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The Climate Action Index: A Subnational Assessment Framework for Policy, Impact and Climate Finance Utilization

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Abstract

Climate change remains one of the most critical challenges of our time, and developing economies like Nigeria face heightened risks due to their dependence on carbon-intensive growth. Over the past decade, while Nigeria's GDP grew by 6.4% between 2011 and 2021, the country also witnessed a staggering 14.7% surge in greenhouse gas emissions. This divergence clearly illustrates the urgent need for policies that decouple economic progress from environmental harm. Looking ahead, projections estimate that Nigeria's GDP will reach around $1.35 trillion in purchasing power parity (PPP) terms by 2025. As the nation strides toward this ambitious goal, it becomes imperative to adopt a structured, data-driven approach to climate governance. Despite the commitments set out in the Climate Change Act (Federal Republic of Nigeria, 2021) and Nigeria's Nationally Determined Contributions (NDCs), there remains a significant gap between policy ambitions and on-the-ground implementation. Current measures often lack robust mechanisms for subnational tracking, evaluation, and accountability. To address these challenges, the Climate Action Index (CAI) has been developed as a transformative tool. The CAI translates broad climate goals into actionable, state-specific performance metrics, providing an integrated framework to assess climate governance effectiveness, financial efficiency, and environmental outcomes across Nigeria's 36 states and the Federal Capital Territory (FCT). Its design centers on three key pillars: **Policy Alignment (40%)**—Evaluates how well state-level policies, legislative frameworks, and institutional capacities align with Nigeria's NDC targets and international climate commitments. This includes the presence of climate action plans, emissions regulations, and enforcement mechanisms. **Spending Efficiency (30%)**—Assesses the effectiveness of climate-related budget allocations, tracking fiscal spending on renewable energy, adaptation, and mitigation projects. This ensures that climate finance is strategically deployed to maximize impact. **Outcome and Targeted Impact Transparency (30%)**—Measures real-world progress in emissions reduc-

tion, resilience-building efforts, and socio-economic benefits. It incorporates a targeted impact sub-metric to evaluate how well climate interventions align with state-specific vulnerabilities and priorities. The CAI's robustness comes from its integration of diverse data from high-resolution satellite imagery and economic indicators to climate finance records and sectoral emissions data. Its methodology aligns with internationally recognized standards such as the Paris Agreement's Enhanced Transparency Framework, Nigeria's Measurement, Reporting, and Verification (MRV) Framework, and Sustainable Development Goal 13. In summary, by providing clear benchmarks and data-driven recommendations, the CAI empowers policymakers, financial institutions, and climate stakeholders to enhance accountability and mobilize targeted climate finance. If implemented effectively, it could serve as a transformative instrument for steering Nigeria and potentially all of Africa toward a low-carbon, climate-resilient future.

Keywords

Climate Change, Sustainability, Climate Action, Economic Development, Subnational Climate Governance, Climate Risk, Climate Finance, Green House Gas Emissions, Nationally Determined Contributions

1. Introduction

Climate Imperative Amid Economic Growth and Rising Emissions

Nigeria's economic trajectory over the past decade has been marked by modest yet steady growth, but this has been accompanied by a disproportionate rise in greenhouse gas (GHG) emissions, signaling an urgent need for strategic climate action. According to the Notre Dame Global Adaptation Initiative (2024), Nigeria's gross domestic product (GDP) grew by 6.4% between 2011 and 2021, while carbon emissions surged by 14.7% during the same period. In 2021 alone, GDP increased by 2% from the previous year, rising from $432 billion to $441 billion, yet emissions grew by 1.8% year-over-year. These trends highlight the challenge of decoupling economic progress from environmental degradation, a task that is especially pressing as Nigeria is projected to reach a GDP of approximately $1.35 trillion in purchasing power parity (PPP) terms by 2025 (World Economics, 2024). Despite this economic expansion, Nigeria remains highly vulnerable to climate risks and lacks sufficient climate readiness to mitigate the consequences of rising temperatures, extreme weather events, and ecosystem degradation. The country ranks in the bottom 10% globally in climate readiness, scoring 38.5 on the ND-GAIN Index, categorizing it as a nation with high vulnerability and low preparedness for climate change (Notre Dame Global Adaptation Initiative, 2024). **Figure 1** shows Nigeria's vulnerability and readiness score from 1996 to 2020, showing a dire criticality. This disconnect between economic ambition and climate resilience presents a critical governance and policy challenge.

Climate Risks: A Threat to Livelihoods and Economic Stability

Climate change is intensifying Nigeria's environmental vulnerabilities, threatening both livelihoods and economic stability. Desertification advances by 1.5 km an-

nually, affecting over 40 million pastoralists and farmers (Dada, Jibrin, & Ze, 2018). The shrinking of Lake Chad now less than 10% of its original size (ESA, 2019) has exacerbated freshwater scarcity and intercommunal conflicts, particularly in the Middle Belt. Coastal cities like Lagos face growing risks from sea-level rise and extreme flooding, with the 2022 floods displacing 1.4 million people and damaging over 300,000 homes (OCHA, 2022; UN-Habitat, 2024; World Bank, 2023). These events underscore the urgency of implementing Nigeria's Climate Change Act of 2021, which aims for a 47% emissions cut by 2030. However, realizing these targets requires robust governance and consistent financing at all administrative levels.

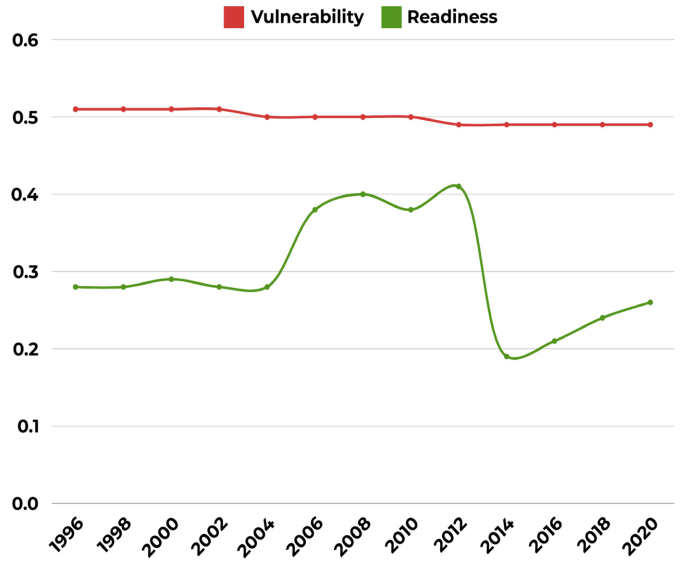

Figure 1. Nigeria's climate vulnerability and readiness score (1996-2020).

Decarbonizing Nigeria's economy necessitates sector-specific interventions (see **Figure 2**), including:

Energy: Shifting from fossil-fuel dependency to renewable energy sources, phasing out gas flaring by 2030, and reducing methane emissions from oil and gas operations by 60% by 2031.

Industry & Manufacturing: Enhancing energy efficiency, circular economy models, and carbon capture technologies.

Agriculture & Land Use: Implementing climate-smart farming techniques, afforestation, and sustainable land management practices.

Transportation: Expanding public transit networks, promoting electric mobility, and improving fuel efficiency standards.

Building Sector: Strengthening building codes and energy efficiency regulations to reduce emissions from cooling and heating. Despite these ambitious policies, several critical questions remain:

Technological Feasibility: Does Nigeria possess the technological and infrastructural capacity to transition toward low-carbon solutions?

Financial Readiness: What are the economic implications of decarbonization, and how will climate finance be mobilized?

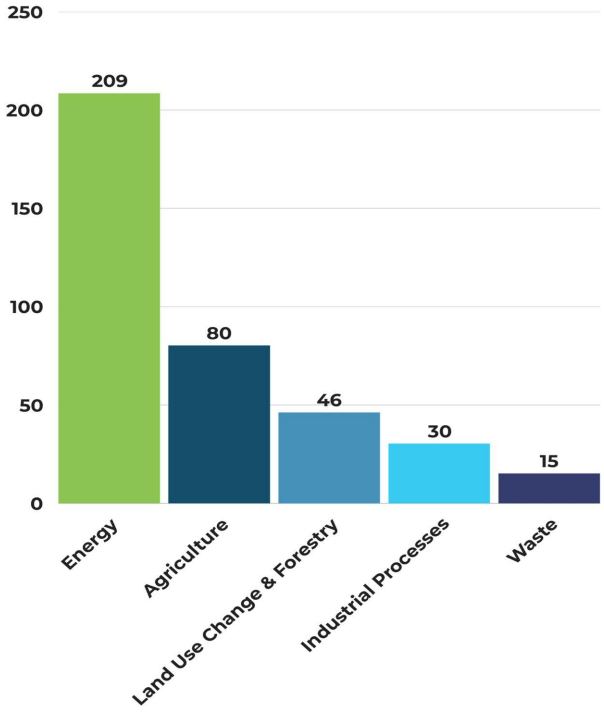

Figure 2. Nigeria greenhouse gas emissions profile by sector.

Regulatory Challenges: What policy adjustments are required to ensure effective implementation?

Emissions Impact: How much carbon reduction will these interventions realistically achieve, and how will they improve Nigeria's vulnerability score?

The Climate Action Index (CAI): Bridging the Gap between Policy and Implementation

Despite ambitious national climate policies, effective implementation hinges on subnational action. State governments, responsible for infrastructure, fiscal planning, and sectoral regulation, play a vital role in operationalizing climate goals. However, disparities in governance capacity and resource allocation have led to inconsistent progress across Nigeria.

The Climate Action Index (CAI) addresses this gap by translating broad national targets into measurable, state-specific indicators through a three-pillar framework:

Policy Alignment (40%)—Evaluates the consistency of state-level policies and institutions with Nigeria's Nationally Determined Contributions (NDCs).

Spending Efficiency (30%)—Assesses how effectively climate-related budgets are allocated and managed.

Outcome and Impact Transparency (30%)—Measures tangible results, such as emissions reduction and resilience gains.

By leveraging satellite data, emissions tracking, and fiscal transparency tools, the CAI provides a data-driven, internationally aligned framework for climate accountability. It aligns with the Paris Agreement's Enhanced Transparency Framework and Nigeria's MRV system.

As Nigeria's economy grows, the CAI offers a scalable solution to mitigate climate risks while advancing sustainable development. This paper outlines the CAI's theoretical foundations, methodology, and implementation pathway, offering strategic insights for policymakers, investors, and stakeholders committed to a climate-resilient future.

Justification for the Pillar Weight Distribution

The CAI assigns weights to its three pillars Policy Alignment (40%), Spending Efficiency (30%), and Outcome Transparency (30%) based on the realities of subnational climate governance in Nigeria and empirical evidence on effective climate action.

Policy Alignment (40%) is prioritized due to the foundational role of regulatory frameworks and institutional capacity. Most Nigerian states are still developing robust climate governance structures (Chukwumerije, 2022), making policy coherence essential for enabling consistent action across regions.

Spending Efficiency (30%) reflects the importance of managing climate finance effectively. Past misallocations have undermined implementation efforts. Transparent, target-linked spending not only improves outcomes but also enhances fiscal credibility and investment appeal.

Outcome Transparency (30%) emphasizes the need for measurable, verifiable results. In a context of fragmented subnational data, reliable metrics are key to tracking real progress, enhancing accountability, and refining policy (IPCC, 2023).

This weight distribution ensures a balanced framework that promotes sound governance, financial discipline, and tangible climate outcomes.

2. Literature Review

2.1. Climate Change and Economic Growth

The link between economic growth and carbon emissions remains a critical challenge for developing economies. The Environmental Kuznets Curve (EKC) suggests emissions rise with growth before declining as cleaner technologies emerge. However, in resource-dependent countries like Nigeria, emissions continue to rise due to reliance on fossil fuels and inefficient energy use.

Between 2011 and 2021, Nigeria's GDP grew by 6.4%, while emissions increased by 14.7% (Notre Dame Global Adaptation Initiative, 2024). The energy and transport sectors, especially the latter, which contributes 23% of CO_2 emissions (International Energy Agency, 2022) remain carbon-intensive. Without targeted policies, this upward trend threatens climate resilience.

Although national frameworks like the Climate Change Act of 2021 and updated NDCs exist, subnational implementation is weak. Many states lack climate offices, adequate funding, and technical capacity. Misalignment between national and state policies further impedes progress. A transparent, structured system for tracking state-level performance is essential for achieving Nigeria's climate goals.

2.2. Subnational Climate Governance: Global Lessons for Nigeria

Globally, subnational governments have been pivotal in advancing climate action. U.S. states like California and New York have led on carbon pricing and renewables, even in the absence of consistent federal policy. Brazil's Amazon Fund and India's state-level solar initiatives further demonstrate the power of decentralized climate governance. Nigeria can draw from these models by strengthening state-level accountability, improving access to climate finance, and adopting measurable emissions targets. The Climate Action Index (CAI) integrates such best practices to assess Nigerian states on policy implementation, financial efficiency, and environmental outcomes.

2.3. The Climate Finance Gap

Limited climate finance remains a major bottleneck in Nigeria's climate response, exacerbated by institutional and transparency challenges (UNEP, 2023; Ojewale, 2022). According to the UNEP (2023) Adaptation Gap Report, developing nations need $140 - $300 billion annually for adaptation, yet Nigeria secures less than 5% of its climate finance needs (World Bank, 2023). Key impediments include high perceived investment risk, inadequate domestic budget allocations, and financial opacity (Ojewale, 2022). These deficiencies reduce investor confidence and weaken implementation capacity. The Climate Action Index (CAI) addresses this gap by introducing transparency-focused financial metrics, ensuring funds are directed toward high-impact adaptation and mitigation projects. By tracking state-level fund utilization and aligning budgets with NDC targets, the CAI fosters accountability and strengthens the business case for subnational climate investment.

2.4. Theoretical Review of the Climate Action Index (CAI)

Introduction to the Theoretical Framework

Effective climate governance demands a structured, evidence-based framework. The Climate Action Index (CAI) addresses this need by providing state-level performance metrics to monitor progress, guide resource allocation, and support low-carbon development.

Grounded in established climate and economic governance models, the CAI integrates the **Theory of Change**, **Policy Alignment Mechanisms**, **Climate Finance Efficiency**, and **Outcome-Based Performance Assessment**. These elements make the CAI not only a monitoring tool, but also a strategic instrument for driving measurable subnational climate action.

Theory of Change: A Roadmap for Climate Governance

The CAI adopts the Theory of Change (ToC) framework to map the pathway from climate interventions to long-term impact, aligning with best practices in transparent climate governance and multilateral cooperation (IPCC, 2023; Hale, 2020) and also with established development planning models (Weiss, 1995). It links state-level policy implementation, resource allocation, and accountability mechanisms to national climate goals and emission reduction targets.

The CAI's ToC is structured around three interdependent pillars:

Policy Alignment—Effective alignment of subnational climate policies with national targets enables coherent governance and operational clarity.

Spending Efficiency—Strategic allocation of climate finance ensures investments are directed toward high-impact renewable energy, adaptation, and mitigation initiatives.

Outcome & Impact Transparency—Robust monitoring and accountability mechanisms foster iterative improvements and track decoupling of economic growth from emissions.

These pillars serve as evaluative metrics, ensuring climate action at the subnational level supports inclusive, low-carbon economic development.

The Three-Pillar Approach of the CAI

The Climate Action Index (CAI) is built on three interlinked pillars, reflecting international consensus on aligning subnational actions with national and global climate goals (Hsu, Weinfurter, & Xu, 2020; Setzer & Nachmany, 2018). Translating Nigeria's commitments under the Paris Agreement and SDG 13 into actionable state-level initiatives.

The Policy Alignment pillar evaluates the alignment of state policies, legislative frameworks, and institutional capacities with national climate goals. Key indicators include the adoption of Climate Action Plans, legislative consistency, and institutional capacity through climate units and enforcement mechanisms. A strong policy alignment ensures that climate targets are supported by concrete governance structures.

The Spending Efficiency pillar examines how effectively state-level climate financing is allocated to drive tangible outcomes. It considers budget alignment with NDC targets, investment transparency, and capital flows into renewable energy and green infrastructure. This pillar ensures climate funds are used efficiently, promoting fiscal accountability and maximizing impact.

By focusing on these interconnected pillars, the CAI ensures that Nigeria's climate action is both effective and transparent at the subnational level, driving sustainable development in alignment with global climate goals.

2.5. Outcome and Impact Transparency

This pillar focuses on tracking real-world climate improvements, ensuring that policy and financial investments translate into measurable environmental and social benefits.

Key Indicators

Verified Emission Reductions—Monitors carbon footprint reductions across key sectors (energy, transportation, agriculture, industry).

Resilience & Adaptation Impact—Evaluates whether states are implementing flood defenses, drought-resistant agriculture, and infrastructure to withstand climate shocks.

Community Benefits & Equity—Assesses the extent to which climate action improves social equity, benefiting vulnerable populations, women-led house-

holds, and indigenous communities.

By incorporating a targeted impact sub-metric, this pillar ensures that interventions are not just reducing emissions but also addressing regional vulnerabilities, fostering inclusive and sustainable development.

2.6. Data Inputs and Methodology

The CAI utilizes a data-driven framework to assess state-level climate performance, integrating national, subnational, and global datasets.

Emission & Economic Data:

- **Sector-Specific Emissions**: Tracks contributions from energy, transportation, agriculture, and industry.
- **Spatial Distribution & Hotspots**: Uses geospatial analytics to target emission-intensive regions for mitigation.
- **GDP & Economic Growth**: Examines the link between economic growth and carbon intensity, aiding in the design of low-carbon strategies.

Subnational Climate Data & Monitoring:

- **Satellite & Remote Sensing**: Integrates datasets from NASA and ESA to monitor land-use changes and environmental risks.
- **Ground Sensor Networks**: Collects real-time climate data on air quality, temperature, and water levels.
- **Stakeholder Surveys**: Engages local communities and governments to verify data accuracy.

These diverse data sources drive continuous climate action improvements and align with global climate governance best practices.

Integrating Economic and Emission Data—Policy Implications: The CAI tracks GDP-emission correlations to identify decoupling opportunities, ensuring economic growth remains low-carbon. States with high emissions need urgent mitigation; low-emission, high-growth states serve as models for sustainable development.

Incorporating these data, the CAI serves as a strategic framework for integrating climate governance, financial accountability, and measurable outcomes. By using a Theory of Change and a structured evaluation framework, it empowers Nigerian states to bridge the gap between policy ambition and action, offering a scalable model to attract climate funding.

2.7. Literature Gap

Identifying Gaps in Climate Action Research

Climate governance research has extensively explored national climate commitments, emissions reduction strategies, and policy frameworks. However, several critical gaps remain in subnational climate governance, financial accountability, and impact assessment models, particularly in developing economies like Nigeria. Despite Nigeria's commitments under the Paris Agreement and Nationally Determined Contributions (NDCs), implementation at the state level remains uneven due to limited monitoring frameworks and weak institutional capacity. This

section highlights key gaps in climate action research and policy implementation, with a focus on subnational governance, climate finance allocation, data transparency, and emissions tracking. The Climate Action Index (CAI) is designed to address these gaps by providing a structured, evidence-based tool for evaluating and enhancing state-level climate action.

The Gap between National Climate Policies and Subnational Implementation

A significant gap in climate action is the disconnect between national policies and subnational execution, a challenge documented across developing nations with decentralized climate responsibilities (Hsu, Weinfurter, & Xu, 2020; Setzer & Nachmany, 2018). Despite Nigeria's climate laws, states face challenges such as weak institutional capacity, inconsistent policy adoption, and limited coordination mechanisms, hindering effective climate action.

How the CAI Addresses This Gap: The CAI bridges this gap by providing a structured evaluation framework to track policy alignment, enforcement, and institutional capacity, ensuring that state-level actions align with national climate goals.

The Lack of Standardized Metrics for Subnational Climate Performance

Existing frameworks, like the Climate Change Performance Index and ND-GAIN Index, focus on national performance, leaving subnational actions untracked. This lack of metrics makes it difficult to assess regional progress, measure outcomes, and benchmark climate readiness.

How the CAI Addresses This Gap: The CAI introduces Nigeria's first state-level climate performance index, tracking:

- Policy Alignment: Climate laws, governance, and institutional frameworks.
- Spending Efficiency: Allocation of funds to renewable energy and mitigation projects.
- Outcome Transparency: Emission reductions and resilience improvements.

Inadequate Transparency and Accountability in Climate Finance Allocation

Misallocation and lack of transparency in climate finance hinder effective climate action. Studies show less than 5% of required climate finance is secured, with international donors reluctant to invest due to corruption concerns.

How the CAI Addresses This Gap: The CAI implements financial tracking mechanisms to ensure funds are efficiently allocated and promote fiscal accountability, boosting confidence among domestic and international investors.

Limited Use of Data-Driven Decision-Making in Climate Governance

Many states lack access to high-resolution climate data, hindering informed policy decisions. Emissions tracking is often inaccurate, and climate risk assessments are rarely integrated into economic planning.

How the CAI Addresses This Gap: The CAI integrates satellite imagery, ground sensors, and stakeholder surveys to provide real-time, high-resolution climate data, enabling evidence-based decision-making.

The Need for a Performance-Based Incentive Model for Climate Action

States often lack motivation to prioritize climate action due to the absence of

direct financial incentives or penalties. Nigeria's climate policies lack enforcement mechanisms.

How the CAI Addresses This Gap: The CAI introduces a performance-based evaluation system, rewarding high-performing states with more climate finance and investment, while offering targeted support to lagging states.

Bridging the Knowledge and Policy Gaps

The CAI addresses gaps in climate governance by:

- Aligning national and subnational policies.
- Ensuring transparency in climate finance.
- Promoting data-driven decision-making.
- Implementing a performance-based incentive model.

As a strategic tool, the CAI offers a clear, evidence-based roadmap for improving and financing state-level climate governance.

3. Methodology

3.1. Introduction to the Research Approach

The Climate Action Index (CAI) is designed as an evidence-based tool to evaluate climate governance at the subnational level. Its methodology integrates quantitative and qualitative data to assess how well Nigerian states align with national climate goals, efficiently utilize climate finance, and achieve measurable environmental outcomes.

The CAI is structured around a three-pillar evaluation framework that translates national climate ambitions into state-specific performance metrics. Each pillar is assigned a weight based on its relative importance in achieving Nigeria's climate targets.

3.2. Thematic Areas and Metrics

Each thematic area is divided into specific sub-metrics, scored on a standardized **0 - 3 scale**, where:

3 = Full implementation

2 = Partial implementation

1 = Minimal effort

0 = No effort

A. Policy Alignment **(40%) (*see* Table 1)**

Table 1. Overview of the CAI three-pillars, weights and scope.

Pillar	Weight	Scope
Policy Alignment	440%	Adoption of NDC-linked policies, legislative consistency, and institutional capacity.
Spending Efficiency	330%	Climate budget alignment, transparency in expenditure, renewable energy investments.
Outcome Transparency	330%	Emissions reductions, adaptation/resilience outcomes, community equity and targeted impact.

B. Spending Efficiency (30%) (*see* Table 2)

Table 2. Policy alignment pillar of the CAI framework.

Sub-Metric	Indicators	Scoring (0 - 3)
NDC Integration	Climate action plan alignment with federal targets, integration into state policies, implementation frameworks	3: Full alignment, 2: Partial, 1: Draft, 0: None
Institutional Capacity	Dedicated climate units, technical expertise, climate governance frameworks	3: Fully staffed, 2: Partial, 1: Ad-hoc, 0: None
Legislative Consistency	Laws supporting renewables, carbon pricing, emissions regulation	3: Enacted, 2: Proposed, 1: None

C. Outcome and Targeted Impact Transparency (30%) (*see* Table 3)

Table 3. Spending efficiency pillar of the CAI framework.

Sub-Metric	Indicators	Scoring (0 - 3)
Budget Alignment	% of climate funds tied to NDC targets, linkage between budget allocations and policy commitments, presence of financial oversight mechanisms	3: >70%, 2: 40% - 70%, 1: <40%, 0: None
Renewable Investment	% of energy budget allocated to solar/wind, investments in renewables, R&D, incentives for clean energy adoption	3: >20%, 2: 10% - 20%, 1: <10%, 0: None
Fraud Detection	Audits revealing misused funds, transparency in procurement, existence of anti-corruption frameworks in climate finance	3: <5% misuse, 2: 5% - 15%, 1: >15%, 0: No tracking

Assessment Matrix (*see* Table 4)

The weighting of Policy Alignment (40%), Spending Efficiency (30%), and Outcome Transparency (30%) is based on the relative impact of each pillar on climate governance effectiveness (see Table 5). Policy Alignment holds the highest weight as it sets the regulatory and institutional foundation. Spending Efficiency is allocated 30% due to its direct link to resource allocation, while Outcome Transparency is equally weighted at 30% to ensure accountability and verifiable progress.

Calculating the Pillar Averages

Step 1: For each pillar, Policy Alignment, Spending Efficiency, and Outcome Transparency calculate the average score of its sub-metrics. For example, if a state's scores for Policy Alignment sub-metrics average to **A**, for Spending Efficiency to **B**, and for Outcome Transparency (including Targeted Impact) to **C** (with each score on a 0 - 3 scale).

Table 4. Outcome and targeted impact transparency pillar of the CAI framework.

Sub-Metric	Indicators	Scoring (0 - 3)
Emissions Reductions	Verified CO_2 cuts (vs. baseline), tracking mechanisms, independent verification	3: >10%, 2: 5% - 10%, 1: <5%, 0: No data
Resilience Projects	Flood barriers built, drought-resistant crops, infrastructure resilience measures	3: >50 k beneficiaries, 2: 10 - 50 k, 1: <10 k, 0: None
Community Equity	% of projects benefiting women-led households, marginalized communities, youth inclusion	3: >40%, 2: 20% - 40%, 1: <20%, 0: None
Targeted Impact	Alignment of outcomes with predetermined, state-specific climate targets—such as achieving defined emission reductions in critical sectors or addressing high-risk areas	3: Outcomes fully meet or exceed targeted benchmarks; 2: Outcomes partially meet the targets; 1: Minimal alignment with the set targets; 0: No targeted outcomes achieved.

Table 5. Assessment matrix of the CAI framework.

Thematic Area	Variable	Sub Variable	Evidence Required	Points	Criteria
Policy and Governance	Climate Policy Framework	Existence of action plan	Policy document	0 - 3	Adoption level
		Alignment with NDCs	Action plan, NDC document	0 - 3	Degree of integration
	Institutional Capacity	Dedicated unit and expertise	Org. chart, staffing records	0 - 3	Established governance structure
Greenhouse Gas Emissions	Emissions Inventory System	Emissions tracking and verification	Inventory reports, verification standards	0 - 3	Coverage and reliability
	Emissions Reduction Targets	Ambition and alignment	Strategy document, NDC reference	0 - 3	Target rigor and alignment
	Sectoral Performance	Energy, transport, waste initiatives	Sectoral plans	0 - 3	Sector-specific actions
Renewable Energy	Energy Sources	Renewable Percentage	Energy mix data, renewable energy reports	0 - 3	Share of renewables
	Efficiency Initiatives	Energy Efficiency Projects	Program documents, monitoring data, policies	0 - 3	Implementation and effectiveness
Climate Finance Management	Financial Planning	Budget allocation and funding sources	Budget reports, funding agreements	0 - 3	Alignment with climate goals
	Expenditure Tracking	Documentation and transparency	Public dashboards, audits	0 - 3	Financial accountability
	Resource Mobilization	External and private funding	Funding agreements, investment reports	0 - 3	Fund sourcing success
Adaptation and Resilience	Vulnerability Assessment	Risk mapping and community index	Risk reports, community surveys	0 - 3	Data depth and accuracy
	Adaptation Planning	Strategy and M&E systems	Plans, progress reports	0 - 3	Strategic clarity and implementation
	Resilience Building	Infrastructure, ecosystems, community	Project reports, community assessments	0 - 3	Impact and coverage

Continued

Biodiversity and Land Use	Conservation Efforts	Protected Areas	Conservation maps, project reports	0 - 3	Scale and effectiveness
	Sustainable Land Management	Afforestation Programs	Program records, satellite imagery	0 - 3	Implementation success
Community Engagement	Public Awareness Campaigns	Campaign Reach	Campaign reports, stakeholder surveys	0 - 3	Audience engagement and impact
	Stakeholder Involvement	Collaborative Strategies	Stakeholder meeting minutes, consultation reports	0 - 3	Inclusiveness and participation

Step 2: Multiply each pillar's average score by its respective weight

- Policy Alignment: A × 40
- Spending Efficiency: B × 30
- Outcome Transparency: C × 30

(***Here, the weights are in percentage points that sum to 100.***)

Step 3: Add the weighted scores

$$\text{Raw Score} = (A \times 40) + (B \times 30) + (C \times 30)$$

The maximum possible raw score occurs when

A = B = C = 3A = B = C = 3A = B = C = 3:

$$\text{Max Raw Score} = (3 \times 40) + (3 \times 30) + (3 \times 30) = 120 + 90 + 90 = 300$$

Step 4: Convert to a Percentage

The overall CAI percentage score is then:

$$\text{CAI Percentage} = (\text{Raw Score}/300) \times 100)$$

Example Calculation: *Assume a state has the following pillar averages:*

Policy Alignment (*A*): *2.5*

Spending Efficiency (*B*): *2.0*

Outcome Transparency (*C*): *2.0*

Using the direct weighted average method:

$$\text{Raw Weighted Score} = (2.5 \times 40) + (2.0 \times 30) + (2.0 \times 30) = 100 + 60 + 60 = 220$$

$$\text{Overall Score on 0-3 Scale} = 220/100 = 2.2$$

$$\text{CAI Percentage} = 2.23 \times 100 \approx 73.3\%$$

This means the state achieves an overall CAI score of about 73.3% relative to the best possible performance.

4. Data Interpretation

The assessment process incorporates internal and external verification to ensure transparency and reliability (Table 6).

Implementation Workflow of the Climate Action Index (CAI)

The Climate Action Index (CAI) implementation process is structured to ensure a seamless transition from data collection to policy impact, fostering continuous improvement and alignment with both national and international climate frameworks. The process follows a structured, cyclical approach that includes baseline assess-

ment, annual updates, capacity building, stakeholder engagement, and long-term policy integration.

Table 6. CAI data validation steps, weight and activities.

Validation Step	Weight	Activities
Internal Assessment	40%	Self-assessment, internal audits, departmental reviews
External Verification	40%	Independent assessor evaluations, technical review workshops
Stakeholder Feedback	20%	Stakeholder workshops, Surveys, consultations with civil society, community, academia, international bodies and private sector

4.1. Baseline Assessment (Year 1)

The initial phase establishes a comprehensive climate performance benchmark for all 36 states and the Federal Capital Territory (FCT). This includes:

- Comprehensive data collection using standardized templates, geospatial tools, and stakeholder surveys.
- State-level assessment based on emission inventories, economic indicators, and climate readiness metrics.
- Initial scoring and categorization, providing a baseline for measuring progress over time.

4.2. Annual Scoring and Public Reporting (Years 2 and beyond)

To ensure accountability and transparency, CAI scores are updated and published annually:

- Annual data updates incorporating the latest climate finance allocations, emissions data, and policy changes.
- Dynamic public dashboard providing real-time benchmarking, state performance comparisons, and trend analysis.
- Stakeholder-accessible reports to drive policy adjustments and targeted interventions.

4.3. Capacity Building and Technical Assistance

To bridge policy implementation gaps, the CAI facilitates targeted capacity-building programs:

- Identifying states with high economic potential but low climate readiness to prioritize support.
- Providing technical assistance, best practice sharing, and skill development programs for policymakers and local climate officers.
- Enhancing institutional capacity by promoting climate governance reforms at the state level.

4.4. Continuous Stakeholder Engagement for Policy Refinement

The CAI emphasizes inclusive, multi-stakeholder collaboration to ensure climate

policies remain effective and adaptable:

- Quarterly progress reviews with local communities, civil society, and technical experts to assess policy effectiveness.
- Structured feedback mechanisms to refine data collection methods, scoring criteria, and intervention strategies.
- Cross-sector engagement to foster collaboration between government agencies, private sector players, and climate finance institutions.

4.5. Alignment with National and International Climate Frameworks

To maintain global credibility and coherence with climate commitments, CAI implementation is aligned with:

- Nigeria's Nationally Determined Contributions (NDCs) and national climate strategies.
- International reporting standards, including the Paris Agreement Enhanced Transparency Framework (ETF), Sustainable Development Goal 13 (SDG 13), and Nigeria's Measurement, Reporting, and Verification (MRV) system.
- Global best practices, ensuring that Nigeria's subnational climate governance remains comparable with international benchmarks.

4.6. Long-Term Monitoring and Policy Guidance

The CAI serves as a long-term policy advisory tool, providing:

- Real-time dashboards for continuous monitoring of emissions trends, climate finance utilization, and policy implementation.
- Iterative, data-driven policy recommendations based on performance trends to refine national and subnational climate strategies.
- Scalable best practices that can be replicated across other African nations seeking to implement similar subnational climate action frameworks.

The CAI implementation process is designed to be dynamic, transparent, and action-oriented, ensuring that climate progress is measurable, adaptable, and aligned with Nigeria's long-term sustainability goals. By integrating data-driven insights, stakeholder collaboration, and continuous policy refinement, the CAI provides a structured pathway for achieving subnational climate resilience and low-carbon development.

Alignment with Global Standards

The Climate Action Index (CAI) is designed not only to drive state-level climate action in Nigeria but also to meet and exceed internationally recognized standards. By aligning with global frameworks, the CAI enhances its credibility, facilitates cross-country comparisons, and reinforces Nigeria's commitment to its international climate obligations. Specifically, the CAI operationalizes the following global standards:

Paris Agreement ETF

The CAI complies with the Transparent, Accurate, Comparable (TACCC) prin-

ciples of the Paris Agreement, reflecting best practices in multilateral frameworks for climate cooperation (Hale, 2020; IPCC, 2023). This ensures that all emission data and related metrics are reported in a manner that meets international standards, fostering transparency and comparability.

Nigeria's MRV Framework

The CAI is fully integrated with Nigeria's Measurement, Reporting, and Verification (MRV) Framework, linking subnational data directly to the National Climate Registry. This alignment guarantees that state-level performance is both consistent with national reporting requirements and traceable for international review.

SDG 13 (Climate Action)

By tracking key indicators related to climate resilience and emissions reductions, the CAI directly supports Sustainable Development Goal 13. This integration not only ensures that Nigeria's progress is in line with global climate targets but also provides actionable insights for achieving sustainable, climate-resilient development.

Broader Implications for Nigeria and Africa

The Climate Action Index (CAI) is not merely a tool for subnational accountability, it is a catalyst for redefining climate governance across Nigeria and, by extension, Africa. By transforming national climate ambitions into actionable, state-specific metrics, the CAI offers a practical pathway to achieve measurable climate outcomes while reinforcing economic resilience.

Enhancing Climate Governance and Economic Resilience Across Nigeria

In Nigeria, the CAI directly addresses the challenge of decoupling economic growth from rising greenhouse gas emissions. By linking state budgets to specific, measurable climate outcomes, the CAI enables:

Targeted Policy Reforms

States with robust climate policies and strong institutional capacity can be identified and supported, ensuring that national goals such as a 47% emissions cut by 2030 are met with coherent local action.

Efficient Investment

By tracking spending on renewable energy, adaptation, and mitigation projects, the CAI highlights where investments can replace fossil fuel subsidies, thereby reducing carbon lock-in and redirecting financial flows toward clean technologies.

Improved Accountability

Through real-time monitoring and detailed outcome metrics, the CAI provides clear benchmarks that help local governments align their actions with national targets. This transparency not only builds trust but also informs adjustments in policy and practice, enhancing Nigeria's overall climate resilience.

For Africa: A Replicable Model for Subnational Climate Governance

The CAI has broader implications for the African continent:

Scalable Governance Framework

The CAI's state-specific metrics can be adapted to reflect the diverse governance challenges across African nations. By focusing on clear, measurable out-

comes, the CAI provides a model that other countries can use to track their progress toward international climate commitments.

Cross-Border Collaboration

As African nations work toward shared climate and sustainable development goals, the CAI can serve as a common framework for benchmarking and collaborative policy reform. This facilitates access to international climate finance and promotes coordinated regional efforts.

Driving Continental Transformation

By improving local-level accountability and transparency, the CAI not only supports Nigeria's transition to a low-carbon economy but also positions the country as a leader in climate governance, a role that can inspire similar initiatives across Africa.

Unlocking Policy and Economic Opportunities

The CAI's rigorous, data-driven approach creates significant opportunities:

Enhanced Investor Confidence

Transparent, performance-based metrics boost the credibility of states in attracting both domestic and international climate finance.

Informed Policy Interventions

Detailed, state-specific data helps policymakers identify priority areas for intervention whether it's in decarbonizing key sectors, improving renewable energy investments, or enhancing community resilience.

Balanced Growth:

By ensuring that economic expansion does not come at the expense of the environment, the CAI fosters a sustainable development model where growth and climate action reinforce each other.

Risks and Mitigation (Table 7)

Table 7. CAI risk and mitigation framework.

Internal Risk	Mitigation Strategy
Data Quality and Integration Risks	- Establish standardized data collection protocols and templates. - Use advanced data validation techniques and cross-checks to ensure consistency. - Integrate multiple data sources (administrative, satellite, and survey data) to create a comprehensive, normalized dataset.
Methodological Complexity and Transparency	- Clearly document and simplify the methodology where possible. - Provide user-friendly guides and conduct training workshops for stakeholders. - Maintain an open-access repository of the methodology to promote transparency and peer review.
Stakeholder Buy-In and Participation	- Engage key stakeholders early through consultations and pilot programs. - Implement continuous feedback loops via surveys, workshops, and public forums. - Offer incentives for accurate and timely data submission to ensure all parties see the value in participating.
Potential for Gaming or Misinterpretation	- Regularly review and update indicators and weighting to ensure genuine climate action is measured. - Incorporate qualitative assessments alongside quantitative scores. - Monitor trends over time to detect anomalies and adjust scoring criteria accordingly.
Technical and Operational Risks	- Invest in a robust, scalable technical infrastructure with regular maintenance and updates. - Develop comprehensive backup and recovery protocols. - Establish a dedicated technical support team to resolve issues promptly and ensure system stability.

Sustainability of the Climate Action Index (CAI)

Ensuring the long-term viability of the Climate Action Index (CAI) requires a structured and multi-pronged approach that integrates the project into local governance, financing mechanisms, policy frameworks, and community engagement structures. By embedding the CAI within institutional mandates, funding mechanisms, and legal frameworks, its sustainability can be guaranteed beyond short-term project cycles or changes in political leadership. The following key components outline a comprehensive sustainability strategy for the CAI.

Institutional Integration for Long-Term Ownership

To ensure the CAI's continuity, it must be anchored within a reputable institution with an existing climate or sustainability mandate. This institutionalization safeguards its operation beyond political transitions.

Effective implementation also requires cross-sectoral collaboration, given climate action's overlap with finance, infrastructure, agriculture, and energy. Establishing inter-agency teams will help align the CAI with broader development agendas, minimize duplication, and embed climate governance into national and subnational planning frameworks.

Steady Funding & Resource Mobilization

The CAI's long-term viability requires a diversified funding strategy beyond government or donor dependence. Sustainable financing should combine public budget allocations, international donor support (e.g., World Bank, AfDB, Green Climate Fund), private sector investments (e.g., green bonds), and philanthropic contributions.

To incentivize progress, performance-based funding mechanisms can link state-level allocations to CAI scores rewarding high-performing states and fostering ongoing commitment.

Capacity Building & Knowledge Transfer

Sustaining the CAI requires ongoing capacity development through structured training and a "training-of-trainers" approach, enabling local officials and technical staff to manage data collection, analysis, and reporting effectively.

Digital platforms, e-learning tools, and automated reporting software should support seamless knowledge transfer and ensure continuity in CAI implementation across changing personnel.

Policy & Legal Anchoring

To ensure CAI's permanence, it must be legally embedded in national and state climate policies. This includes mandating its use through legislation or executive orders, allocating dedicated budgets, and requiring annual reporting.

Public disclosure of CAI results will enhance transparency, enabling civil society and local communities to monitor progress and drive accountability in climate governance.

Robust Governance & Oversight Mechanisms

Establishing a multi-stakeholder steering committee composed of government officials, civil society representatives, private sector actors, and development part-

ners will enhance oversight and decision-making. This committee should oversee project milestones, troubleshoot challenges, and approve adjustments to CAI metrics as needed.

To further strengthen credibility, periodic independent audits should be conducted. Third-party verification of CAI data and implementation progress will improve transparency, build trust, and ensure data accuracy.

Stakeholder Engagement & Local Buy-In

For the CAI to achieve lasting impact, it must be embraced beyond government. Community engagement, civil society partnerships, and private sector collaboration ensure climate action is inclusive and participatory.

Mechanisms such as public forums, digital dashboards, advocacy partnerships, and co-developed private sector initiatives foster broad ownership and sustain momentum, even amid leadership transitions.

◆ **Adaptability & Continuous Improvement**

Given the evolving nature of climate data and risks, the CAI must remain flexible. Regular annual or biannual reviews, along with updates to indicators, methodologies, and data collection tools, will help maintain relevance.

Leveraging emerging technologies such as AI analytics, remote sensing, and real-time monitoring can enhance precision, reduce costs, and improve responsiveness.

◆ **Risk Management & Resilience Strategies**

To safeguard the CAI's continuity, robust risk mitigation is essential. This includes cross-party political support, institutionalizing CAI processes beyond individuals, and creating contingency funding buffers.

Such resilience strategies ensure the CAI remains functional and effective, even in the face of political, economic, or funding-related disruptions.

5. Summary & Recommendations

The Climate Action Index (CAI) is a strategic tool designed to enhance state-level climate governance, financial transparency, and emissions tracking in Nigeria. This white paper has highlighted the need for a structured performance assessment framework and detailed how the CAI addresses critical implementation gaps.

Despite Nigeria's ambitious climate policies, challenges persist in subnational execution, finance tracking, and data use. The CAI responds by evaluating state performance across policy alignment, spending efficiency, and impact transparency. States with high growth but rising emissions and low readiness are flagged for targeted support, including conditional financing, capacity building, and regulatory assistance ensuring that climate action is both measurable and adaptive to specific regional needs.

6. Key Recommendations for Enhancing Climate Governance in Nigeria

- Institutionalize the CAI within a permanent government body to ensure its

longevity and integration into national climate policies.

- Expand financial sustainability mechanisms by diversifying funding sources, introducing performance-based incentives, and securing long-term budget allocations.
- Strengthen capacity building efforts through continuous training, digital tools, and knowledge-sharing platforms for government officials and technical staff.
- Mandate transparent public reporting to enhance accountability, ensure civil society oversight, and encourage grassroots participation in climate action.
- Adopt adaptive management practices by regularly updating CAI metrics, incorporating emerging technologies, and integrating global best practices.
- Develop cross-sector partnerships with private sector actors, development partners, and research institutions to scale up climate action initiatives.
- Enhance resilience strategies to mitigate risks from political and economic fluctuations, ensuring that the CAI remains an independent and sustainable assessment tool.

By implementing these recommendations, Nigeria can strengthen its climate governance framework, mobilize international climate finance, and accelerate progress toward a low-carbon, climate-resilient future. The CAI provides a roadmap for measurable, accountable, and scalable climate action, ensuring that economic growth and environmental sustainability go hand in hand.

7. Conclusion

The Climate Action Index (CAI) offers a transformative approach to subnational climate governance in Nigeria. By operationalizing national climate goals through state-specific performance metrics policy alignment, spending efficiency, and impact transparency the CAI bridges the gap between federal ambition and local implementation. This framework enhances accountability, supports targeted investments, and provides a replicable model for other African nations. As states improve their climate performance, they become better positioned to attract international finance, implement resilience strategies, and contribute meaningfully to Nigeria's Nationally Determined Contributions. Beyond governance, the CAI also promotes equity and community-level engagement, ensuring climate actions are inclusive and effective. With strong institutional backing and continuous data-driven refinement, the CAI can anchor Nigeria's transition toward a low-carbon, climate-resilient economy and catalyze broader climate reforms across the continent.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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