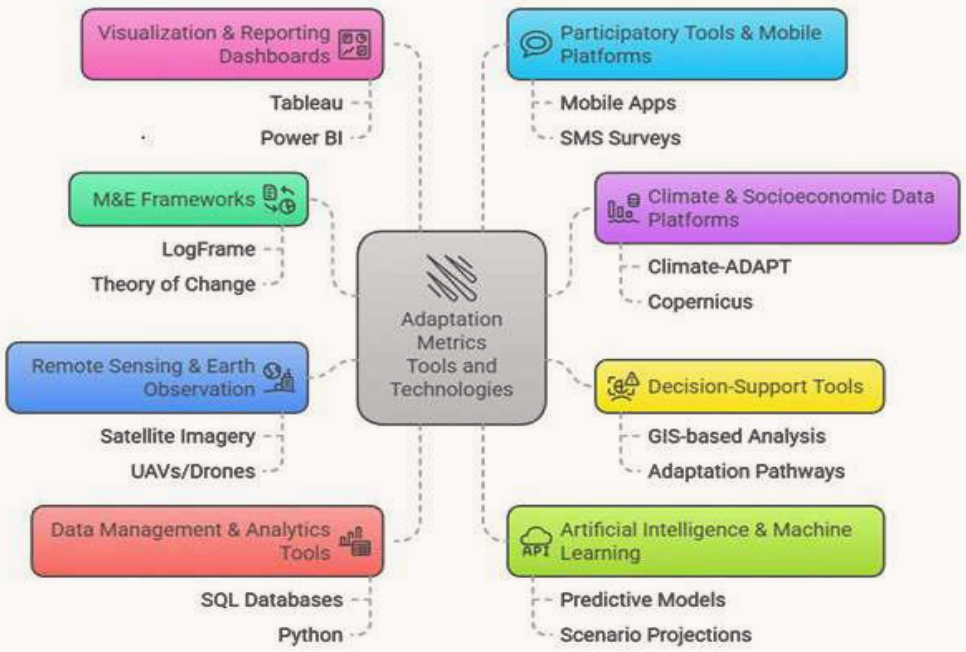
As previously noted, while adaptation requirements continue to grow, metrics, frameworks and tools to assess their effectiveness have not kept pace. This shortfall weakens effective resource allocation, hinders informed decision-making, and limits the opportunity to learn and replicate from successful experiences – ultimately constraining the effectiveness of climate governance (UNFCCC, 2022).

Climate adaptation tools are essential for evaluating progress in reducing vulnerability and climate-related risks and impacts but also, increasingly, for monitoring climate resilience. To date, a wide array of metrics tools is currently available, and emerging technologies—such as AI, IoT, and blockchains—are continuously expanding opportunities for better forecasting, enhanced transparency, and improved financial tracking **(Figure 3)**.

Figure 3.

Functional categories reflecting a typical adaptation-metrics workflow—from setting objectives and collecting data to analysis, decision support, visualization, and user feedback. Together, these categories form a closed loop that turns data into decision-ready insights.

Source: Own preparation.



View of the assistance at plenary session, IPAM international conference 2025

However, despite progress, many tools remain 'standalone' and lack interoperability, and comparability across regions and sectors continues to be present (Ulibarri et al., 2022)). Persistent challenges such as variable definition, quality, accessibility, and usability of data; inconsistent analytical methodologies; and limited longitudinal evidence of tool effectiveness remain. These issues hinder progress in tracking adaptation implementation, especially in vulnerable regions. In addition, unclear adaptation pathways with complex interactions between adaptation and development interventions; weak attribution of results; and insufficient integration across sectors and scales, often obscure cause–effect relationships and can severely limit the ability to assess real progress (Werners et al., 2021; Schlumberger et al., 2023).

Apart from technical difficulties in designing metrics, wider political and human resource issues often hinder effective monitoring and evaluation as a consequence of poor alignment between metrics and institutional priorities; low commitment to transparency; insufficient human and technical capacity and competency; and a lack of sustained financial resources (UNEP DTU Partnership, 2016). Indeed, while some blocs such as the European Union (EU) benefit from robust data and monitoring systems, many low- and middle-income countries face persistent capacity gaps, weak institutions, and fragmented governance structures (Malik & Ford, 2024)). In Middle East and North African (MENA) countries, for example, difficulties in monitoring, evaluating and tracking adaptation progress is often coupled with a lack of institutional and political willingness to act on climate change adaptation. Across Asian countries there is a marked disparity in capacity, governance and access to advanced tools, often compounded by financial and technical barriers. In summary, political short-termism and limited local capacity are often at the heart of blockages on the development and implementation of effective adaptation metrics, and consequently undermine climate resilience efforts. Moreover, marginalization of Indigenous Peoples and of women in some regions - together with behavioural resistance - can also significantly distort the identification and application of relevant metrics and hence assessment of adaptation outcomes (United Nations, 2025)).

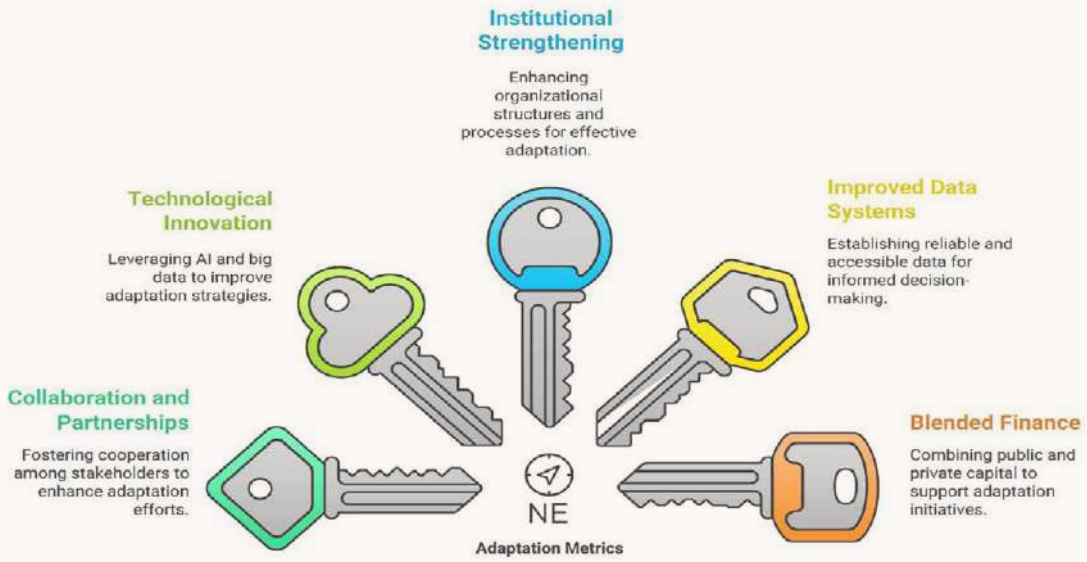
Likewise, financial barriers arising from the unequal distribution and underfunding of adaptation finance together with minimal levels of private sector investment, further hold back the creation of consistent and actionable multi-scale and multi-sector MEL systems (Watkiss & England, 2025; IMF, 2024).

All of this serves to underline the urgent need to develop and make operational robust adaptation frameworks to track progress, understand impact, and guide resource allocation, as well as to ensure transparency and accountability of actions. To achieve this requires strengthening tools and capacities, enhancing collaboration, fostering technological innovation, and reinforcing institutional frameworks **(Figure 4)**. This could be enhanced with greater investment in technical capacity and technology transfer in developing countries to ensure that all regions can contribute data and analysis on equal footing. Deeper consideration of how finance from developed countries to support what the Paris Agreement calls "means of implementation", in this case capacity building for tools, training and application in developed countries, can be mobilized is imperative (UNFCCC, 2015).

Figure 4.

Key elements required to operationalize robust adaptation frameworks to track progress, understand impact, and guide resource allocation, while ensuring transparency and accountability.

Source: Own preparation.



In this vein, linking adaptation metrics with finance is also crucial to ensure that resources are effectively directed toward measurable resilience outcomes and ensuring that decision-making is evidence-based and accountable (Bernhofen & Ranger, 2023). To date, metrics are urgently needed to inform results-based and blended finance mechanisms, such as those supported by the Green Climate Fund (GCF), Global Environment Facility (GEF), and the Adaptation Fund (AF), as well as by a growing ecosystem of private and hybrid finance mechanisms. To do that, dedicated funding is required to strengthen data systems, institutional capacities, and human resources, ensuring that adaptation tracking efforts are both credible and sustainable over time.

Lessons learned highlight that a comprehensive understanding of adaptation effectiveness requires mixed method approaches that combine both quantitative and qualitative metrics (Green Climate Fund, 2022). Inclusion of storytelling narratives and other qualitative insights enrich context-specific experiences and outcomes. This 'theory of change' of adaptation is all too often missed by focusing on quantitative indicators alone. In addition, there also needs to be a rebalancing of the emphasis from a focus on input and process-based indicators and towards outcome-based ones (EvalCommunity, 2025). This is difficult as the former tend to be the easiest to define and measure, but it is worth the effort to develop outcome measures as they better reflect real adaptation impact results.

The development of open-access and interoperable data systems underpinning metrics is essential for effective adaptation tracking and global comparability and is an effort that calls for sustained investment in data infrastructure and capacity (Boltz et al., 2022). The AMME Framework (Adaptation Metrics Mapping Evaluation), developed under the auspices of IPAM, provides an example of a systematic basis for identifying and selecting relevant adaptation metrics which are context-specific.

Technical innovation is key to strengthening resilience (Ford & Berrang-Ford, 2016). The integration of AI offers potentially unprecedented capabilities in data collection, risk modeling, decision support, and has the potential to transform raw environmental data into actionable risk metrics and generate real-time, high-resolution indicators (World Economic Forum, 2024). Other technological solutions (such as blockchain or the integration of IoT and remote sensing tools) can also revolutionise climate adaptation metrics. Together they will transform the ease with which funding and metrics applications might be tracked, audited and optimized and address persistent gaps in equity and scalability. However, all of that comes with significant ethical and operational challenges which, in turn, demand principled and accountable governance, especially in developing countries, where limited digital infrastructure and connectivity, and shortages of skilled professionals pose major constraints.

Development of climate adaptation MEL frameworks is an iterative effort requiring continuous learning across projects and institutions. Stakeholder engagement, where co-designing approaches to reporting tools development and application with communities ensures context-specific and local grounding, always stands a greater prospect of longer-term success and sustainability (UNFCCC Secretariat, 2024). This requires a transfer not only of technology, but know-how skills from developed to developing countries with serious effort required into the building of both local management capacity and local financial capacity, and a strengthening of local institutions that bridge between theoretical frameworks and practical implementation. At the same time, best practices and grassroot innovations in reporting, tracking and data should be leveraged and uptaken when suitable, thus fostering two-way learning..

Global progress on adaptation MEL, innovation, and climate action relies on the active engagement of both state and non-state actors (NSA), supported by strong multilateral and inter-ministerial coordination (UNFCCC High-Level Champions Team, 2024). The exchange of tools, data, and best practices among developing countries, together with the participation of local actors, is essential to ensure that adaptation metrics capture on-the-ground realities. Integrating learning-oriented governance approaches, such as MEL, into adaptation planning also serves to strengthen linkages with the Global Goal on Adaptation (GGA) and Global Stock Take (GST). Partnerships with the private sector drive innovation and mobilize financing but always require safeguards to ensure equity and transparency. Open and accountable systems foster trust among stakeholders and help attract private investment (Climate Policy Initiative, 2024).

Discussion panel at plenary session

Part of the document writing team at the IPAM international conference

V. Desired global adaptation metrics development

From the above consideration, there emerges a clear depiction of the current issues and strengths of global adaptation metrics. To move forward, this chapter introduces three proposals: first, a set of principles for indicator design; second, a functional classification of adaptation indicators; and third, a multi-scalar, multi-sectoral MEL framework for adaptation.

On the first point, while many different organizations have proposed criteria for designing more effective and meaningful adaptation metrics (UNEP, 2017; IPAM, 2021, 2023; UNFCCC, 2024), the sets of principles and conditions do not fully align. Based on a systematization of existing proposals, at least six overarching guiding principles can might look like **(Figure 5)**:

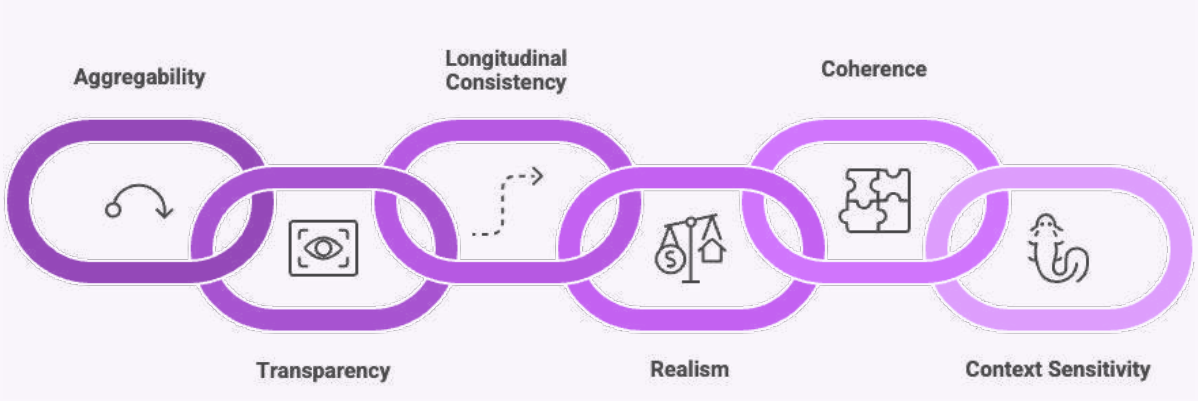
1. aggregable, enabling meaningful aggregation from local to global levels while still maintaining contextual nuance.
2. transparent, with data sources, methodologies, and limitations be clearly documented and accessible to all stakeholders.
3. longitudinal consistency, enabling progress tracking over time through stable definitions and methodologies.
4. realistic given resource and capacity constraints, particularly in many developing countries. Metrics that align with existing reporting systems, such as the SDGs and the Sendai Framework, improve efficiency and reduce duplication.
5. coherent so that metrics align with existing frameworks and form a logical, interconnected system capable of capturing different dimensions of adaptation while avoiding maladaptation.
6. sensitive to context; reflecting diverse national and local circumstances while still enabling comparison and synthesis at the international level. Together, these principles promote the development of metrics that are both globally comparable and locally relevant, balancing universal consistency with contextual specificity.

These principles are relevant in that they provide a general guidance for the selection and development of metrics. The process of reducing and selecting indicators is inherently political and requires transparent acknowledgment of trade-offs, which can be made simpler through the definition of shared principles and criteria such as the ones proposed.

Figure 5.

Six guiding principles for developing robust adaptation metrics: aggregable, transparent, longitudinally consistent, realistic, coherent, and context-sensitive. Together, these principles support metrics that are globally comparable yet locally relevant, ensuring transparency, efficiency, and alignment across adaptation frameworks and scales.

Source: Own preparation.



On the other hand, we also propose that a 'functional' classification of indicators would provide a rigorous, transparent, and systematic basis for indicator selection, enhancing both accountability and coherence, significantly increasing the usefulness and clarity of indicators.

This functional typology would distinguish:

- Input metrics refer to the measuring resources mobilized for addressing adaptation issues adaptation (such as obtaining funding, or available human capacity).
- Process metrics capture the activities, governance mechanisms, and institutional arrangements put in place to support adaptation.
- Output metrics measure the immediate results of interventions, for example, the number of projects implemented, or people trained.
- Outcome and impact metrics reflect longer-term effects on vulnerability and adaptive capacity and measure the enduring transformations in well-being, ecosystems, and economies that result from successful adaptation.

Although these indicators are methodologically challenging to define and measure, they represent the ultimate goal of adaptation and align closely with the broader objectives of sustainable development. This typology strengthens the logical connection between actions, their immediate and intermediate effects, and their long-term consequences, improving traceability and supporting more strategic evaluation and learning.

Within the 'outcomes and impact' category, a refined classification can be employed, distinguishing

between flexibility, memory, and self-transformation. Flexibility refers to a system's capacity to persist in the face of shocks and maintain essential functions. Memory captures the accumulation of learning and institutionalization of practices, reflecting adaptive capacity and the ability to adjust behaviors based on past experiences. Self-transformation represents the ability of systems to fundamentally reconfigure their structures, identities, and functional relationships when conditions demand, opening pathways for innovation and deeper transformation. This threefold framework links the measurement of outcomes with broader resilience dynamics, highlighting that effective adaptation is not only about persistence but also about transformation.

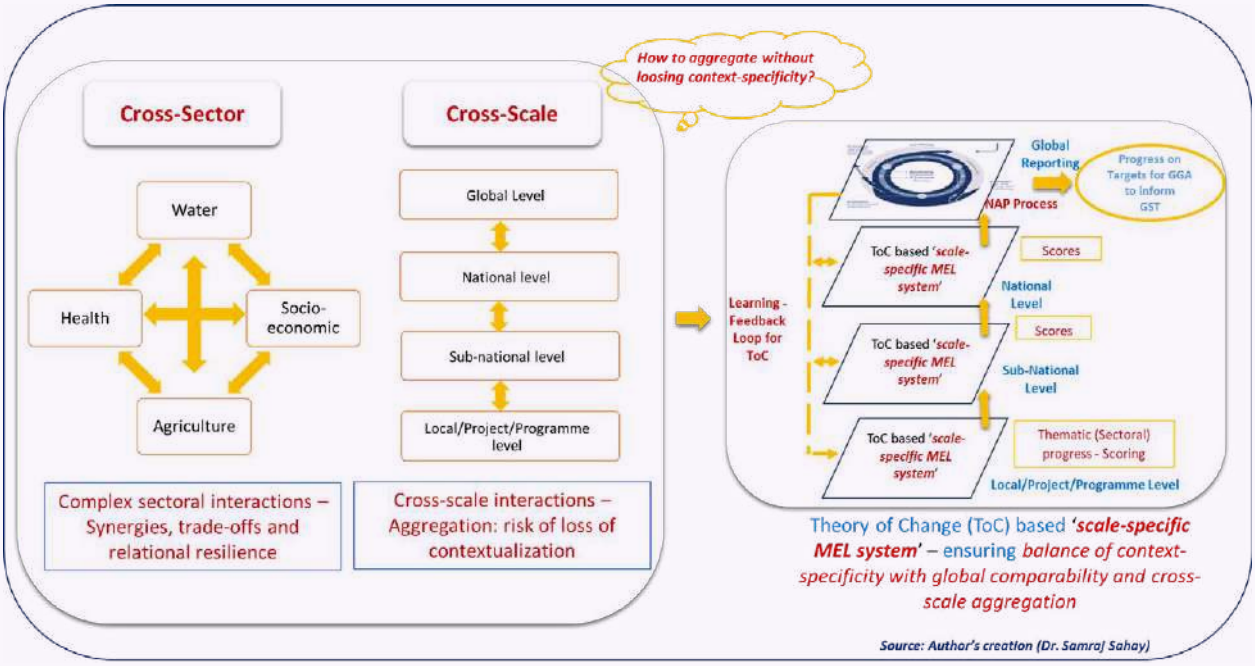
As mentioned above, currently outcome indicators remain the least developed and underrepresented type of metrics. Making explicit the functional classification would help in maintaining a balance among different types of metrics, essential to avoid overemphasizing certain dimensions. Moreover, it would feed smoothly into the adoption of a ToC approach to adaptation metrics, which would provide a clearer picture on how specific adaptation actions tie with their ultimate goal (reducing risks).

The advantages of the adoption of ToC approaches to adaptation has been often discussed elsewhere. However, to address these fundamental challenges discussed in Section III, a ToC-based, scale-specific MEL framework from the indicator's perspective that balances context specificity with global comparability and ensures cross-scale aggregation is proposed as a way forward (**Figure 6**). The framework begins with ToC development as the starting point, involving identification of relevant stakeholders, stakeholder-led context-specific indicator selection, incorporation of GESI, identification of locally defined risks to avoid maladaptation, and identification of transformational adaptation. The framework uses scorecards to aggregate sectoral results upward while preserving contextual meaning—sectoral (thematic) progress at each scale is evaluated using scale-specific ToC and indicators. The scale-specific scorecard is then used to inform the next higher level and finally to the National Adaptation Plan (NAP), allowing aggregation of results to inform the progress on GGA. An iterative learning loop is embedded to adjust interventions to shifting baselines and new knowledge, tracking both signals of change (shorter-term intermediate outcomes) and learning indicators.

Figure 6.

Theory of Change (ToC)-based 'scale-specific MEL system'.

Source: Own preparation.



This framework maintains context-specificity while enabling comparability. It can be applied at any scale—project/programme level, local level, sub-national and national level—while facilitating aggregation to inform national MEL systems under NAPs and global MEL under GGA. The proposed MEL system augments the existing systems with a framework for having adequate, effective, and context-specific indicators that can be aggregated across scales. This approach addresses the critical tension between the need for context-specific adaptation indicators and the requirement for national and global comparability under the GGA.

Operationalizing this framework will require coordinated action across multiple actors. National governments must develop context-specific MEL systems aligned with national priorities and policies but also be compatible with global frameworks, all while institutionalizing stakeholder participation (local communities, vulnerable groups, sub-national governments) in indicator design to ensure enhanced ownership, inclusivity, and legitimacy. Gender, equality and social inclusion must be systematically integrated in MEL processes, with a shift in focus from processes and outputs to outcomes and impacts that reflect real adaptation results. Global institutions (UNFCCC, GGA, GST, UAE-FGCR) should encourage and support bottom-up aggregation methods (e.g., scorecards, thematic synthesis) and provide flexible guiding frameworks that allow aggregation from diverse national systems instead of rigid top-down indicators. Recognition and encouragement of reporting on transformational adaptation and cross-sectoral synergies will help capture systemic resilience rather than just sectoral

outputs, while enabling learning as a central function of MEL systems will ensure that adaptation policies and practices remain flexible and responsive to shifting climate baselines and new risks.

It is also important to highlight the crucial role that researchers and practitioners have in advancing methodological innovations for cross-scale integration and relational resilience, exploring whole system approaches (e.g., water–energy–food–health linkages) to capture cascading risks and co-benefits essential for cross-sectoral integration in MEL systems. Strengthening learning-oriented evaluation will ensure MEL systems drive adaptive management rather than just reporting, while developing approaches to effectively balance context-specific adaptation indicators with requirements for national and global comparability under the GGA remains a priority. This proposed framework offers a feasible pathway to reconcile local specificity with global reporting requirements, providing a pragmatic approach for countries to track and report adaptation progress credibly on GGA and meaningfully inform the GST, while managing pertinent differences in the use of contextualized and standardized indicators and capturing cross-sectoral linkages while managing potential trade-offs and inequalities.

Finally, while we believe these proposals could contribute significantly to the quality and robustness of indicators and MEL frameworks, to make them operational it is also important to work on enabling conditions, such as: processes and resources for the regular updating of indicator sets to reflect evolving scientific knowledge and policy priorities; the development of clear guidances for applying and implementing indicators and MEL at different scales, including the functional typology; and, the creation of a permanent expert group dedicated to adaptation metrics, among others. These elements will be further analysed in the next and final sections.

Document writers' workshop, Rabat, October 2, 2025

VI. Creating Enabling Conditions for the implementation of adaptation metrics. Key recommendations

These recommendations synthesize the findings of IPAM experts and the International Conference on Adaptation Metrics held in Rabat in 2025. The key challenge ahead is to translate gaps and challenges previously discussed into operational systems that connect national and global reporting, and support the improvement of the evidence base for climate-resilient development. An overarching requirement is to marshall the international financial, human resource, and policy support for the following recommendations.

To advance the implementation of the Global Goal on Adaptation, a set of priority recommendations has been identified. These actions aim to enhance the coherence, inclusiveness, and effectiveness of adaptation metrics across all levels of governance addressing gaps previously named **(Figure 7)**.

Recommendation 1: Adopt whole system and context specific approaches

- Ensure that metrics capture linkages across sectors and scales, track both short and long-term outcomes, and that they reflect locally defined vulnerabilities and priorities. (This supports the UAE-Belém aim of aligning local, sub-national, national and global indicators within the GGA framework).

Recommendation 2: Ensure participation, transparency and accountability

- Co-design metrics with local and Indigenous stakeholders; communicate methods and results clearly
- Develop open, interoperable data systems that underpin the building of trust and accountability across the actors contributing to GGA and related monitoring processes.

Recommendation 3: Strengthen capacity in metrics development, application and coordination

- Establish an international adaptation metrics hub - coordinated by IPAM and partners - to share methodologies, training, and evidence aligned with GGA indicators
- Build national capacities to integrate these metrics into NAPs, NDCs, and sectoral planning.

Recommendation 4: Advance the technical and data foundations for metrics

- Address data gaps through structured frameworks (such as the AMME Framework)
- Develop quantitative and qualitative indicators together
- Invest in digital tools (such as AI, GIS, and blockchain) to improve metrics comparability and support GGA metrics reporting.

Recommendation 5: Link metrics to policy and finance

- Align adaptation metrics with decision and financing cycles to enable results-based and blended finance mechanisms that reward measurable resilience outcomes while safeguarding equity and transparency.

Recommendation 6: Promote adaptive learning and continual improvement

- Embed feedback loops and regular review protocols into monitoring and evaluation systems so that metrics evolve as new knowledge and climate realities become apparent. This will ensure continuing relevance under both UNFCCC and broader global metrics processes.

Figure 7.

Key recommendations to strengthen adaptation metrics under the Global Goal on Adaptation (GGA). Together, these recommendations aim to enhance coherence, comparability, and effectiveness in adaptation measurement and reporting across all levels of governance.

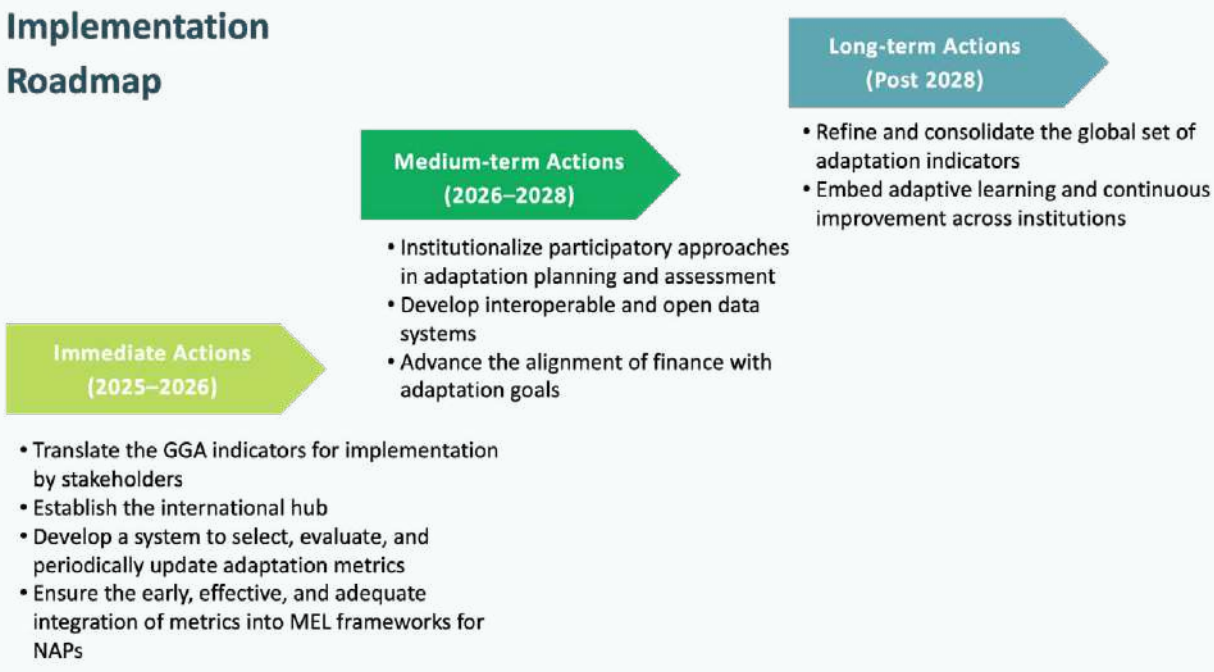
Source: Own preparation.

Furthermore, IPAM sets out a clear implementation timeline and responsibilities to close identified gaps, tackle challenges, and advance the recommendations (**Figure 8**).

Figure 8.

Phased roadmap for advancing adaptation metrics under the Global Goal on Adaptation (GGA). The roadmap outlines immediate (2025–2026), medium-term (2026–2028), and longer-term (post-2028) priorities to strengthen the development, implementation, and continuous improvement of adaptation metrics.

Source: Own preparation.



VII. Acknowledgements

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VIII. Annex

VIII.1. Methodological approach

A participatory method was used in the elaboration of this policy paper. A group of 20 adaptation practitioners and academics—members of the International Platform on Adaptation Metrics (IPAM)—convened at the beginning of 2025 and initiated the elaboration of a reference research document on adaptation metrics. The effort was undertaken in parallel with the UAE-Bélém Work Program on Adaptation Indicators process. The draft research document was circulated among eight peer reviewers ahead of the International Conference on Adaptation Metrics. Their feedback was incorporated into the design of the conference program and the outcomes of the present policy paper.

The international conference on adaptation metrics held in Rabat, Morocco, under the theme "Accelerating Global Climate Resilience through Robust Adaptation Metrics," convened 60 participants from 25 countries and a diverse institutional range, with a particular focus on African participation. Over three days, participants engaged in focus-group working sessions across five thematic areas, conducted both in French and English. Each thematic session was organised around four guiding questions that addressed technical as well as policy-oriented aspects of adaptation metrics. Following each set of parallel discussions, plenary sessions were held to synthesise findings and consolidate conclusions. This process has directly informed the present policy paper. Further dissemination and peer-reviewed publications of the findings are planned following COP30.

VIII.2. Adaptation MEL frameworks, indicators, and cross-scale aggregation

To come up with a pragmatic approach, a review of 19 documents related to monitoring, evaluation, and learning (MEL) systems that are already in practice, have been or are being used, and are proposed and recommended was carried out. The purpose was to develop an understanding of the MEL systems that operate across scales and sectors and map the positioning and contribution of adaptation indicators that could measure the adaptation performance at the national level while considering the adaptation action at the sub-national, local, and project/program level with an overarching objective of informing the progress of GGA for the purpose of GST. Among the 19 MEL frameworks, only seven explicitly delineated aggregation approaches, revealing a fundamental gap in how to connect local action with national and global reporting **(Table 1)**.

Table 1. Summary of key frameworks and tools for monitoring and evaluation (M&E) of climate change adaptation. The table synthesizes major publications and toolkits that address adaptation M&E systems, summarizing their objectives, framework characteristics, use of indicators and metrics, and proposed approaches for cross-scale aggregation and integration. It highlights common principles such as the need for standardized yet context-specific indicators, vertical and horizontal integration across governance levels, and mechanisms to ensure coherence between subnational and national adaptation reporting systems. *Note: The literature presented in the table is not exhaustive. Detailed review of only that document has been provided which specially provide the details of the M&E system with reference to the indicators and metrics, scale of implementation, sector and most importantly if aggregation of the outcome of the M&E of adaptation and the approach used for aggregation of the adaptation progress from the project/programme level, local and sub-national level to the national level have been provided.

Source: Own preparation.

Authors and publication type	Objective	M&E Framework-Mentioned/discussed	Indicator & Metrics in M&E system	Cross-Scale Aggregation/ integration proposed or recommended
Dazé, Price-Kelly, & Rass (2016) - Synthesis report	Framework for vertical integration of the M&E	Framework for vertical integration of the M&E - - two-way knowledge sharing between national and sub-national actors to support learning and integration - Sharing of synthesized results and strategic lessons from the M&E system with sub-national actors recommended.	Sub-national metrics for adaptation must be designed to ensure aggregation and synthesis.	The aggregation approach is to use - - standardized indicators at different levels -specific indicators identified by sub-national actors at their level based on key themes decided at the national level to account for context-specificity - synthesis of information from different levels, identifying common themes and lessons
Price-Kelly, Hammill, Dekens, Leiter, & Olivier (2015) - Guidebook	To guide decision-making regarding the purpose, design, operationalisation, and use of results of an appropriate system for national M&E of adaptation.	Guidance on development of national M&E system, application (scale) and aggregation of data and information across priority sectors (horizontally at the same level and across geographical scale (vertically).	Indicator selection based on the relevance to the context determined by ToC, focus of the M&E (process or outcome), data availability and resources required.	Aggregation - As suggested by Leiter (2015) -Using standardised (i.e. the same) metrics at all scales -actors at different scales to use level specific (i.e. different) metrics that address common themes identified at the national level - ensure the information produced will be easily aligned with the national system -Focusing on informal links or a synthesis of available information
Climate Investment Funds (CIF) (2018)- Toolkit	To provide a common understanding of monitoring and reporting and a common set of indicators within and across all PPCR (The Pilot Program for Climate Resilience) countries.	PPCR results framework for the use of five core indicators that every PPCR country is required to monitor and report on annually over the lifetime of their SPCR (a Strategic Program for Climate Resilience)	The core indicators to be used at national level with data from the subnational level to cover resilient development planning, adaptive capacity, decision making, and innovative investment approaches and reflect the expected transformation process taking place in PPCR countries	Uses the five core indicators to measure progress at either the national or project/program level and PPCR-provided instruments (scorecards or tables) to collect data based on indicator type (qualitative or quantitative) - Scoring done by stakeholders -Project level scores are aggregated to reach at the national level scores

Authors and publication type	Objective	M&E Framework- Mentioned/ discussed	Indicator & Metrics in M&E system	Cross-Scale Aggregation/integration proposed or recommended
Brooks & Fisher (2014)- Toolkit	To come up with a manual/step-by-step guidance for developing a robust M&E framework that is used by national governments, sectoral specialists, project, and programme managers - Tracking adaptation and measuring development (TAMD) framework.	TAMD, a twin-track framework that assesses institutional Climate Risk Management (CRM) (Track 1) and measures adaptation and development performance (Track 2) where track 1 influences track 2 through processes described in theory of change (ToC).	Uses four categories of indicators for – CRM, resilience, wellbeing, and climate hazards.	The framework suggests - - Use of scorecard method (involving each stakeholders) for each indicator to evaluate the change at each level to inform the next level - Recommends data for indicators to be collected at the respective level
United Nations Environment Programme (2021) – Technical Guidelines.	To come up with guidelines to motivate countries to adopt ecosystem-based (EbA) approaches to adaptation.	MERL built into the NAP planning stage and facilitated harmonizing the indicators across sectors and governance levels, also seeking their integration with existing frameworks, such as the Sendai framework, SDG, or The Aichi targets for CBD action plans to optimize utilization of resources.	EbA metrics system should be - Conceptually sound, yet simple and operationally feasible- - Capable of measuring the impact of a single project but also be scalable to a programme, sector or NAP level.	Establishing a hierarchical system of indicators as monitoring take place at the project level, thus allowing aggregation of EbA and non-EbA indicators at the NAP level - To allow aggregation, setting of quantitative goals, time-bound targets, and use of SMART indicators, preferably in a hierarchical scheme is recommended.
Vallejo (2017)- Working paper	To review and present current national approaches to M&E of adaptation, identify key challenges and put them in the context of the international climate negotiations.	M&E, based on the review, combines a varying number of qualitative and quantitative indicators used to monitor trends in climate exposure and vulnerability, realised impacts of climate events, and/or assess either adaptation processes or outcomes.	M&E systems mostly use indicators on climate risks, on adaptation processes and on adaptation outcomes.	The study recommends following two approaches for aggregation - -Vertical integration of the MEL system as given in Daze *et al*., 2016 - Three ways of aggregation formalized by Leiter (2015)- (i) Using standardised indicators for each sector across geographical levels (ii) Use of level-specific metrics that address common themes identified at the national level, and (iii) Focusing on informal links instead of designated indicators
OECD (2024) - Report	To provide a stocktake of countries' efforts and reflect OECD members' strong interest in developing and using indicators to measure their climate adaptation progress (with cases from Chile, Korea, Slovak Republic and the United Kingdom).	The OECD's approach recommends separate M&E framework at different scale with sub-national actors measuring the effectiveness at their level and reporting it to the national government	UK uses different indicators for the same outcome due to inadequate UK-wide data coverage Chile, at present uses only sector and scale specific indicators South Korea - implementing ministries for the sectoral adaptation and local government carry-out self-evaluations using combination of of key performance indicators for each sector	The review finds that - In the case of the UK, aggregation is not possible due to the number of sectors involved and the diversity of the dimensions. Chile has been planning to develop a system for expanding the indicator coverage across different sectors and different levels of government. South Korea - each of sector (ministries) and local government evaluates using their specific indicators and report to the NAP using scores (very good, good, average and insufficient) at their level

VIII.3. Literature cited

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