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# Measuring climate action beyond commitments: a nationally determined contributions implementation index for Africa

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The Paris Agreement shifted global climate governance from a top-down to a bottom-up model, making countries directly responsible for implementing their Nationally Determined Contributions (NDCs). Yet global monitoring frameworks remain focused on ambition and emissions, overlooking the institutional, governance, and financial conditions that determine delivery. This omission is particularly acute in Sub-Saharan Africa, where climate vulnerabilities intersect with weak institutions, fragmented data, and limited financial resources. This paper applies the NDC Implementation Index, a multi-dimensional framework developed through participatory stakeholder engagement to assess implementation rather than ambition. The Index evaluates five components—Governance (30%), Measurement, Reporting and Verification (MRV) (25%), Mitigation (20%), Adaptation (15%), and Finance and Technology Transfer (10%)—and was co-designed with African stakeholders to ensure contextual relevance. Data from NDCs, National Communications, Biennial Update Reports, and National Adaptation Plans for 12 countries (Kenya, Ethiopia, Ghana, Zimbabwe, Tanzania, Côte d'Ivoire, Namibia, Uganda, Botswana, Sierra Leone, Zambia, and Nigeria) were analysed using standardized scoring protocols. Results show that governance is the strongest dimension, with Kenya, Zimbabwe, and Ghana demonstrating advanced frameworks. Mitigation shows moderate progress, while adaptation remains underfunded. MRV, Finance, and Technology Transfer emerge as the weakest link, exposing systemic inequities in climate finance accessibility. The study contributes conceptually by operationalizing implementation as a measurable construct; methodologically by offering a transparent, participatory index; and strategically by creating opportunities for peer learning. It concludes that robust institutions are necessary but insufficient without equitable access to finance and technology, and calls for the integration of the Index into national and global accountability systems.

## KEYWORDS

adaptation, climate finance, climate governance, measurement, reporting and verification, mitigation, nationally determined contributions, NDC implementation index and technology transfer

## 1 Introduction

The Paris Agreement, adopted in 2015 under the United Nations Framework Convention on Climate Change (UNFCCC), marked a historic turning point in global climate governance by introducing a universal framework of Nationally Determined Contributions (NDCs). Unlike earlier top-down approaches such as the Kyoto Protocol, the Paris Agreement created a bottom-up architecture in which each country voluntarily sets its own mitigation and adaptation goals, with the expectation that collective efforts will limit global warming to well below 2 °C (Chan, 2016; Falkner, 2016). This shift placed national ownership and flexibility at the core of climate action, empowering states to articulate priorities in line with domestic circumstances.

Yet the challenge remains how to ensure that ambition is effectively translated into sustained and measurable implementation. While global monitoring platforms such as the Climate Action Tracker and the United Nations Environment Programme's (UNEP's) Emissions Gap Reports focus largely on ambition and quantitative emission trajectories, they often underestimate institutional, governance, and capacity dimensions that determine long-term effectiveness (Ross and Winkler, 2021; Pauw et al., 2017). This narrow focus obscures whether countries are building the governance systems, financial mechanisms, and adaptive capacities required to sustain climate action.

This limitation is particularly consequential in sub-Saharan Africa. Despite contributing minimally to global emissions, African countries face acute vulnerabilities, including increased extreme weather events, food and water insecurity, and risks to livelihoods (Intergovernmental Panel on Climate Change IPCC, 2022; Rogelj and Schönfeld, 2025). At the same time, structural constraints such as weak institutions, limited technical capacity, and overdependence on intermediated finance constrain their ability to translate climate commitments into tangible outcomes (African Union, 2022; Elbarky et al., 2024). Traditional monitoring frameworks have further reinforced these challenges by relying on input-based measures—pledged emission cuts or finance flows—without assessing whether governance and institutional conditions enable effective delivery. Adaptation, a critical priority for Africa, is especially underrepresented.

To address these gaps, the African Technology Policy Studies Network (ATPS) and the Pan-African Climate Justice Alliance (PACJA) developed the NDC Implementation Index through a multi-year participatory process (2018–2020). The Index emerged from recognition that existing monitoring tools prioritized emission reductions over institutional capacity, creating a blind spot in assessing whether countries could actually deliver on their commitments. Development involved three regional workshops in Nairobi, Addis Ababa, and Dakar (2019), which engaged 127 stakeholders, including national climate focal points, civil society representatives, academic researchers, and officials of regional economic communities. Participants co-designed a five-dimensional framework—Governance (30%), Measurement, Reporting and Verification (MRV) (25%), Mitigation (20%), Adaptation (15%), and Finance and Technology Transfer (10%)—with indicators scored on a five-point scale from poor to outstanding (Ozor, Nyambane, and Muhathiah, 2025).

The Index was piloted between 2019 and 2021 in eight African countries (Botswana, Côte d'Ivoire, Ethiopia, Gabon, Kenya, Nigeria, Tanzania, and Zambia), combining political economy analysis, stakeholder mapping, national consultations, and data validation processes

(Ozor, Nyambane, 2020). This phase ensured the instrument was technically sound, context-responsive, and policy-relevant while strengthening civil society and government capacity to engage with NDC data. Building on this foundation, the initiative was subsequently scaled up within a larger programme that emphasized institutionalisation, capacity building for NDC focal points, and the deployment of a digital NDC Index platform.

This paper applies the validated NDC Implementation Index to assess implementation progress across 12 African countries—Kenya, Ethiopia, Ghana, Zimbabwe, Tanzania, Côte d'Ivoire, Namibia, Uganda, Botswana, Sierra Leone, Zambia, and Nigeria—representing the first systematic cross-national application of the framework. The study has three primary objectives: first, to diagnose systemic gaps in governance, transparency, and finance that constrain NDC delivery; second, to identify regional patterns and peer-learning opportunities; and third, to generate evidence-based recommendations for institutional reform and regional cooperation. By focusing on implementation rather than ambition, this paper addresses a critical gap in climate policy, governance, research, and practice.

The NDC Implementation Index extends theories of polycentric and adaptive governance by translating them into a measurable framework. Polycentric governance emphasizes the interplay of multiple centers of authority (Ostrom, 2010), while adaptive governance highlights learning and flexibility (Duit and Galaz, 2008). The Index operationalizes these concepts by assessing how institutional arrangements, accountability mechanisms, and data systems interact with finance and technology flows to shape implementation. In doing so, it advances debates on climate governance by demonstrating that effective implementation is not reducible to emissions outcomes, but is contingent on the interplay of institutions, resources, and equity.

## 2 Methodology

### 2.1 Country selection and data collection

This study applied the NDC Implementation Index to 12 African countries selected to represent regional diversity, varying levels of institutional capacity, and different climatic vulnerabilities: Kenya, Ethiopia, Ghana, Zimbabwe, Tanzania, Côte d'Ivoire, Namibia, Uganda, Botswana, Sierra Leone, Zambia, and Nigeria. Selection criteria included: (i) geographic representation across East, West, and Southern Africa; (ii) availability of recent NDC submissions and national communications; (iii) diversity in economic structure (resource-dependent vs. diversified economies); and (iv) variation in institutional maturity. Nigeria and Ghana represent West African economies with significant fossil fuel dependence; Kenya, Ethiopia, Tanzania, and Uganda comprise East African cases with relatively advanced climate governance; Zimbabwe, Zambia, Botswana, and Namibia represent Southern African contexts with distinct land-use and mitigation profiles; Côte d'Ivoire and Sierra Leone provide additional West African perspectives with differing institutional capacities. It was also a requirement that the participating countries, through their governments, provide a no-objection letter and commit to support the initiative.

Primary data were collected between January 2023 and June 2024 through systematic document analysis and direct engagement with national data holders. Documents analysed included NDCs (first and

updated submissions), National Communications (NCs) to the UNFCCC, Biennial Update Reports (BURs), Biennial Transparency Reports (BTRs), National Adaptation Plans (NAPs), national climate change policies, and legislative frameworks. National data holders—specifically UNFCCC national focal points, environmental protection agency officials, and national statistics office representatives—were contacted through formal letters of request sent via email and followed up with virtual consultations. Secondary data sources included the UNFCCC secretariat database, the World Bank climate change knowledge portal, the International Renewable Energy Agency (IRENA) statistics, the United Nations Food and Agriculture Organisation (FAO) forestry databases, and the Organisation for Economic Co-operation and Development (OECD) climate finance tracking systems.

## 2.2 NDC implementation index platform analytical framework and scoring methodology

The NDC Implementation Index evaluates performance across five weighted components: Governance (30%), MRV (25%), Mitigation (20%), Adaptation (15%), and Finance and Technology Transfer (10%) (Ozor, et al., 2025). Indicators within each dimension are scored on a five-point scale, ranging from poor to outstanding, benchmarked against national NDC targets. Detailed scoring protocols and country assessments are available at <https://atps-ndcindex.africa/>.

### 2.2.1 Indicators and scoring criteria

Table 1 presents the specific indicators assessed within each dimension. For Governance (30%), indicators included: existence of dedicated climate change legislation (scored 1–5 based on binding vs. advisory status); functionality of inter-ministerial coordination mechanisms (assessed through frequency of meetings and evidence of joint planning); degree of subnational integration (presence of county/provincial climate units); and accountability mechanisms (parliamentary oversight committees, civil society consultation requirements). MRV (25%) indicators encompassed: existence of a designated national MRV entity; frequency and timeliness of UNFCCC submissions; integration of data flows across energy, agriculture, and forestry sectors; and technical capacity for GHG inventory compilation (evidenced by use of IPCC Tier 2 or 3 methods). Mitigation (20%) indicators tracked: renewable energy share in national mix; implementation status of Nationally Appropriate Mitigation Actions (NAMAs); energy efficiency program coverage; and progress against sectoral emission targets specified in NDCs. Adaptation (15%) indicators evaluated: National Adaptation Plan development and implementation status; coverage of climate-resilient agriculture and water programs; existence of disaster risk reduction institutional mechanisms; and budget allocation transparency for adaptation. Finance and Technology Transfer (10%) indicators measured: volume of climate finance accessed (bilateral, multilateral, domestic); existence of national climate fund or green finance mechanism; degree of private sector engagement in climate investments;

TABLE 1 Specific indicator assessment.

Dimension	Specific indicators assessed	Scoring criteria
Governance (30%)	<ol style="list-style-type: none"> <li>1. Climate change legislation (binding vs. advisory)</li> <li>2. Inter-ministerial coordination functionality</li> <li>3. Subnational integration (county/provincial units)</li> <li>4. Accountability mechanisms (oversight, CSO engagement)</li> </ol>	<ol style="list-style-type: none"> <li>1 = Poor: No framework</li> <li>2 = Weak: Draft/policy only</li> <li>3 = Average: Legislation without enforcement</li> <li>4 = Good: Functional coordination with gaps</li> <li>5 = Outstanding: Fully operational with accountability</li> </ol>
MRV (25%)	<ol style="list-style-type: none"> <li>1. Designated MRV entity existence</li> <li>2. Timeliness of UNFCCC submissions</li> <li>3. Cross-sectoral data integration</li> <li>4. GHG inventory technical capacity (IPCC Tier level)</li> </ol>	<ol style="list-style-type: none"> <li>1 = Poor: No system</li> <li>2 = Weak: Ad-hoc reporting</li> <li>3 = Average: System exists, fragmented data</li> <li>4 = Good: Regular reporting with gaps</li> <li>5 = Outstanding: Fully integrated, timely, Tier 2/3 methods</li> </ol>
Mitigation (20%)	<ol style="list-style-type: none"> <li>1. Renewable energy penetration rate</li> <li>2. NAMA implementation status</li> <li>3. Energy efficiency program coverage</li> <li>4. Progress against sectoral NDC targets</li> </ol>	<ol style="list-style-type: none"> <li>1 = Poor: No progress</li> <li>2 = Weak: Pilot initiatives only</li> <li>3 = Average: Partial implementation</li> <li>4 = Good: Significant progress, monitoring gaps</li> <li>5 = Outstanding: On track to exceed targets</li> </ol>
Adaptation (15%)	<ol style="list-style-type: none"> <li>1. NAP development and implementation</li> <li>2. Climate-resilient sector program coverage</li> <li>3. Disaster risk reduction mechanisms</li> <li>4. Adaptation budget transparency</li> </ol>	<ol style="list-style-type: none"> <li>1 = Poor: No NAP</li> <li>2 = Weak: NAP developed, not implemented</li> <li>3 = Average: Partial implementation, no monitoring</li> <li>4 = Good: Implementation with limited resourcing</li> <li>5 = Outstanding: Fully resourced, monitored, evaluated</li> </ol>
Finance and tech (10%)	<ol style="list-style-type: none"> <li>1. Climate finance volume accessed</li> <li>2. National climate fund/green finance mechanism</li> <li>3. Private sector engagement degree</li> <li>4. Technology partnership evidence</li> </ol>	<ol style="list-style-type: none"> <li>1 = Poor: No access/mechanism</li> <li>2 = Weak: Minimal external finance</li> <li>3 = Average: Moderate finance, high fragmentation</li> <li>4 = Good: Substantial finance, some domestic mechanisms</li> <li>5 = Outstanding: Diversified finance, strong tech transfer</li> </ol>

and evidence of operational technology partnerships or transferred technologies.

### 2.2.2 Weighting rationale

The weighting reflects both theoretical and empirical considerations derived from stakeholder workshops. Governance (30%) and MRV (25%) were prioritized because institutional strength and transparency are preconditions for credible NDC delivery, consistent with institutionalist theory (Peters, 2019) and transparency requirements under the Enhanced Transparency Framework. Mitigation (20%) and Adaptation (15%) reflect the dual pillars of climate action, but their relative weights acknowledge that without governance and MRV, progress cannot be verified or sustained. Finance and technology transfer (10%) were weighted lower in this version of the Index due to limited comparable data; however, results consistently show that this is the binding constraint. Sensitivity tests ( $\pm 5\%$ ) confirmed that country rankings remained stable, suggesting robustness despite normative judgments. Future iterations could rebalance weights as data ecosystems improve.

### 2.2.3 Validation and reliability

A co-design approach was employed through which ATPS and PACJA engaged national focal points and technical experts. Harmonized scoring protocols reduced subjectivity, while inter-coder reliability checks ensured consistency across countries. Where qualitative judgment was unavoidable, assessments were reviewed by independent experts to minimize bias.

### 2.2.4 Limitations

Data availability varied, with countries like Kenya and Zimbabwe benefiting from more recent reports. This creates a reporting bias

whereby data-rich countries would appear to perform better. Although reliance on government-reported data raises concerns about accuracy and transparency, such dependence is unavoidable, as governments are the primary custodians of official information. Data holders' reluctance to release information constituted a significant obstacle. These limitations highlight the need for improved climate data ecosystems in the region (UNFCCC, 2015; Intergovernmental Panel on Climate Change IPCC, 2022).

## 3 Results

### 3.1 Strengthening governance and institutional frameworks

Governance emerged as the strongest-performing dimension across the 12 countries assessed, underscoring the centrality of institutional arrangements in shaping effective NDC implementation. Countries such as Kenya, Zimbabwe, and Ghana stand out for having advanced legal and institutional frameworks that provide both authority and coordination for climate action. Kenya's Climate Change Act (2016) established a binding legal foundation for mainstreaming climate action across ministries and mandated accountability mechanisms through the Climate Change Directorate. Zimbabwe institutionalized climate governance through inter-ministerial councils that facilitate cross-sectoral coordination, while Ghana strengthened its National Climate Change Committee to integrate NDC objectives into national planning processes. These institutional innovations reflect deliberate efforts to embed climate policy within broader development agendas, thereby enhancing coherence and legitimacy (Peters, 2019).

By contrast, Namibia, Sierra Leone, and Botswana achieved only "average" scores, reflecting institutional weaknesses and limited

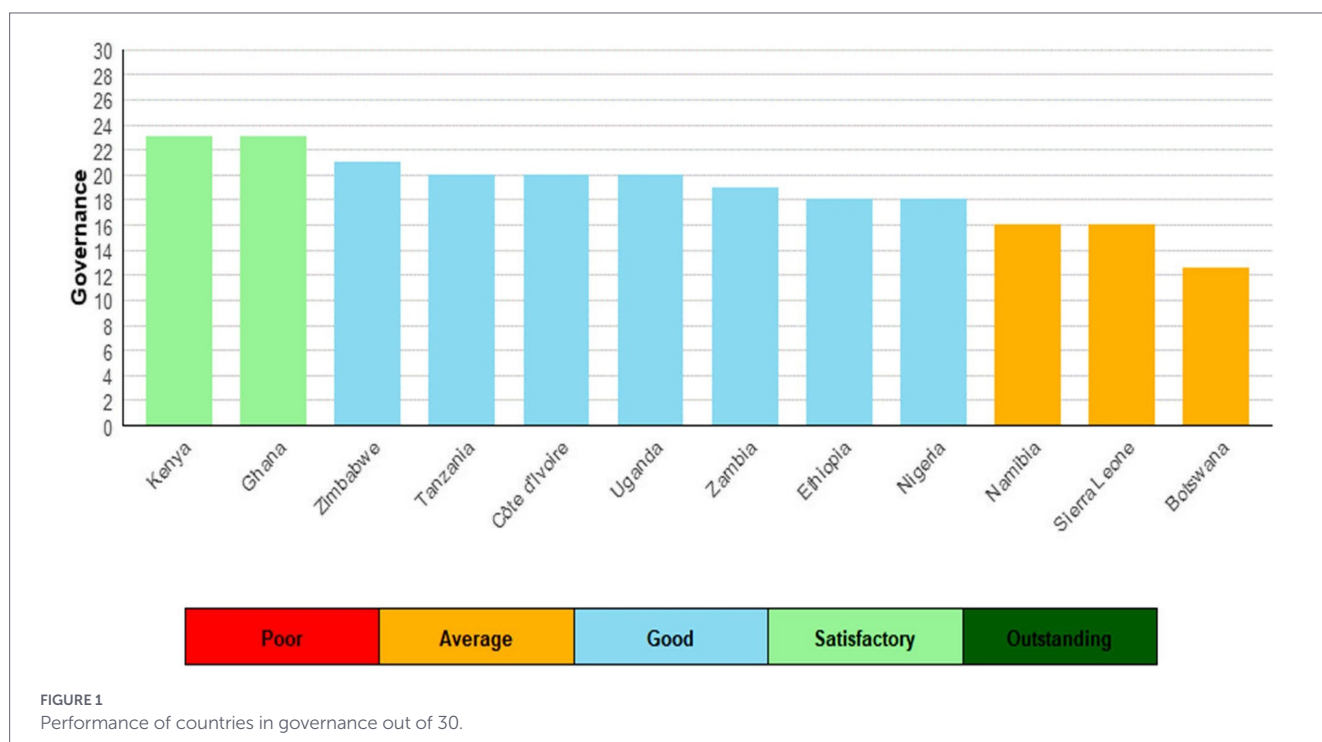


TABLE 2 NDC Index score per country.

Rank	Country	Governance (30%)	Measurement, reporting and verification (MRV) (25%)	Mitigation (20%)	Adaptation (15%)	Finance and technology transfer (10%)	Index score (100%)
1	Zimbabwe	21.0	17.1	15.1	11.0	7.3	71.5
2	Kenya	23.0	17.1	12.9	11.0	6.8	70.8
3	Ethiopia	18.0	15.0	12.4	11.5	7.2	64.1
4	Ghana	23.0	13.6	12.0	5.5	6.4	60.5
5	Tanzania	20.0	12.1	10.2	10.0	5.2	59.0
6	Côte d'Ivoire	20.0	14.3	12.0	8.0	5.4	57.5
7	Namibia	16.0	12.1	11.6	9.0	5.4	56.3
8	Uganda	20.0	10.4	10.2	7.0	4.2	53.5
9	Botswana	12.5	12.1	12.4	12.0	4.6	51.9
10	Sierra Leone	16.0	10.7	8.4	8.5	5.6	50.6
11	Zambia	19.0	8.9	7.0	7.0	5.0	50.6
12	Nigeria	18.0	11.6	5.5	5.5	3.7	49.5
	Average scores	19.0	12.9	10.8	8.8	5.6	57.7

Below 40 Index—Poor | >40 to 54 Index—Average | >55 to 69 Index—Good | >70 to 79 Index—Satisfactory | >80 Index—Outstanding.

enforcement capacity (Figure 1 and Table 2). While some of these countries have adopted policy frameworks or national adaptation plans, these are often not underpinned by binding legislation or adequately resourced implementation mechanisms. For instance, in Sierra Leone, climate institutions remain fragmented across ministries, with limited authority to compel coordination, whereas in Botswana, the absence of a dedicated climate change law has constrained the systematic integration of climate priorities into development planning. These gaps align with the concept of “institutional voids,” where formal structures exist but lack the authority, resources, or legitimacy to drive substantive change (Hajer, 2003).

The variation across countries illustrates two important insights. First, legal mandates matter: countries that have enacted climate legislation or embedded climate responsibilities in statutory frameworks demonstrate stronger performance. Second, coordination mechanisms and enforcement powers are as important as policy adoption. The presence of climate change committees or inter-ministerial platforms, if weakly mandated or poorly resourced, does not necessarily translate into effective governance.

At the regional level, East African countries appear to have advanced further in institutionalizing governance frameworks (Figure 2), reflecting a broader history of regional integration and donor-supported institutional reforms. By contrast, governance structures in parts of West Africa remain relatively fragmented, with weak mandates and low institutional capacity. This suggests that peer learning and South–South cooperation could be particularly valuable in governance reform, enabling weaker performers to adapt institutional innovations from regional leaders.

### 3.2 Progress and gaps in MRV systems

MRV systems showed moderate progress, with Kenya and Zimbabwe rated as “good,” while Ghana and Nigeria were rated as “average” (Figure 3). Persistent gaps include fragmented data flows and weak inter-ministerial coordination. For instance, Ghana’s MRV

system remains constrained by institutional silos, in which sectoral ministries collect data independently, without robust mechanisms for harmonization. Nigeria’s MRV challenges stem from weak institutional buy-in among key ministries and insufficient technical expertise to meet international reporting requirements. These challenges undermine the Paris Agreement’s Enhanced Transparency Framework, underscoring the urgency of investing in technical capacity and data integration (Ross and Winkler, 2021). MRV systems are a cornerstone of effective NDC implementation, enabling countries to track progress, ensure transparency, and maintain accountability. Across the 12 countries assessed, MRV performance showed moderate progress, with Kenya and Zimbabwe achieving “good” ratings, while Ghana, Côte d'Ivoire, and Nigeria remained “average.” No country scored “satisfactory” or “outstanding,” highlighting the structural weaknesses that continue to constrain MRV in the region. Country-level dynamics reveal uneven performance. Kenya’s relatively strong MRV system reflects early investments in institutional capacity, harmonized data protocols, and integration with its Climate Change Act (2016). Zimbabwe, despite broader institutional fragilities, has developed a functional system for compiling GHG inventories and reporting sectoral emissions.

At a regional level, East African countries (e.g., Kenya, Ethiopia) generally outperform others, partly due to stronger donor engagement in capacity building and earlier adoption of integrated climate governance frameworks. In contrast, West African countries often struggle with fragmented institutional setups and limited donor coordination, resulting in weaker MRV outcomes.

### 3.3 Mitigation efforts and financing constraints

Mitigation performance varied widely across all countries (Figure 4), reflecting differences in policy ambition, sectoral priorities, and access to finance and technology. While several countries have developed ambitious mitigation strategies, actual implementation

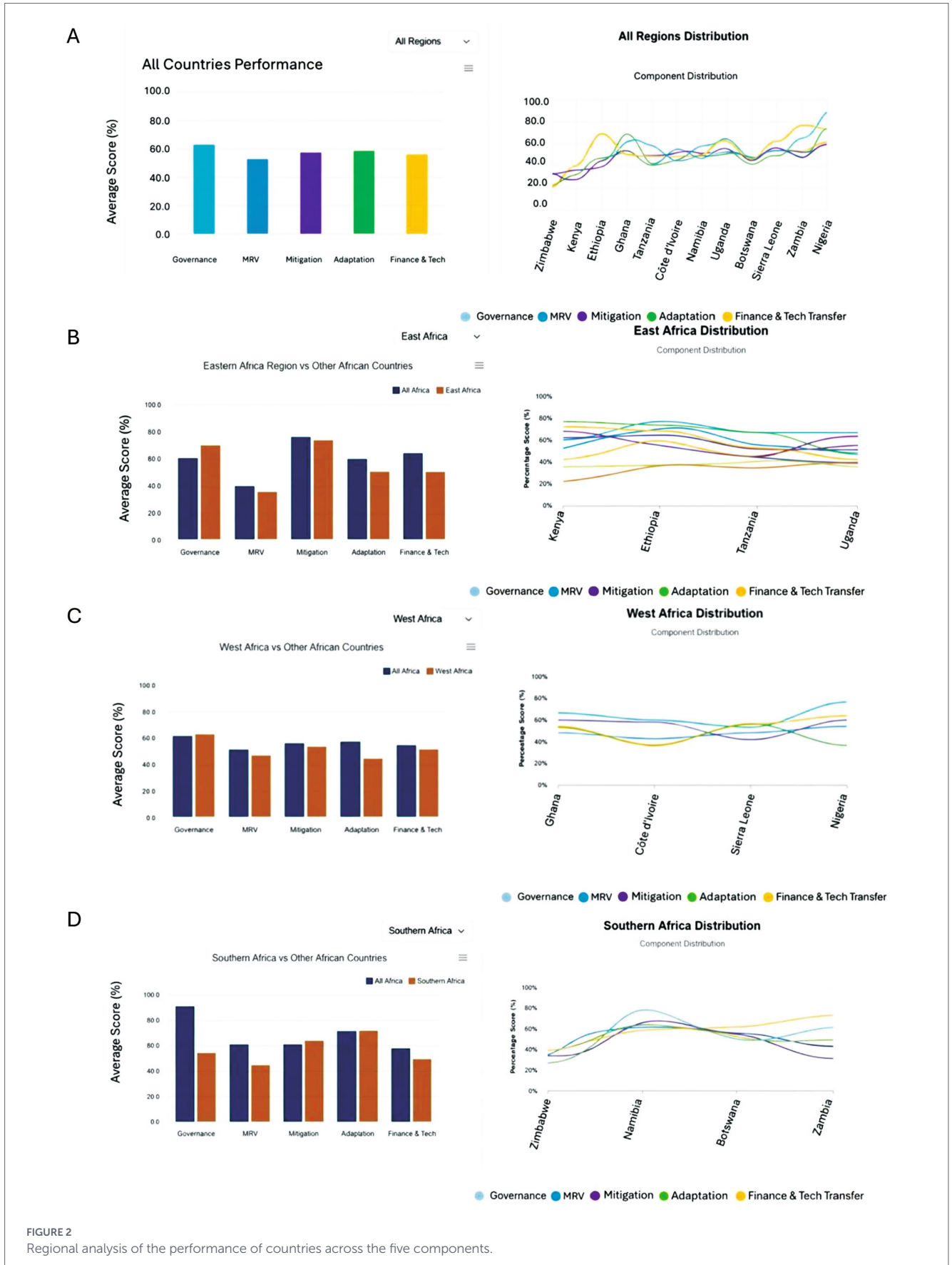


FIGURE 2 Regional analysis of the performance of countries across the five components.

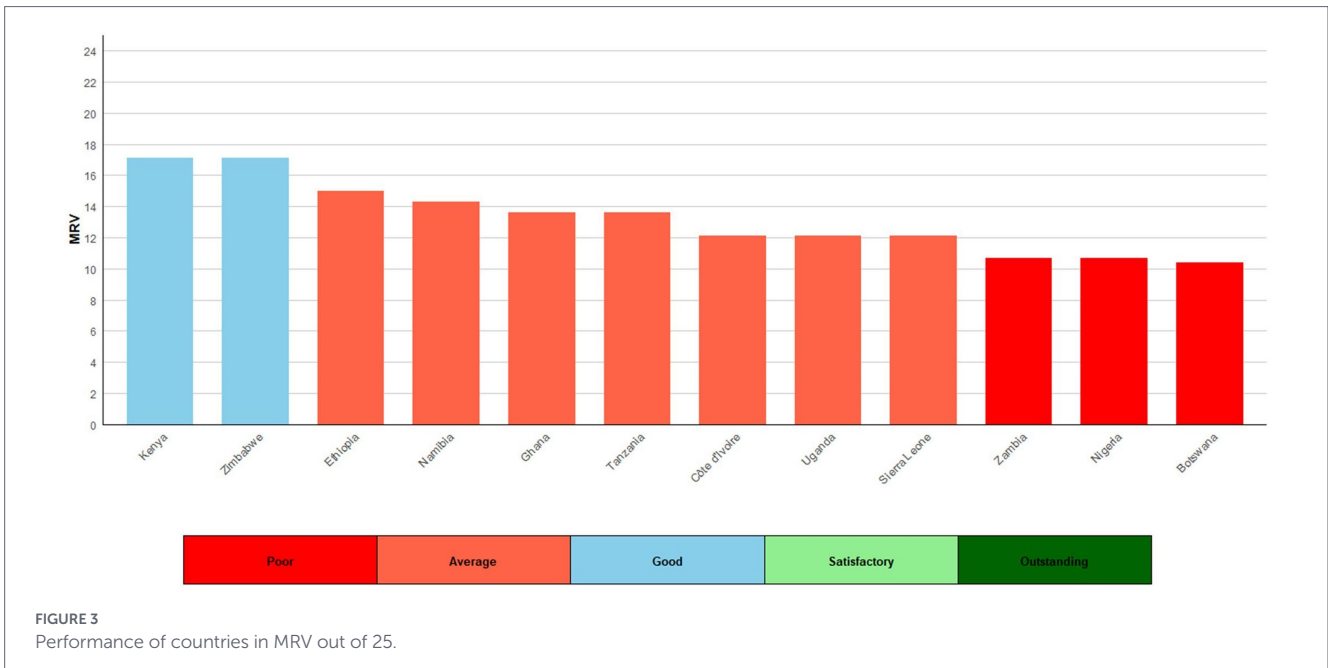


FIGURE 3 Performance of countries in MRV out of 25.

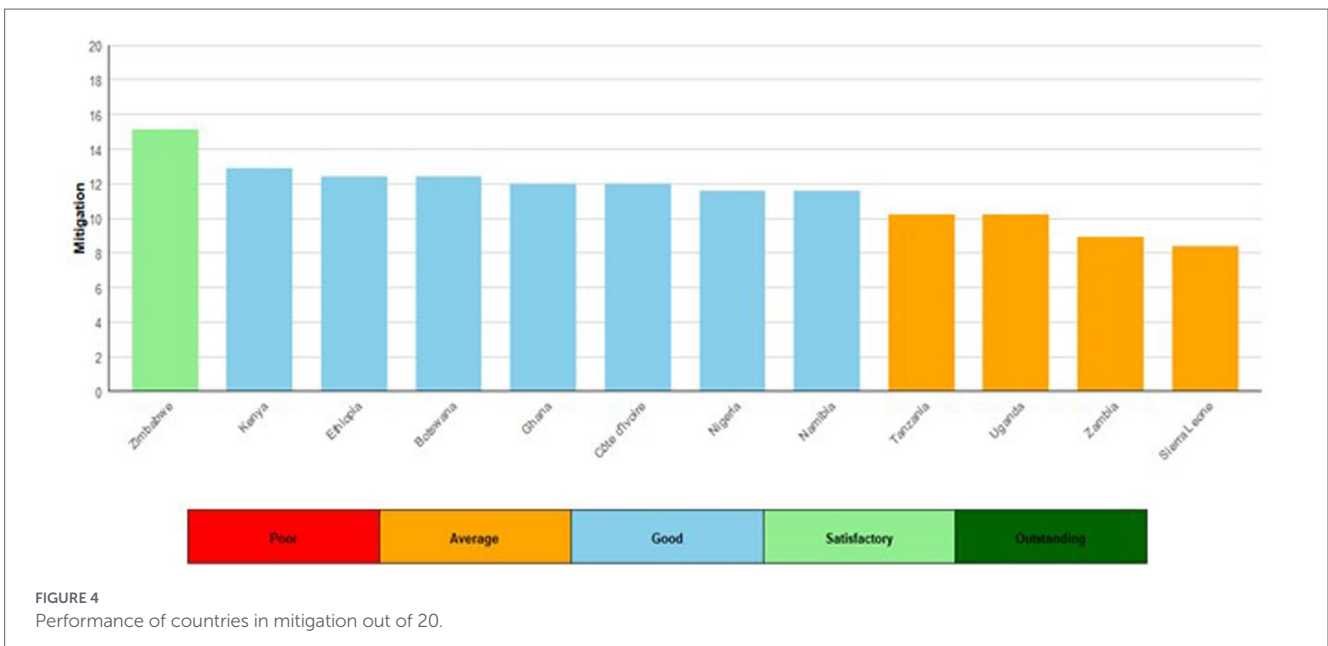


FIGURE 4 Performance of countries in mitigation out of 20.

remains uneven and highly dependent on external resources. Access to finance and technology transfer remained decisive constraints, reinforcing findings from the Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC AR6) on equity gaps in mitigation (Intergovernmental Panel on Climate Change IPCC, 2022). Zimbabwe was the only country to achieve a “satisfactory” score, largely due to its investments in renewable energy deployment, reforestation initiatives, and energy efficiency measures. Kenya and Ethiopia both achieved “good” ratings. Kenya’s progress is underpinned by substantial investments in geothermal and wind power, positioning the country as a regional leader in renewable energy penetration (IRENA, 2020). Ethiopia’s performance reflects the implementation of its Climate-Resilient Green Economy (CRGE) Strategy, which emphasizes the expansion of hydropower, afforestation, and low-carbon agriculture. These examples illustrate the benefits of long-term strategic planning,

combined with targeted investments in renewable energy and land-based mitigation.

Figure 4 reveals a performance hierarchy in NDC implementation, with Zimbabwe leading with a “Satisfactory” rating, while major economies like Nigeria and Kenya maintain a “Good” standing despite significant structural hurdles. Nigeria’s performance is particularly noteworthy; as a fossil-fuel-dependent economy, its “Good” score reflects strong policy frameworks—such as the Climate Change Act and Energy Transition Plan—balanced against the immense economic challenge of a significant funding gap. While Nigeria demonstrates high ambition in its mitigation strategies, its transition to a top-tier score is currently constrained by its reliance on oil revenue and a lower domestic liquidity ratio compared to peers like Namibia, highlighting a common regional trend where economic capacity and high transition costs remain the primary barriers to achieving full NDC

implementation. Heavy dependence on oil revenues, policy uncertainty, and weak institutional coordination have hindered the country’s low-carbon transition, despite its ambitious NDC pledges (Adenle, 2020). Zambia’s low scores reflect the delayed implementation of renewable energy projects and its persistent reliance on traditional biomass, while Sierra Leone continues to grapple with basic energy access challenges that complicate the prioritization of mitigation efforts (Richmond et al., 2024).

### 3.4 Adaptation as a priority but under-resourced

Although most countries developed NAPs, weak financial mechanisms and limited monitoring hindered progress. This illustrates the persistent marginalization of adaptation in global finance flows (Pauw et al., 2017; African Union, 2022). Adaptation consistently ranked as a top priority across the African countries assessed, reflecting the region’s acute vulnerability to climate impacts, including droughts, floods, desertification, and declining agricultural productivity. However, adaptation efforts remain under-resourced, inconsistently implemented, and weakly monitored, resulting in mixed performance across countries.

Ethiopia, Kenya, Botswana, and Zimbabwe achieved “satisfactory” scores (Figure 5), demonstrating relatively stronger institutional commitment to resilience-building. Ethiopia’s Green Legacy Initiative, which has mobilized large-scale tree-planting and land-restoration efforts, has both ecological and socio-economic benefits, enhancing carbon sequestration while reducing vulnerability to land degradation. Kenya has advanced adaptation mainstreaming by embedding resilience measures into county-level development plans and by prioritizing climate-smart agriculture initiatives that directly support smallholder farmers (Republic of Kenya, 2023). Zimbabwe’s progress reflects its integration of adaptation into national planning frameworks, while Botswana has invested in ecosystem restoration and drought management programs.

At the other end of the spectrum, Nigeria and Ghana were rated “poor” (Figure 5), despite having developed NAPs and sectoral strategies. In Nigeria, adaptation programming has been hindered by weak

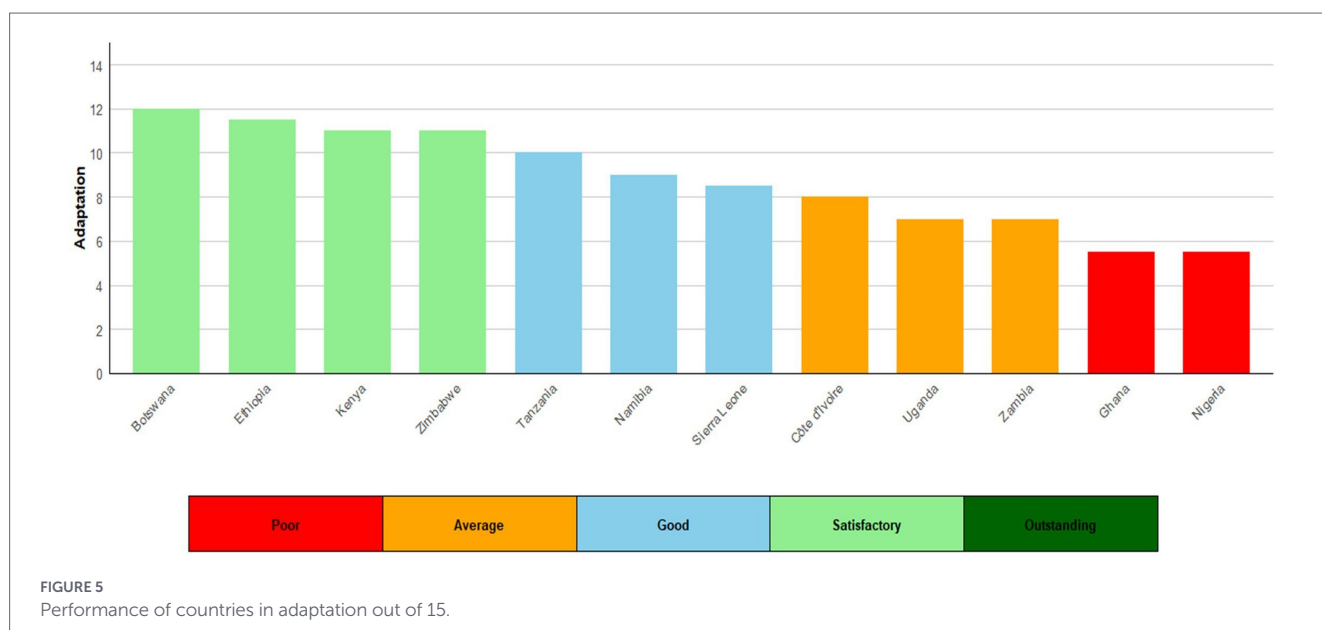
institutional coordination, fragmented funding mechanisms, and a lack of localized monitoring systems. Ghana, while progressive in the design of adaptation policies, has struggled to translate plans into tangible outcomes due to limited financial resources and low priority in national budget allocations. These findings highlight a broader gap between policy formulation and practical implementation in adaptation governance (Pauw et al., 2017).

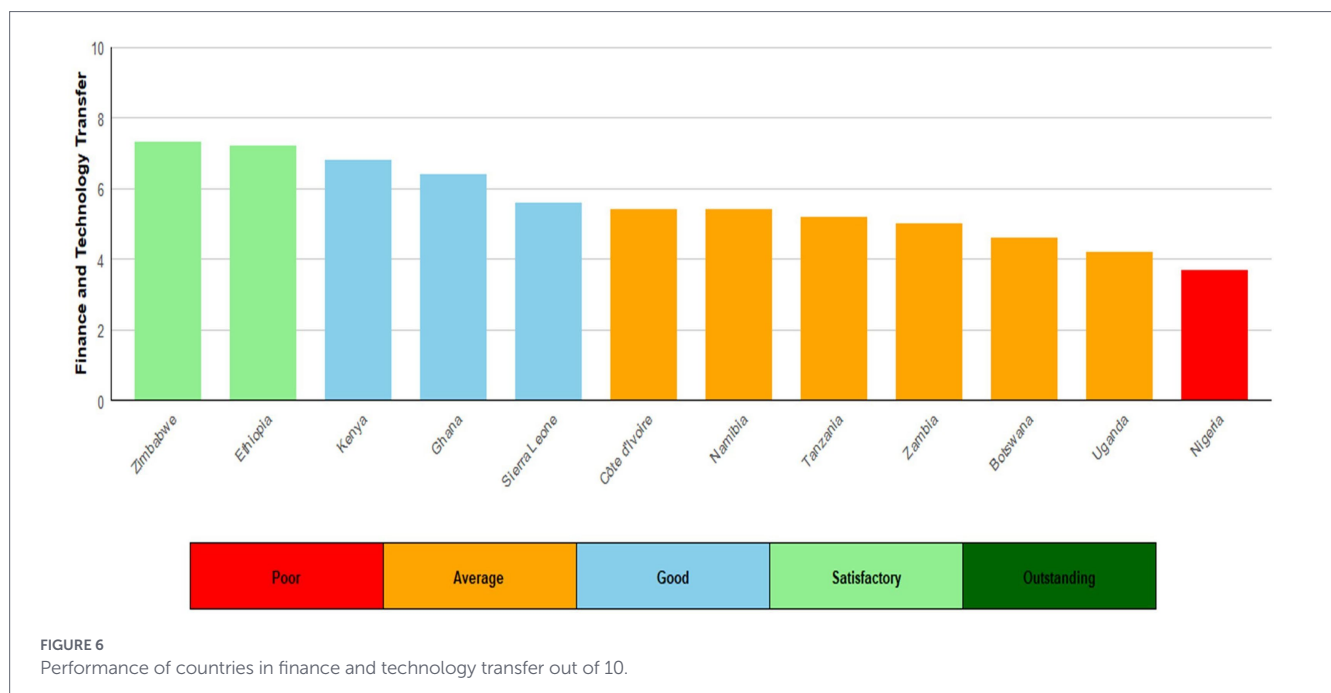
At the Regional level, East Africa generally outperforms other regions in adaptation (Figure 2), with Ethiopia, Kenya, and Tanzania demonstrating stronger adaptation frameworks supported by donor programs and regional initiatives such as the IGAD Climate Prediction and Applications Centre (ICPAC). Southern African countries show progress in ecosystem-based adaptation and drought management, particularly in Botswana and Zimbabwe. By contrast, West Africa continues to lag, with persistent institutional and financial barriers preventing systematic implementation.

### 3.5 Persistent weakness in finance and technology transfer

Among the five components of the NDC Implementation Index, Finance and Technology Transfer consistently scored among the lowest (Figure 6), confirming long-standing concerns that resource mobilization and technology diffusion remain critical bottlenecks for climate action in Africa. Only Ethiopia and Zimbabwe attained “satisfactory” levels, Kenya and Ghana scored “good,” while most other countries, including Nigeria, Zambia, and Sierra Leone, remained in the “average” or “poor” categories. Nigeria, despite its significant economic size, performed particularly poorly due to limited direct access to climate funds, underdeveloped green finance instruments, and persistent barriers to the adoption of clean technology.

The gap between global pledges and actual disbursements is especially evident in Africa. While substantial international commitments exist, most notably the \$100 billion per year pledge under the Paris Agreement, African countries face difficulties accessing these funds directly. Finance is frequently mediated through multilateral intermediaries, which increases transaction costs and reduces national





ownership (Weikmans and Roberts, 2019). This has led to a structural inequity whereby countries that are most vulnerable to climate change receive the least predictable and accessible financing. For instance, Ethiopia and Kenya, which have stronger institutional frameworks and designated national implementing entities, have been more successful in accessing funds, whereas countries with weaker governance capacity remain dependent on donor-driven projects.

Most countries continue to allocate very limited domestic resources to climate action, relying heavily on external donors. Zimbabwe and Ethiopia stand out for experimenting with domestic climate levies and public-private partnerships that create dedicated funding streams for climate projects. However, across the region, the fiscal space for climate investment remains constrained by debt burdens, competing development priorities, and limited tax bases (African Development Bank, 2022).

Technology diffusion is another persistent weakness. Although African countries have adopted Technology Needs Assessments (TNAs), practical implementation remains slow due to high upfront costs, lack of technical expertise, and limited absorptive capacity (Ockwell and Byrne, 2016). Renewable energy technologies—solar, wind, and geothermal—have seen some progress in Kenya and Ethiopia; however, the adoption of low-emission agricultural technologies, clean transport systems, and industrial efficiency measures remains limited. The absence of regional technology hubs and weak intellectual property frameworks further constrain the uptake of innovations.

Some localized initiatives provide promising models. Zambia’s emerging carbon market framework, Ethiopia’s technology scaling efforts under the CRGE, and Kenya’s green bond market represent experiments in mobilizing finance and accelerating technology adoption. However, these remain isolated cases rather than region-wide trends, highlighting the lack of systemic approaches to integrating finance and technology.

### 3.6 Regional analysis across components

East Africa outperformed other regions, particularly in governance and adaptation. Southern Africa showed relative strength in mitigation,

while West Africa underperformed in MRV and adaptation. These patterns reflect structural differences in institutional capacity, donor dependence, and political stability. Nigeria’s paradoxically poor performance, despite its significant economic size, highlights the role of governance weaknesses and resource dependence in shaping outcomes.

The regional analysis of NDC implementation reveals significant variation across East, Southern, and West Africa, underscoring the importance of structural, political, and economic contexts in shaping outcomes. Performance diverges not only between regions but also within them, highlighting both systemic strengths and persistent gaps.

East African countries, including Kenya, Ethiopia, Uganda, and Tanzania, emerged as relative leaders in governance and adaptation (Figure 2). Kenya and Ethiopia were rated among the highest in governance due to their strong climate legislation, institutional coordination, and the integration of climate objectives into national development planning. Adaptation efforts also stood out, supported by initiatives such as Ethiopia’s Green Legacy Initiative and Kenya’s county-level climate planning frameworks. Tanzania demonstrated notable progress in ecosystem-based adaptation. These strengths reflect not only deliberate domestic reforms but also sustained donor engagement and regional collaboration through bodies such as the Intergovernmental Authority on Development (IGAD) and the East African Community (EAC), which have promoted regional coordination on climate resilience. However, MRV systems in East Africa remain uneven, with Uganda and Tanzania still grappling with fragmented data flows, indicating incomplete institutionalization of transparency mechanisms.

Southern African countries, including Zimbabwe, Botswana, Namibia, and Zambia, demonstrated comparative strength in mitigation, particularly through investments in renewable energy and reforestation. Zimbabwe’s performance was bolstered by large-scale reforestation programs and energy diversification, while Botswana invested in ecosystem restoration and Namibia emphasized sustainable land management. Zambia’s exploration of carbon market frameworks illustrates innovation in financing mitigation. However, governance performance across much of the region lagged behind East Africa, reflecting weaker institutional mandates and inconsistent legal

frameworks. MRV systems also tended to be modest, with Namibia and Zambia scoring only “average.” Adaptation progress was mixed: Botswana achieved “satisfactory” results through drought management, but Zambia and Namibia remained constrained by financial and institutional barriers. Overall, Southern Africa’s mitigation-focused profile highlights the region’s emphasis on energy transition and land use, but underscores the need to strengthen governance and transparency as key enablers of long-term implementation.

West African countries, including Ghana, Nigeria, Côte d’Ivoire, and Sierra Leone, consistently underperformed in MRV and adaptation (Figure 2). Weaknesses in institutional coordination and limited technical capacity constrained MRV, with Ghana’s siloed data collection and Nigeria’s lack of inter-ministerial buy-in exemplifying regional challenges. Adaptation efforts were hindered by insufficient financing and weak monitoring frameworks, despite the existence of NAPs in most countries. This underperformance reflects broader structural constraints, including donor dependence, political instability in some states, and competing development priorities. Ghana stood out for relatively strong governance frameworks, but its adaptation score remained low, highlighting the gap between institutional design and effective resource mobilization. Nigeria’s paradoxically low overall score despite being the continent’s largest economy highlights how resource dependence on fossil fuels, institutional fragmentation, and weak climate finance systems can undermine effective NDC implementation. Côte d’Ivoire performed moderately well in governance and mitigation but lagged in adaptation, underscoring similar regional trends.

The regional analysis of NDC implementation reveals marked differences across Africa’s subregions. East Africa consistently outperforms in governance, underpinned by strong legal mandates and cross-ministerial coordination, while Southern and West Africa display more uneven institutional arrangements. A similar pattern emerges in MRV, with East Africa showing relatively stronger systems compared to Southern Africa’s moderate performance and West Africa’s persistent weaknesses. In terms of mitigation, Southern Africa stands out for investments in reforestation and renewable energy, complemented by East Africa’s advances in geothermal and hydropower, particularly in Kenya and Ethiopia. West Africa, however, lags significantly due to dependence on fossil fuels and slow diffusion of low-carbon technologies. Adaptation is most advanced in East Africa, where ecosystem-based and community-level resilience initiatives are widespread, while Southern Africa demonstrates moderate progress. West Africa again underperforms, hindered by limited financing and weak monitoring systems. Finally, MRV is rated lowly, as is finance and technology transfer across all regions, though Ethiopia, Kenya, and Zimbabwe show relatively stronger performance through institutional innovations and modest success in mobilizing climate finance. Taken together, these findings highlight how regional disparities reflect both structural conditions and institutional capacities, underscoring the importance of peer learning and cooperation to accelerate implementation across the continent.

## 4 Discussion

### 4.1 Diagnostic value of the index

The findings demonstrate that the NDC Implementation Index provides significant diagnostic value by moving beyond the narrow

emphasis on ambition that dominates most global monitoring tools. While frameworks such as the Climate Action Tracker benchmark emissions reductions against global pathways, they largely neglect the institutional, governance, and capacity dimensions that determine whether commitments are realized (Ross and Winkler, 2021). The Index addresses this gap by operationalizing implementation across five interrelated components, thereby providing a more comprehensive picture of progress.

A critical insight is that governance consistently emerged as the backbone of NDC implementation. Countries with strong legal frameworks, institutional coordination, and accountability systems, such as Kenya, Ethiopia, and Zimbabwe, performed better not only in governance scores but also across other dimensions. These results underscore the importance of institutional embeddedness in climate governance, consistent with new institutionalist theories that highlight the role of formal and informal rules in shaping policy outcomes (Peters, 2019).

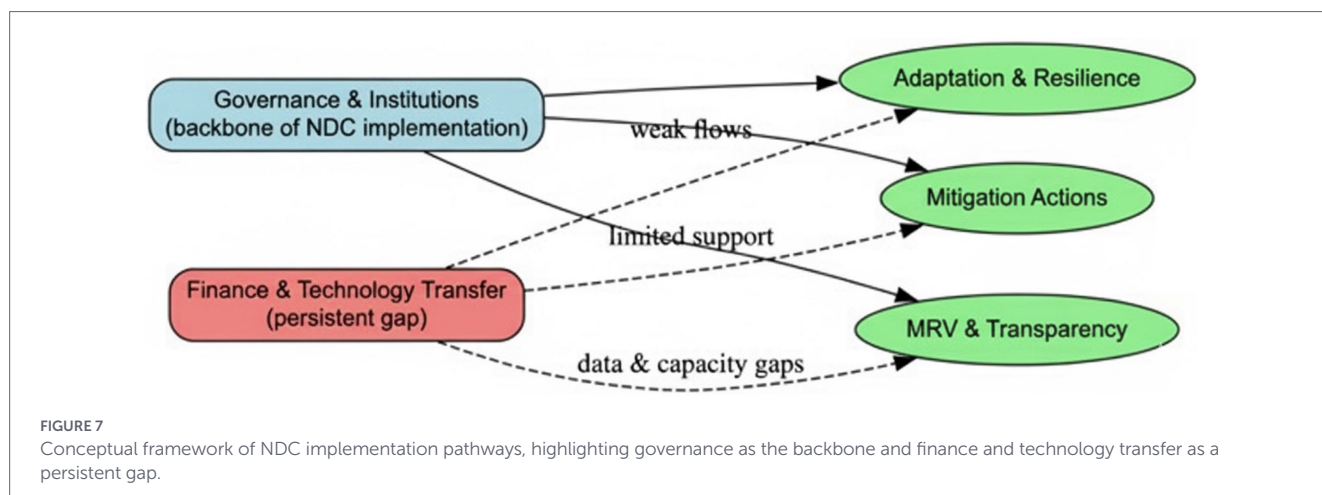
Across regions, East Africa leads in governance and adaptation, reflecting earlier adoption of climate legislation and stronger donor engagement. Southern Africa performs better in mitigation, leveraging renewable energy and reforestation, while West Africa underperforms in MRV and adaptation, constrained by institutional fragmentation and finance gaps. The comparative analysis reveals three systemic insights: (1) legal mandates are strongly associated with better governance and MRV performance; (2) resource dependence (e.g., Nigeria’s oil reliance) undermines mitigation and finance access despite economic size; and (3) donor engagement influences capacity-building but can reinforce uneven progress, as countries with stronger institutions attract more support. These findings highlight structural inequities that shape climate governance beyond national ambition.

At the same time, the Index reveals that governance capacity alone is insufficient without predictable flows of finance and technology. Even the strongest governance systems struggled to sustain momentum when resources were scarce, as evidenced by gaps in adaptation financing and slow technology diffusion across the region. This finding echoes the IPCC AR6 conclusion that institutional readiness must be matched with equitable and accessible finance to enable transformative change (Intergovernmental Panel on Climate Change IPCC, 2022). The Index, therefore, helps diagnose where institutional strength is undermined by systemic inequities in global climate finance and technology transfer.

Figure 7 presents a conceptual framework of NDC implementation pathways, highlighting the dual role of governance and finance as central determinants of climate policy outcomes. The framework illustrates two core insights emerging from the Index: (1) governance and institutional capacity provide the backbone of NDC implementation, while (2) finance and technology transfer remain a persistent structural gap.

On the left side of the framework, governance and institutions are positioned as the primary enablers of effective NDC delivery. Countries with strong legal mandates, institutional coordination, and accountability systems demonstrated better performance in adaptation, mitigation, and MRV dimensions. This reflects the Index’s finding that governance correlates positively with implementation outcomes: for instance, Kenya’s Climate Change Act (2016) (Republic of Kenya 2016) and Ethiopia’s Climate Resilient Green Economy (CRGE) strategy created institutional stability that translated into stronger MRV systems and more coherent adaptation planning.

Conversely, the framework indicates that finance and technology transfer flows are persistently weak, as indicated by dashed lines



leading to the other dimensions. Across countries, access to international climate finance was limited, fragmented, and often mediated through intermediaries, undermining national ownership. Similarly, technology adoption was constrained by high costs, limited absorptive capacity, and inadequate technical expertise. These systemic gaps meant that even countries with strong governance often struggled to fully operationalize mitigation and adaptation priorities. Nigeria's low score in finance and technology transfer, despite being Africa's largest economy, illustrates this tension.

The arrows in the framework highlight the linkages across dimensions. Governance feeds into adaptation, mitigation, and MRV, but the arrows are marked as “weak flows” where financial and technological inputs are missing. Finance and technology, although necessary for scaling up actions, provide only “limited support” when mechanisms are fragmented and unpredictable. MRV and transparency systems, in particular, are undermined by “data and capacity gaps,” reflecting the lack of both technical infrastructure and consistent funding.

Taken together, the framework emphasizes that governance is necessary but not sufficient. Strong institutional backbones create enabling conditions, but without adequate finance and technology transfer, implementation remains partial and uneven. This duality reflects broader structural inequities within the global climate regime, in which African countries face disproportionate barriers to accessing finance and affordable technologies (Weikmans and Roberts, 2019; Intergovernmental Panel on Climate Change IPCC, 2022).

The conceptual model thus provides a diagnostic lens that connects the empirical findings of the Index to a broader theoretical claim: effective NDC implementation requires an interplay between robust domestic governance and predictable external enablers.

## 4.2 Peer learning and adaptive governance

A key contribution of the NDC Implementation Index is its potential to serve as a peer-learning instrument rather than a competitive-ranking tool. Framing results as opportunities for exchange aligns with the principles of adaptive governance, which emphasize experimentation, iterative adjustment, and policy learning in complex systems (Duit and Galaz, 2008). The Index highlights that African countries are developing context-specific innovations that could be adapted elsewhere. Kenya's climate governance reforms, which integrate climate action into national legislation and county-level planning, illustrate how institutionalization strengthens the delivery of

climate action. Ethiopia's mainstreaming of resilience through initiatives such as the Green Legacy Initiative demonstrates how adaptation can be elevated to a central development priority. Zambia's experimentation with carbon market frameworks offers a novel approach to climate finance mobilization in resource-constrained settings. These examples underscore the Index's value in identifying transferable practices that can be tailored to diverse political, economic, and ecological contexts.

Figure 8 builds on these insights by illustrating the regional dynamics of peer learning and cooperation. Eastern Africa (Kenya, Ethiopia, Tanzania, Uganda) stands out with strong performance in governance and adaptation, providing opportunities to share institutional models with West Africa, where governance fragmentation and weak adaptation frameworks hinder progress. Southern Africa (Zimbabwe, Namibia, Botswana, Zambia) demonstrates relative strength in mitigation and adaptation, offering lessons in renewable energy investments, reforestation, and finance mobilization through innovations like Zambia's carbon markets. These lessons can help East and West African countries address their financing constraints while enriching resilience-building strategies. Although West Africa (Ghana, Côte d'Ivoire, Sierra Leone, Nigeria) scored lowest in MRV and adaptation, the region's experience with finance pooling mechanisms and cross-border cooperation (e.g., under ECOWAS) provides entry points for strengthening collective institutions that could complement governance and adaptation reforms elsewhere.

The arrows in Figure 8 depict how knowledge flows could be structured:

- From East Africa to West Africa through governance and institutional coordination lessons.
- From Southern Africa to East and West Africa through finance mobilization innovations and mitigation/resilience models.
- From West Africa to other regions through collective finance pooling experiences.

Taken together, the framework suggests that regional disparities can be leveraged as mutual strengths when viewed through the lens of adaptive governance. Embedding these peer learning dynamics within African Union (AU) and Regional Economic Community (REC) frameworks would formalize the exchange, turning uneven progress into structured opportunities for cooperation, accountability, and collective action. The Index thus positions regional variation not as a

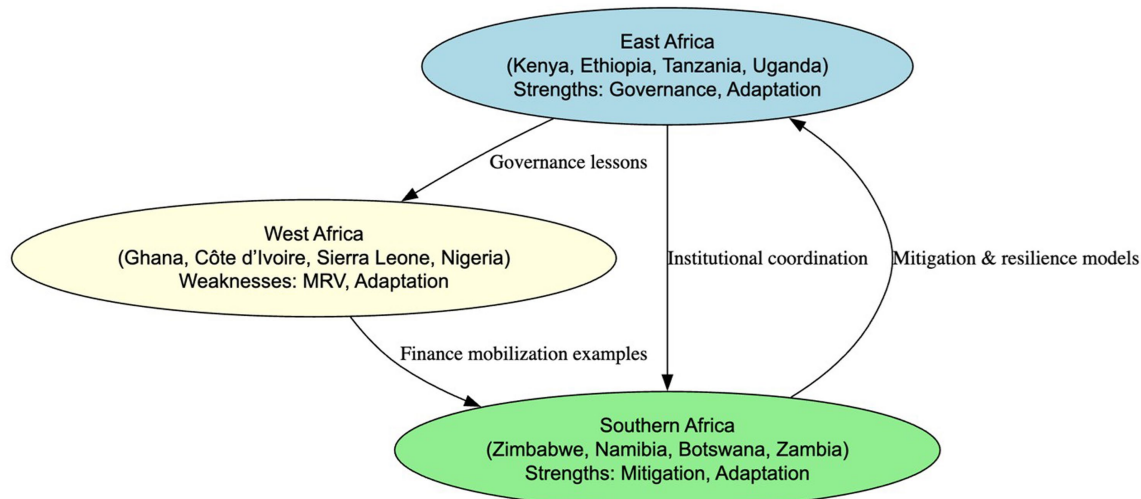


FIGURE 8 Regional peer learning dynamics in Africa, highlighting comparative strengths and opportunities for knowledge transfer.

weakness but as a resource for adaptive governance, reinforcing its role as both a diagnostic tool and a catalyst for transformative climate action.

### 4.3 Deeper engagement with equity, data politics, and measurement

The NDC Implementation Index not only evaluates performance across governance, MRV, mitigation, adaptation, and finance but also sheds light on the broader equity debates and data politics underpinning global climate governance. Its findings underscore that climate action in Africa is shaped not only by national ambition but also by the structural and political conditions under which implementation occurs. A central issue concerns the politics of measurement and transparency. Heavy reliance on government-reported data risks reproducing official self-assessments, raising questions about transparency, independence, and accountability. Where MRV systems are fragmented or weak, governments may strategically present selective information, reinforcing what Okereke (2010) terms the “politics of climate governance,” where narratives of compliance are often curated to secure legitimacy or donor support. As scholars of climate governance argue, data is never neutral but reflects underlying power asymmetries in global systems of reporting and accountability (Ciplet et al., 2015; Gupta and Mason, 2014).

The Index also highlights systemic inequities in the measurement of adaptation and finance. Adaptation is inherently harder to quantify than mitigation, as outcomes are multidimensional, context-specific, and long-term. This creates persistent data gaps that disadvantage African countries in international reporting processes (Khan and Roberts, 2013). Similarly, the measurement of climate finance remains highly contested. Climate finance flows are often intermediated through multilateral development banks and international financial institutions, which complicates attribution and limits direct access for African governments. As Weikmans and Roberts (2019) demonstrate, this has produced an “accounting muddle” in which donors retain control over definitions and reporting, thereby reinforcing power asymmetries between providers and recipients.

By exposing these inequities, the Index contributes to debates on climate justice and fair measurement. It highlights the need for methodologies that move beyond assessing ambition and outcomes to also capture the conditions of implementation, including access to finance, institutional capacity, and political stability. This aligns with arguments by Newell and Mulvaney (2013) that climate governance frameworks must grapple with structural inequalities if they are to be effective and legitimate.

In this sense, the Index not only functions as a policy tool but also as an intervention in global debates on justice and accountability. It reframes measurement as a matter of equity: not simply benchmarking African states against universal standards, but acknowledging the systemic barriers they face. This makes the Index a contribution to the decolonization of climate governance metrics, advancing a more inclusive, transparent, and context-sensitive framework for assessing progress under the Paris Agreement.

### 4.4 Opportunities for cooperation at the national and international levels

The regional variation captured by the Index underscores the strategic value of South–South cooperation in accelerating NDC implementation. East Africa’s relative strength in governance and adaptation reflects not only domestic reforms but also the role of regional institutions such as the Intergovernmental Authority on Development (IGAD) and the EAC, which have fostered data sharing and policy coordination. These successes provide replicable models for West African countries, where governance fragmentation and weak adaptation frameworks remain persistent weaknesses. Similarly, Southern Africa’s strengths in mitigation, including Zimbabwe’s large-scale reforestation and Zambia’s experimentation with carbon markets, demonstrate how resource-based economies can leverage natural capital for low-carbon growth, offering lessons for regions grappling with energy transitions and land-use pressures. West Africa, while underperforming overall, has advanced regional finance pooling mechanisms (e.g., through ECOWAS), which could inform collective funding solutions elsewhere on the continent.

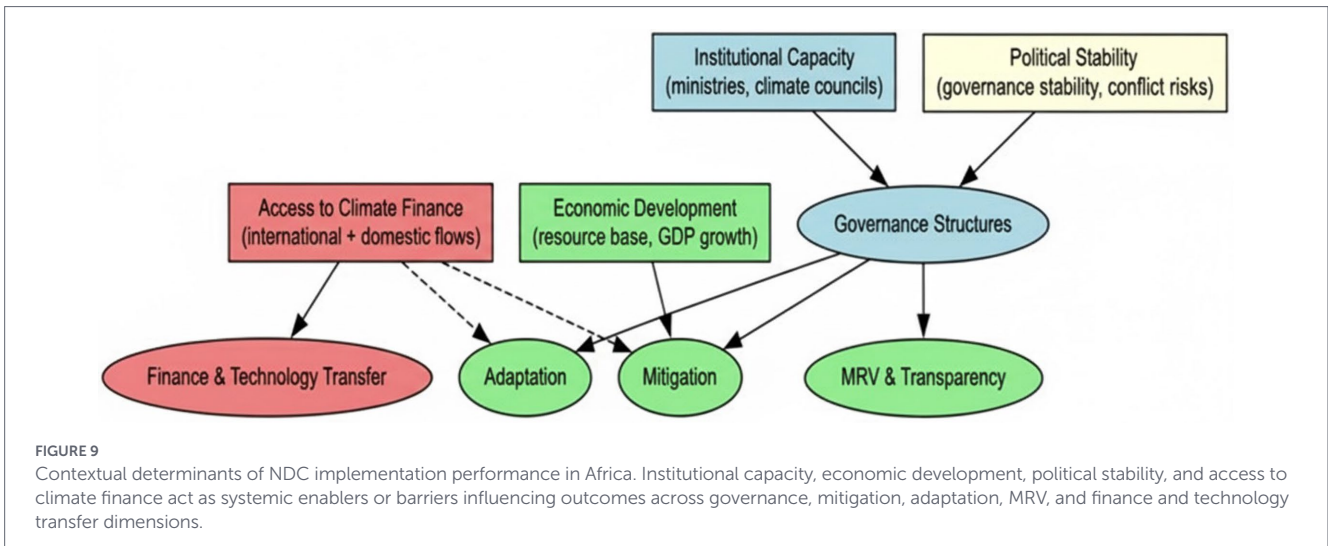


Figure 9 situates these regional strengths and weaknesses within a broader framework of contextual determinants of NDC performance. Institutional capacity and political stability shape the effectiveness of governance structures, which in turn influence MRV, adaptation, and mitigation outcomes. Access to climate finance, both domestic and international, feeds directly into adaptation and technology transfer, while economic development determines the fiscal space available for climate investments. This framework reinforces that regional differences in performance are not random but emerge from structural conditions, governance arrangements, and access to resources.

Taken together, the Index and Figure 9 highlight the need to connect national determinants with regional opportunities for cooperation. East Africa’s governance innovations, Southern Africa’s mitigation and finance mobilization models, and West Africa’s regional finance mechanisms can complement one another if embedded within the AU and the REC processes. Institutionalizing the Index within these frameworks would formalize cross-regional exchange, enhance mutual accountability, and reduce overreliance on external monitoring. Moreover, linking the Index to the AU’s Climate Change and Resilient Development Strategy (2022–2032) would provide a platform for scaling promising practices across the continent while aligning national and regional action with the Paris Agreement’s Global Stocktake.

In this sense, both the Index and the conceptual model in Figure 9 serve as a mirror and a bridge: a mirror reflecting uneven progress shaped by contextual determinants, and a bridge enabling structured cooperation, knowledge exchange, and policy harmonization across Africa.

### 4.5 Strategic pillars for enhanced climate action

Figure 10 presents a roadmap of strategic pillars that directly translate the Index’s analytical findings into actionable policy guidance. The framework builds on the empirical insight that governance and institutional frameworks are relatively strong across Africa, while finance, technology transfer, and data ecosystems remain persistent

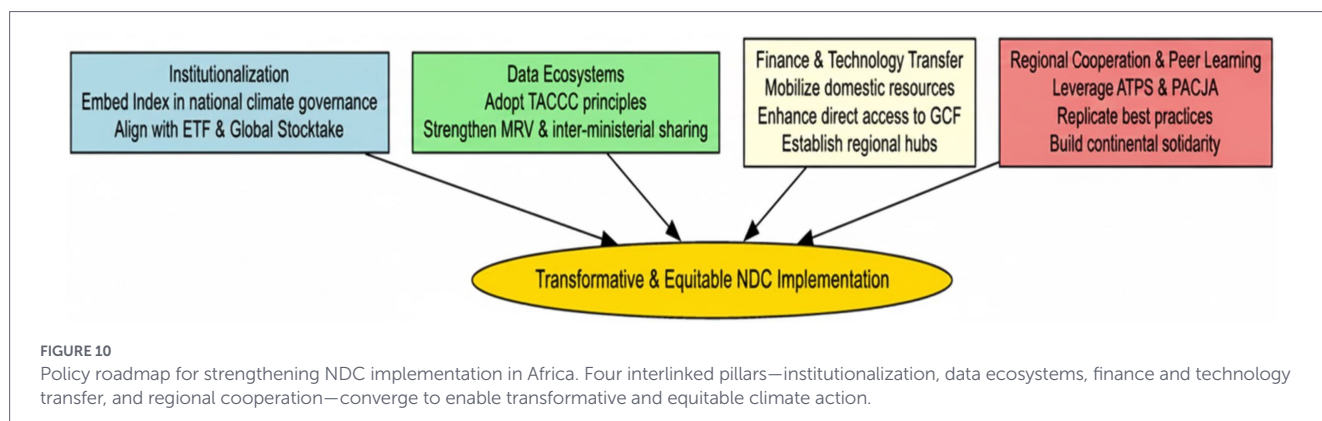
weaknesses. The four pillars, therefore, provide a practical agenda for countries and regional bodies to strengthen NDC implementation in a structured and coherent manner.

#### (a) Institutionalization.

The first pillar emphasizes the need to consolidate governance gains by embedding the Index into national climate governance systems. Doing so would transform the Index from an external benchmarking tool into a domestic instrument of accountability, linked directly to climate legislation, sectoral plans, and monitoring frameworks. Institutionalization also ensures alignment with international processes, particularly the Enhanced Transparency Framework (ETF) and the Global Stocktake under the Paris Agreement. This dual alignment reinforces credibility by demonstrating that domestic progress tracking is consistent with international reporting obligations.

#### (b) Data Ecosystems.

The second pillar targets one of the most persistent challenges revealed by the Index, fragmented MRV systems and weak technical capacity. To address this, the roadmap calls for the adoption of Transparency, Accuracy, Completeness, Consistency, and Comparability (TACCC) principles and the strengthening of inter-ministerial data-sharing mechanisms. These principles constitute a foundational framework for climate and greenhouse gas (GHG) reporting, designed to ensure the integrity, reliability, and utility of the data used for accountability and policy development. Transparency mandates that all methodologies, data sources, and assumptions are clearly documented; Accuracy requires that estimates systematically minimize uncertainties; Completeness ensures that all relevant emission sources and gases are included; Consistency dictates that the same methodologies are used over time for trend analysis; and Comparability standardizes formats to allow for benchmarking across nations (Intergovernmental Panel on Climate Change IPCC, 2006). Building robust data ecosystems is foundational: reliable, harmonized information not only enhances transparency but also enables governments to monitor progress, diagnose gaps, and make evidence-based policy



decisions. Strong MRV systems also underpin access to international finance, as donors and climate funds increasingly require verifiable data on impacts and outcomes.

#### (c) Finance and Technology Transfer.

The third pillar addresses the most significant structural bottleneck identified by the Index: the finance and technology gap. To close this gap, countries need to pursue a two-pronged strategy. First, mobilize domestic resources through climate levies, green bonds, and carbon pricing mechanisms to create predictable local funding streams. Second, enhance direct access to the Green Climate Fund (GCF) and other international mechanisms to reduce reliance on intermediaries and strengthen national ownership. In parallel, the establishment of regional finance and technology hubs would reduce transaction costs, enhance absorptive capacity, and create economies of scale in deploying low-carbon and resilience technologies. This pillar is crucial because without reliable finance and technology transfer, even the strongest governance systems cannot fully deliver on NDC commitments.

#### (d) Regional Cooperation and Peer Learning.

The fourth pillar leverages the Index's comparative insights to position peer learning and cooperation as a driver of accelerated implementation. The strategy builds on platforms such as ATPS and PACJA, which can facilitate knowledge sharing and replication of best practices across regions. East Africa's strong governance frameworks, Southern Africa's mitigation and carbon market innovations, and West Africa's experiments with pooled finance mechanisms provide models that can be adapted elsewhere. Embedding these exchanges within the African Union and the REC structures would transform regional variation into a resource for adaptive governance, strengthening continental solidarity and ensuring Africa speaks with a unified voice in global climate negotiations.

Taken together, [Figure 10](#) illustrates how the Index is more than a diagnostic tool: it provides a strategic roadmap for action. The roadmap provides a pathway for African countries to translate ambition into effective, sustained, and equitable climate action by consolidating governance, strengthening data ecosystems, closing finance and technology gaps, and institutionalizing peer learning.

## 5 Policy implications

To translate the diagnostic value of the NDC Implementation Index into action, recommendations are organized across three levels:

#### (a) National Governments

- Institutionalize the Index within climate governance structures, ensuring alignment with NDC processes, NAPs, and sectoral strategies.
- Strengthen national climate data ecosystems by establishing centralized repositories and applying Transparency, Accuracy, Completeness, Consistency, and Comparability (TACCC) principles.
- Mainstream adaptation and resilience financing into national budgets through innovative instruments such as climate levies, earmarked taxes, and green bonds.

#### (b) Regional Economic Communities (RECs) and African Union (AU)

- Embed the Index into the AU Climate Change and Resilient Development Strategy and the REC climate platforms as a peer-learning tool.
- Facilitate South–South knowledge exchange by documenting and scaling successful practices, such as Kenya's governance reforms, Ethiopia's adaptation mainstreaming, and Zambia's emerging carbon markets.
- Establish a continental observatory for climate implementation data to harmonize methodologies and support the Global Stocktake process.

#### (c) Development Partners and the International Community

- Reform climate finance modalities to ensure direct access by African states and non-state actors, reducing dependence on intermediaries.
- Link finance disbursements to implementation performance while safeguarding equity and avoiding punitive conditionalities.
- Support technology transfer through capacity-building partnerships, regional centers of excellence, and investment in locally appropriate innovations.

## 6 Conclusion and recommendations

This study has demonstrated the value of the NDC Implementation Index as a novel, multidimensional framework for assessing how African countries are translating climate commitments into measurable action (Nyambane and Ozor, 2025; Ozor and Nyambane, 2025). The Index integrates five components from the Paris Agreement, namely governance, MRV, mitigation, adaptation, and finance and technology transfer, to move beyond ambition-focused tools and capture the institutional and systemic factors that shape effective NDC implementation (Ozor and Nyambane, 2025).

The results revealed both strengths and weaknesses at the national level. Governance emerged as the backbone of implementation, with countries such as Kenya, Ethiopia, and Zimbabwe performing better where legal mandates, coordination mechanisms, and institutional capacity were more entrenched. MRV systems showed low to moderate progress but remain constrained by fragmented data flows and weak inter-ministerial coordination (Ozor et al., 2025; Ozor and Nyambane, 2025). Mitigation efforts were uneven, with successes in renewable energy and reforestation in some countries but persistent dependence on fossil fuels and traditional biomass in others. Adaptation, although politically prioritized, remains under-resourced and inconsistently monitored. Overall, MRV, and Finance and technology transfer remain the weakest components, exposing structural inequities in global climate finance and barriers to the diffusion of technology.

At the regional level, East Africa outperformed other regions in governance and adaptation, while Southern Africa showed relative strength in mitigation. In contrast, West Africa underperformed in MRV and adaptation. These patterns underscore the significance of contextual factors, including institutional maturity, donor engagement, political stability, and resource dependence. Nigeria's paradoxically low performance, despite its significant economic weight, underscores the risks associated with governance weaknesses and overreliance on fossil fuel revenues.

## Author contributions

NO: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AN: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. WM: Conceptualization, Data curation, Formal analysis, Methodology, Software, Validation, Visualization, Writing – original draft, Writing – review & editing.

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## Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fclim.2026.1746338/full#supplementary-material>

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