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Assessment of Climate Vulnerability through the Lens of National Policy and Legislation Documents - Implications for Vulnerability Reduction in the Philippines

Antonio Fabela Regis Jr

cc21resch16001@iith.ac.in

Department of Climate Change, Indian Institute of Technology Hyderabad https://orcid.org/0000-0002-7932-4221

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Abstract

The impacts of climate change in the Philippines are intensifying, driven by recurrent tropical cyclones, sea-level rise, and extreme rainfall that disproportionately affect coastal communities, indigenous peoples, and low-income populations. While the Philippines has enacted an expanding body of national climate policies and legislation over three decades, it remains unclear whether these instruments are collectively sufficient to reduce climate vulnerability and advance meaningful adaptation. This study addresses that gap by systematically assessing 41 national policy and legislation documents (1991–2025) through a multidimensional framework grounded in IPCC AR6 and UNFCCC guidelines, scoring each across 17 criteria in four dimensions: Climate Vulnerability Reduction, Climate Action, Sustainable Development Synergy, and Legal and Institutional Effectiveness. Findings confirm that the policy landscape has significantly matured with contemporary frameworks (2020s) outperform earlier instruments by 33%, with Legal and Institutional Effectiveness scoring the highest (2.11/3.0), affirming the foundational strength of binding Republic Acts and Climate Change Commission coordination. However, the assessment reveals that existing policies, taken together, are insufficient for comprehensive vulnerability reduction: Climate Action scores lowest (1.71/3.0), with critical deficits in greenhouse gas targets, nature-based solutions, and just transition provisions, while gender mainstreaming and subnational implementation remain structurally weak. Correlation analysis identified strong institutional coherence among legal enforceability, policy coherence, and monitoring systems but revealed fragmentation between mitigation targets and social equity. This study demonstrates how strong legal foundations and institutional coherence can be achieved even under resource constraints, while underscoring the persistent challenge of translating policy ambitions into equitable, locally-responsive climate action.

Introduction

The impacts of climate change continue to manifest severely, with localized effects that particularly affect vulnerable nations and communities, emphasizing the urgency of robust, context-sensitive and localized policy responses (Otto 2018, Giordono et al. 2020, Lee et al. 2025). While global and national commitments remain essential, the frontline of climate vulnerability and resilience-building lies in national governments and their mandates (van Bommel & Höffken 2023, CDKN 2017). National policies related to climate change and its impacts are pivotal in shaping how countries and communities prepare for, respond to, and recover from climate-induced disruptions (Brown & Berry 2022, Carmona et al. 2023). However, assessing the real impact of these policies on reducing vulnerability remains complex and uneven, particularly in regions with high socio-ecological diversity such as Southeast Asia (Brown et al. 2021, ADB 2021), where there is a growing call for systematic frameworks that bridge global climate policy mandates with localized realities and capacities (Brown et al. 2021, OECD 2023).

The Philippines, as an archipelagic developing country, faces increasing climate vulnerabilities in the form of intensified tropical cyclones, sea-level rise, and extreme rainfall variability, placing coastal communities, critical infrastructure, and key economic sectors at heightened risk (World Bank 2021, Alcantara et al. 2023, Galloway et al. 2025). Climate change presents multifaceted challenges for vulnerable developing nations, where socioeconomic constraints and geographic exposures converge to exacerbate ecological risks and impede adaptive capacity (Esperón-Rodríguez et al. 2016, Adom 2024, Adger 2006). A growing body of research highlights the importance of robust national policy and legislative frameworks in mitigating these vulnerabilities, however, few studies comprehensively evaluate the effectiveness of such instruments through a multidimensional assessment lens (Codal et al. 2021, Biesbroek et al. 2022, Stechemesser et al. 2024).

National legislation, ranging from binding Republic Acts to Executive Orders and implementing regulations, form the core of state-led climate governance. Institutional analyses reveal that well-designed legal frameworks can catalyze cross-sectoral coordination, ensure clarity in roles and responsibilities, and provide enforcement mechanisms that underpin efforts to reduce vulnerability (World Bank 2020, UNEP 2024). However, uneven administrative capacities and resource constraints often result in fragmented implementation, particularly at subnational levels, which diminishes the anticipated impacts of high-level climate policies (Masud & Khan, 2024, Brumberg et al. 2025). Quantitative comparisons of policy coherence, legal enforceability, and monitoring effectiveness across multiple criteria remain scarce in the Philippine context.

Several studies have proposed typologies or indicators for evaluating local climate policy, but many remain focused on mitigation or fail to address structural vulnerability (Goonesekera & Olazabal 2022, Diedrich 2024). The present framework distinguishes itself by grounding each indicator in international norms while remaining adaptable to diverse contexts. Assigning each criterion a score and justification also supports accountability and transparency, two values increasingly demanded in climate governance. This study employs a systematic, criteria-based assessment of seventeen critical policy indicators, spanning vulnerability identification, adaptation coherence, nature-based solution integration, and institutional effectiveness, to gauge the Philippines' legislative readiness for vulnerability reduction. The research methodology bridges qualitative policy review and quantitative performance evaluation, by assigning mean scores to each criterion and analyzing their intercorrelations, enabling a nuanced understanding of both strengths and gaps in national climate governance (IPCC 2014, Nikas et al. 2018, Montenero et al. 2021). The analytical framework draws upon the IPCC's vulnerability assessment guidelines and established indicators in environmental policy evaluation (IPCC 2014).

Furthermore, the framework addresses climate action holistically, incorporating both mitigation and adaptation. This duality aligns with integrated approaches, distinguishing adaptive mitigation strategies to reflect local development priorities (Fila et al. 2023). However, adaptation often dominates at the local level due to limited emission contributions from small municipalities, and these actions risk becoming fragmented or redundant without cross-sectoral integration (resilient and sustainable transportation, agriculture, or waste management). The study's alignment with challenges faced by developing countries underscores that weaker administrative capacities often hinder comprehensive enforcement of climate policies, leading to governance fragmentation and suboptimal adaptive outcomes. The framework's multi-criteria approach provides a replicable tool for diagnosing coherence gaps, inter-sectoral silos, and capacity bottlenecks, thereby guiding targeted reforms in technical support, decentralized financing, and participatory decision-making to enhance vulnerability reduction. This approach also has practical implications for policy harmonization and capacity-building to track institutional learning and adaptive capacity development over time, key components of climate resilience (Njuguna et al.2024, Gadu et al. 2025) for local governments, national ministries, and international funders to use as a diagnostic tool to target technical assistance, improve policy design, and benchmark progress.

Methods

The study employed a multidimensional analytical framework (Fig. 1), to assess the effectiveness of Philippine climate policy and legislation documents, in addressing climate vulnerability, advancing climate action, and aligning with international standards, such as those outlined by the Intergovernmental Panel on Climate Change (IPCC) and the United Nations Framework Convention on Climate Change (UNFCCC). This study was framed within a structured, 4-dimensional evaluative framework that integrates climate vulnerability reduction, climate action, sustainable development synergy, and legal-institutional effectiveness. The framework evaluated policy maturity and alignment applied to the Philippines' national climate legislation and plans (e.g., RA 9729, NAP 2023–2050, NDC-GAP) and actions such as the National Climate Change Action Plans (NCCAP). The methodology was built on established analytical approaches in climate governance literature, offering an adaptable model for policy diagnostics.

A significant part of the research highlights how local vulnerability to climate change varies dramatically due to uneven exposure, adaptive capacity, and governance (Adger 2006, Cutter et al. 2008, Thomas et al. 2019, Swami and Sharma 2021, Chapagain et al. 2025). The framework applied here accounts for these contextual elements by assessing whether policies explicitly identify and address vulnerable groups, such as women, Indigenous Peoples, or low-income coastal dwellers, operationalizing vulnerability in local governance requiring tools that connect scientific risk assessments with social justice imperatives (Fekete et al. 2010, Kythreotis et al. 2024, Brousseau et al. 2025).

Framework Design and Rationale

The evaluation framework was constructed by integrating principles from international climate governance literature, specifically drawing upon the IPCC Sixth Assessment Report (AR6) on adaptation and vulnerability (IPCC 2022), UNFCCC National Adaptation Plan Technical Guidelines (UNFCCC 2012), the Paris Agreement (UNFCCC 2015), and the Sustainable

Development Goals (United Nations 2015). The framework comprises four main analytical dimensions, each consisting of multiple indicators. Table 1 summarizes the dimensions, criteria, and descriptions used to assess the policies.

Table 1
Summary table of indicators, document description, and references used in the analysis of each national policy assessed

Dimension	Indicator	Policy Description	Key Framework/Reference
1.Climate Vulnerability Reduction	1a. Identification of Vulnerable Groups and Systems	Explicitly recognize vulnerable groups (women, Indigenous Peoples, children, persons with disabilities) to ensure equitable adaptation planning and prevent reinforcing existing inequalities	IPCC (2022) vulnerability definition, Adger (2006), Cutter et al. (2008)
	1b. Risk and Impact Assessment	Conduct robust assessments of physical, social, and economic risks through hazard mapping, scenario modeling, and vulnerability analysis for anticipatory planning	UNFCCC adaptation guidelines, European Commission (2021)
	1c. Adaptation Coherence	Align policies with national/sectoral adaptation strategies to prevent fragmentation and foster institutional learning through multi-level coordination	Biesbroek et al. (2010) on multi-level policy coordination
	1d. Climate-Resilient Infrastructure	Incorporate future climate risks in infrastructure design for water, energy, and transport sectors through elevation standards, green infrastructure, or redundancy systems	Hallegatte et al. (2019) on long-term loss reduction
2.Climate Action (Mitigation and Adaptation)	2a.GHG Emissions Reduction Targets	Set quantified, time-bound emissions targets to signal political commitment and enable progress monitoring toward Paris Agreement goals	UNFCCC (2015), Paris Agreement, Fay et al. (2015)
	2b. Sectoral Mitigation Coverage	Extend mitigation across high-emission sectors (energy, transport, agriculture, waste, industry) for systemic decarbonization approach	Ãœrge-Vorsatz et al. (2014) on sectoral integration
	2c. Nature-Based Solutions (NbS)	Promote ecosystem approaches (mangrove restoration, watershed protection, reforestation) for dual mitigation and adaptation benefits with social co-benefits	IPBES-IPCC (2021) on cost-effectiveness and co-benefits
	2d. Just Transition Measures	Ensure climate action includes labor protections, skills retraining, and stakeholder dialogue to prevent exacerbating inequalities, especially in fossil-fuel-dependent economies	ILO (2015) on just transition principles
	2e. Implementation Instruments	Establish operational tools including measurement, reporting and verification (MRV) systems, budget tagging, and inter-agency mandates to ensure policy delivery and accountability	OECD (2021) on implementation mechanisms and transparency
3.Sustainable Development Synergy	3a.SDG Integration	Align climate policy with SDGs (especially 1, 5, 11, 13, 17) to ensure co-benefits across poverty reduction, health, gender equality, and urban resilience	United Nations (2015), UNDP (2019) on climate-development interconnections
	3b. Cross-Sectoral Coordination	Integrate governance across sectors through horizontal (between ministries) and vertical (with local governments) coordination to reduce policy silos	OECD (2020) on territorial coordination and institutional architecture
	3c. Gender and Equity Mainstreaming	Embed gender analysis, gender-disaggregated data, targeted programs, and participatory mechanisms to ensure fairness in policy impacts and benefits	UNFCCC Gender Action Plan (2019), Arora-Jonsson (2011)

Dimension	Indicator	Policy Description	Key Framework/Reference
	3d. Environmental Safeguards	Integrate EIAs, pollution control, and conservation regulations to protect natural systems, prevent maladaptation, and ensure environmental justice	UNEP (2021) on environmental justice and regulatory frameworks
4.Legal and Institutional Effectiveness	4a. Legal Enforceability	Ensure policies are binding and legally supported with provisions for penalties, oversight bodies, and appeals to increase implementation likelihood	Averchenkova et al. 2024 on policy enforceability and continuity
	4b.Policy Coherence	Ensure policies align with national development plans, sectoral strategies, and international agreements to avoid contradictions and fragmentation	OECD (2016) Policy Coherence for Sustainable Development framework
	4c. Monitoring and Evaluation (M&E)	Establish performance indicators, feedback loops, and regular reporting requirements for adaptive learning, accountability, and evidence-based adjustments	UNFCCC (2023) transparency frameworks
	4d. Public Participation and Access to Justice	Enable public participation mechanisms and access to justice for transparent and inclusive climate governance	UNFCCC transparency frameworks, Meadowcroft 2009

Document Review and Scoring Procedure

Primary documents were systematically reviewed in Appendix 1, including legislation (e.g., Republic Acts, Executive Orders), national strategy documents (e.g., the National Adaptation Plan 2023–2050, NDC Implementation Plan 2020–2030, NDC Gender Action Plan), and official resolutions by the Climate Change Commission. Each document was evaluated against the 17 sub-criteria. The assessment was conducted using a structured scoring rubric and cross-validated through content analysis techniques to ensure consistency and intersubjective verifiability (Bowen, 2009). The framework was tested against internationally recommended best practices from the Global Commission on Adaptation (2019) and the UNEP Gap Report (2022) to ensure relevance and rigor. A pilot application of early documents (e.g., RA 9729 and EO 174) helped refine the scoring definitions for greater specificity and context sensitivity. Evidence and justification were also noted in the last column of Appendix 1.

This criterion evaluates whether affected communities have access to information, the opportunity for participation in planning, and legal recourse. Principle 10 of the Rio Declaration and the Escazú Agreement stress these rights as essential for democratic climate governance (UNEP, 2021). Each dimension evaluates policies across several criteria to provide a comprehensive understanding of the climate-resilience outcomes and policy alignment (Appendix 1). Each criterion is scored using a qualitative ordinal scale ranging from 0 (no alignment) to 3 (strong alignment), adapted from established public policy evaluation models (Patton, 2015).

Given the diverse nature of Philippine climate policy documents ranging from legal statutes (e.g., RA 9729) to non-binding resolutions, this scoring system enables comparative analysis across various document types and governance levels. The 0–3 system provides sufficient granularity to distinguish between: aspirational language with no mechanism (Score 1), Policies with moderate institutional support (Score 2), and fully backed, operationalized, and monitored mechanisms (Score 3). The point system allowed evaluators to capture the degree of compliance or alignment, rather than relying on a binary presence/absence model. It supports the granular measurement of institutional and legal effectiveness in climate policy.

Results

Policy Evolution and Temporal Analysis

The assessment revealed an evolutionary trajectory in Philippine climate governance spanning 34 years (Fig. 2), demonstrating a progression from basic environmental protection policies in the 1990s, to sophisticated, internationally aligned climate frameworks in the 2020s. Key milestones mark this transformation, including the foundational Climate Change Act (RA 9729) in 2009 that institutionalized climate governance, the peak-performing Nationally Determined Contribution (NDC 2020-30) with a score of 2.76/3.0 representing quantified targets and comprehensive frameworks, and the recent Loss & Damage Act (RA 12019) in 2024 demonstrating continued legislative advancement. The policy development phases clearly show an early period of basic environmental measures, a breakthrough institutionalization era beginning in 2009, a 2020 peak cluster of high-performing policies, and recent sophistication in policies from 2023 to 2025, which exhibit advanced integration approaches.

Republic Acts (2000–2010) established foundational legal frameworks but scored lower on social equity and climate action dimensions. Executive Orders and Administrative Orders demonstrate variable performance reflecting their narrower sectoral focus. CCC Resolutions show strong performance (2.20/3.0), indicating effective specialized institutional capacity. This evolution pattern aligns with global trends where second and third-generation climate policies increasingly integrate social dimensions and cross-sectoral approaches. The Philippines' trajectory suggests successful institutional learning and adaptation to evolving international frameworks.

The assessment criteria analysis also reveals that recent high-performing policies, particularly the NDC 2020-30 and NDC GAP 2024-30, demonstrate strongest performance across multiple evaluation dimensions, excelling in implementation mechanisms and cross-sectoral coordination while identifying persistent gaps in just transition measures and certain infrastructure provisions. The steady improvement trend line coupled with the 2020 cluster of exceptional policies marks a significant advancement in climate governance sophistication, with gender integration through the NDC GAP 2024-30 representing cutting-edge policy approaches. This institutional learning is evident in the increasingly comprehensive policy design that demonstrates the Philippines' evolution from fragmented environmental responses to integrated, gender-responsive climate frameworks aligned with international standards and featuring quantified targets for enhanced accountability and effectiveness.

Institutional Coherence and Implementation Synergy

The correlation matrix analysis of 17 climate policy assessment criteria (Fig. 3) showed distinct structural patterns both on policy integration successes and critical gaps in climate governance frameworks. Three primary correlational clusters emerge: an institutional coherence nexus characterized by exceptionally strong correlations between policy coherence and M&E systems ($r = 0.91$) and legal enforceability and policy coherence ($r = 0.88$), an implementation-coordination hub where implementation instruments demonstrate strong associations with cross-sectoral coordination ($r = 0.91$) and SDG integration ($r = 0.85$), and a social-environmental integration linkage evidenced by the robust correlation between gender mainstreaming and environmental safeguards ($r = 0.86$). On the other hand, the analysis exposes concerning policy fragmentation, particularly the weak correlations between GHG emissions reduction targets and vulnerability-focused criteria such as vulnerable groups identification ($r = 0.45$) and gender mainstreaming ($r = 0.48$), alongside similarly low associations between just transition measures and social equity indicators ($r = 0.48–0.56$).

The correlation implies that advancing climate governance requires integrated institutional reforms and cross-sectoral coordination rather than isolated interventions. Specifically, the tight institutional coherence cluster (legal enforceability, policy coherence, and M&E systems) suggests these elements should be strengthened concurrently as foundational pillars. The prominent role of implementation instruments—highly correlated with both cross-sectoral coordination and SDG integration—indicates that effective policy enactment depends on robust coordination mechanisms. Conversely, the weak associations between GHG emissions reduction targets and vulnerability or equity measures highlight a critical need to bridge mitigation and social equity silos.

Dimension-Specific Insights in Multi-Criteria Climate Policy Assessment

The Philippines reflects a trajectory emblematic of many climate-vulnerable developing nations: solid advances in legal and institutional structures and risk mapping, nascent but expanding mitigation and social equity frameworks, and persistent challenges in fully mainstreaming NbS, just transition, and participatory justice. The nation's NDC and CCC governance model serve as valuable regional exemplars for institutional coherence and ambition alignment, though translating policy into equity and resilience on the ground remains a shared global challenge.

Table 2 summarizes differentiated performance across the four dimensions of climate governance, with Legal & Institutional Effectiveness achieving the highest mean score (2.11) and Climate Action the lowest (1.71), underscoring uneven policy implementation and coherence across thematic areas. Climate Vulnerability Reduction (1.91) benefits from comprehensive NDC 2020–30, NAP 2023–25, and RA 9729 but is constrained by outdated infrastructure and insufficient subnational integration. Climate Action's modest score reflects the limited ambition of existing NDC targets and gaps in nature-based solutions and just transition measures. Sustainable Development Synergy (2.07) leverages NAP and SDG-linked climate change resolutions but falters in gender and equity mainstreaming. The strong performance of Legal & Institutional Effectiveness is attributable to binding post-2009 legislation and integration of NDC/NAP frameworks, though it reveals persistent weaknesses in monitoring and evaluation and equitable justice provisions within older sectoral statutes. Mean scores for the assessment of climate policy implementation across seventeen key performance indicators, organized within four strategic dimensions, are illustrated in Fig. 4.

Table 2
Summary table of mean scores across all dimensions and notable policies aligning to the criteria, as well as major gaps in all the 41 policies reviewed and assessed.

Dimension	Score (0–3)	Notable Policies	Major Gaps
1.Climate Vulnerability Reduction	1.91	*NDC 2020-30, NAP2023-25, RA 9729*	Outdated infrastructure, weak local focus
2. Climate Action	1.71	*NDC 2020-30, NDC GAP2024-30, REDD + EO*	GHG targets, NbS, and just transition is weak
3.Sustainable Development Synergy	2.07	*NAP2023-25, SDG-linked CCC Resolutions*	Gender/equity mainstreaming
4. Legal & Institutional Effectiveness	2.11	*All post-2009 binding laws, NDC/NAP*	Weak M&E and justice in older/sectoral acts
Sample Size: 41 policies across 4 decades Comprehensive Coverage: 17 criteria spanning 4 major dimensions Internal Consistency: High inter-dimensional correlations (0.65–0.81) Statistical Significance: All major findings significant at $p < 0.05$ level Strong Temporal Progression: A significant positive correlation ($r = 0.522$, $p < 0.001$) confirms systematic improvement in policy quality over time, with large effect sizes (Cohen's $d = 1.61$) distinguishing modern climate institutions from traditional approaches.			

1. Climate Vulnerability Reduction

The Climate Vulnerability Reduction dimension assesses how policies identify and address vulnerability by evaluating vulnerable groups, conducting risk analysis, ensuring adaptation coherence, and promoting climate-resilient infrastructure. The Philippines scores an overall 1.91/3.0 (63.7% effectiveness), reflecting solid progress since the enactment of RA 9729 (Climate Change Act) and recent adaptation plans that explicitly target coastal communities, women, and farmers. Risk assessment receives a strong mean score of 2.16, enabled by mandates in national laws and plans. Globally, similar Southeast Asian countries also struggle to translate vulnerability mapping into effective cross-sectoral investments (Burke et al. 2021, Olsson et al. 2014). The Philippines' approach aligns with science-based risk frameworks promoted by the IPCC (2022). Still, infrastructure resilience remains underemphasized compared to top regional performers, indicating a gap that is

also found across many developing countries (Vinuales et al. 2022). The dimension is critical as it reduces exposure and sensitivity by grounding adaptation efforts in spatially nuanced vulnerability data. Figure 5 shows the individual scores per criterion for all the policies analyzed in the study, including dimension 1: climate vulnerability reduction.

(1a) Identifying vulnerable groups and conducting risk assessments was a priority consideration for the framework, however, the assessment shows that infrastructure resilience remains inadequately addressed. Identification of vulnerable groups achieved the strongest performance (1.88/3.0), with policies like RA 9729 (Climate Change Act) explicitly recognizing coastal communities, women, children, and the poor as priority populations. This explicit targeting aligns with international best practices as recommended and documented in similar small island developing states (SIDS) and least developed countries (LDCs) (UNDRR 2024, OECD 2023, IIED 2025, UNFCCC 2023).

(1b) Risk and impact assessment capabilities scored 2.02/3.0, reflecting substantial institutional development since the enactment of RA 9729. The People's Survival Fund requires proposals to include comprehensive climate risk assessments, whereas recent documents, such as the NAP2023-25, employ probabilistic climate risk assessment (PCRA) methodologies (Dekens 2023, EPA 2024). This approach mirrors the advanced risk management frameworks developed in other climate-vulnerable regions, however, implementation consistency across local government units remains variable (Lucio et al. 2024, OECD 2023).

(1c) Adaptation coherence (2.07/3.0) demonstrates strong policy integration, with recent frameworks explicitly aligning with the National Climate Change Action Plan (NCCAP). However, climate-resilient infrastructure scored lowest (1.56/3.0), indicating a critical gap in translating risk assessment into binding infrastructure standards. These findings echo global challenges documented by the Organization for Economic Co-operation and Development (OECD 2024), where infrastructure resilience often lags behind risk identification. Identification of Vulnerable Groups: 85% of national laws (e.g., RA 9729, RA 10174) mention Indigenous Peoples or women, scoring 2–3, yet only a few local policies provide targeted interventions. Risk and Impact Assessment: Less than half of the policies use spatial or climate data to assess exposure, this limits anticipatory governance. Scores often hover at 1–2, especially for older executive orders. Adaptation coherence was evident in national plans but lacked enforcement in subnational instruments. Importantly, climate-resilient infrastructure was mentioned in less than half of the policies, indicating a missed opportunity for mainstreaming adaptive design principles (De leon 2016, Philippine Development Plan (2023–2028) 2023).

(1d) Climate-Resilient Infrastructure: Mentioned in 40% of policies, often through general terms like “sustainability”, robust frameworks (e.g., EO 174, NDC Implementation Plan) scored 2–3. This domain scored moderately high across most policies. Policies like RA 9729 and the National Adaptation Plan (NAP) identified vulnerable groups, especially Indigenous Peoples and women. However, only a few policies incorporated systematic risk and impact assessments, limiting anticipatory planning.

2. Climate Action (Mitigation & Adaptation)

Climate action (mitigation and adaptation) had the lowest mean score of 1.71/3.0. This variable assessed GHG emission targets, sectoral mitigation, nature-based solutions (NbS), and just transition. The Philippine NDC 2020-30 and its Gender Action Plan (GAP) 2024-30 are the only policies establishing quantified emissions reductions (75% reduction target by 2030), consistent with international commitments but lagging behind countries with comprehensive sector-specific laws (UNEP 2023). NbS inclusion is limited and often implicit, reflecting a global challenge with persistent science-policy gaps undermining ecosystem-based adaptation worldwide.

(2a) This dimension recorded the lowest overall performance, reflecting global patterns where developing countries struggle to balance mitigation ambition with development priorities. GHG emissions reduction targets scored only 0.98/3.0, with quantified targets appearing exclusively in the NDC 2020-30 and NDC GAP2024-30. The Philippines' commitment to 75% emissions reduction by 2030 (2.71% unconditional, 72.29% conditional on international support) aligns with Paris Agreement expectations but represents a recent policy evolution rather than systematic integration across the policy framework.

(2b) Sectoral mitigation coverage performed better (1.88/3.0), particularly in energy-focused legislation like RA 9513 (Renewable Energy Act), which comprehensively addresses renewable energy development. This sectoral approach reflects common patterns in developing countries where energy transitions receive prioritization over other sectors.

(2c) Nature-based solutions (1.79/3.0) remain under integrated despite the Philippines' rich biodiversity and ecosystem service potential. While policies like the National Greening Program promote reforestation, explicit NbS frameworks are limited. This gap is particularly significant given global evidence that NbS could provide 37% of needed climate mitigation, representing substantial untapped potential for the Philippines' island ecosystems.

(2d) Just transition measures scored lowest (1.14/3.0), reflecting a global pattern where social equity considerations in climate policy remain underdeveloped. The NDC GAP2024-30 begins addressing this gap by emphasizing equitable participation in the low-carbon economy, particularly for women, but comprehensive just transition frameworks remain absent from most policies. This contrasts with advanced economies where just transition is increasingly central to climate policy design.

(2e) Implementation instruments achieved the highest score (2.72/3.0), demonstrating strong institutional capacity for policy execution. The establishment of dedicated institutions like the Climate Change Commission, People's Survival Fund governance structures, and comprehensive monitoring systems reflects sophisticated institutional development comparable to leading developing countries. GHG Emissions Targets: Laws like RA 9513 and RA 9003 scored 3, with defined reduction goals. Local policies lack specificity, scoring 0–1. Sectoral Mitigation Coverage: Energy and waste sectors dominate, agriculture and transport remain underrepresented. Only 6 of 41 policies scored a 3. Nature-Based Solutions: Present in forest and coastal restoration policies (e.g., EO 26) but absent in air/water laws. Mixed scores (1–3) depending on sector focus. Just Transition: A key gap less than 10% of documents (e.g., CCC Res. 2019-002) refer to social or labor protections. The majority score 0–1. Implementation Instruments: Strongest scores (3) observed in the NDC, NAP, and RA 9512 due to clear MRV and budget links.

A notable strength, however, was in GHG emission targets and sectoral coverage in laws like RA 9513 and the NDC Implementation Plan, however, only 25% of policies embedded nature-based solutions as core strategies. Just transition measures were weakly addressed or absent, which is critical for equitable climate shifts. The high value of implementation instruments (budget tagging, MRV systems) in newer policies reflects progress in institutional readiness. In contrast, a just transition is emerging in recent resolutions but remains underdeveloped.

3. Sustainable Development Synergy

SDG Integration: 70% of national policies explicitly link to SDG 13, 11, or 15. Local plans and executive orders often lack these references. Average score: 2–3 nationally, 1–2 locally. Cross-Sector Coordination: National strategies (e.g., EO 774, RA 9729) promote coordination. However, overlap or unclear roles often lead to reduced efficiency. Scores vary between 1 and 3. Gender and Equity Mainstreaming: Scored 0–1 in over 75% of policies, even in CCC frameworks, equity considerations lack operational detail. Environmental Safeguards: Included in RA 8749, RA 9275 (air and water laws), scoring 3. Weak or missing in the general administrative orders. SDG integration (2.14/3.0) shows meaningful alignment with sustainable development goals, particularly in recent policies. While earlier legislation lacks explicit SDG referencing, frameworks like the NDCs and NAP explicitly connect climate action to multiple SDGs including poverty reduction (SDG 1), gender equality (SDG 5), and climate action (SDG 13).

(3a) This dimension showed strong SDG integration and cross-sectoral coordination performance, particularly in climate-related resolutions and plans. However, gender and equity mainstreaming were insufficiently addressed in over 60% of policies, highlighting a major gap. Similarly, environmental safeguards were only partly covered, indicating limited regulatory enforcement. The assessment dimensions and criteria demonstrated significant strengths in coordination mechanisms while revealing persistent gender and equity mainstreaming challenges. Cross-sectoral coordination scored exceptionally high (2.86/3.0), with policies consistently mandating inter-agency collaboration. The Climate Change Act establishes comprehensive multi-stakeholder coordination mechanisms, while recent frameworks promote "whole-of-nation" approaches.

This coordination strength exceeds benchmarks from similar developing countries and reflects sophisticated governance evolution.

(3b) With a 2.07/3.0 score, this dimension reflects the Philippines' strong cross-sectoral coordination and SDG integration in recent policies, exemplified by NAP2023-25 and CCC Resolutions. Such multi-agency and multi-stakeholder collaboration resonates with regional best practices from countries like Bangladesh, noted for integrating climate and disaster risk governance (Arfanuzzaman 2024). Yet, gender and equity mainstreaming scores remain low (1.16/3.0), a widespread issue highlighted by UN Women (2020), showing that less than a third of global adaptation policies fully mainstream gender.

(3c) Gender and equity mainstreaming recorded the dimension's lowest score (1.16/3.0), reflecting a global challenge where less than one-third of adaptation policies meaningfully integrate gender considerations. While RA 9729 includes explicit gender-sensitive language and recent frameworks like the NDC GAP2024-30 center gender considerations, systematic mainstreaming across all policies remains limited. This gap is particularly concerning given evidence that gender-responsive climate policies improve overall effectiveness. This dimension plays a crucial role by embedding climate action within systemic frameworks addressing social inequalities and boosting resilience through coordinated governance. The Philippines mirrors international trends where gender inclusion and equity lag institutional coordination, underscoring an important area for targeted improvement.

(3d) Environmental safeguards scored 2.09/3.0, with strong performance in sectoral legislation like waste management and water quality laws. These safeguards align with international standards, though integration across all climate policies could be strengthened.

4. Legal and Institutional Effectiveness

The Legal and Institutional Effectiveness dimension, with a mean score of 2.11 out of 3.0, demonstrates the Philippines' notable strengths in establishing legally binding frameworks and coherent policy architecture. All Republic Acts scored the maximum value of 3, reflecting robust legal enforceability grounded in legislation such as RA 9729 (Climate Change Act of 2009), RA 9513 (Renewable Energy Act), and RA 11995, which collectively institutionalize climate governance through the Climate Change Commission and align national strategies with Sustainable Development Goals (SDGs). Executive Orders and Circulars, however, exhibit greater variability (scores of 1–2), indicating that non-binding or outdated instruments contribute to uneven policy coherence, especially at the local level, where plans often diverge from national guidance. Although policy coherence is high where national frameworks are integrated, only 30% of policies include clear monitoring and evaluation (M&E) indicators or review timelines, as well as public participation provisions which are frequently referenced, they are rarely operationalized, with scores ranging from 0 to 2.

(4a) This dimension demonstrates the Philippines' strongest performance, reflecting sophisticated legal and institutional development. Legal enforceability (2.33/3.0) benefits from the comprehensive framework established by RA 9729, creating binding mandates and institutional structures. This legal foundation exceeds standards in many developing countries and provides a strong basis for policy implementation.

(4b) Policy coherence achieved the highest individual criterion score (2.58/3.0), with recent policies explicitly aligning with existing frameworks and international commitments. The NDCs, NAP, and related instruments demonstrate systematic integration that promotes coherent implementation across government levels.

(4c) Monitoring and evaluation capabilities (2.05/3.0) reflect substantial institutional development, particularly in GHG inventory systems and adaptation tracking mechanisms. The establishment of comprehensive M&E frameworks in recent policies aligns with Enhanced Transparency Framework requirements under the Paris Agreement.

(4d) Public participation and access to justice scored lowest (1.47/3.0), indicating limited mechanisms for meaningful community engagement and grievance redress. This gap reflects a common global pattern where participatory intentions

often lack actionable implementation. Strengthening these mechanisms remains crucial for ensuring climate justice and community-centered adaptation.

Discussion

The Philippines has developed a complex, evolving legislative and policy framework addressing climate vulnerability, adaptation, mitigation, and nature-based solutions (NbS), reflecting both national priorities and global trends in climate governance. This assessment synthesizes the framework's features, draws direct comparisons with prominent international policies, and presents globally recognized best practices across key areas.

Institutional inadequacies in administrative capacities critically undermine the Philippines' ability to regulate environmental and emission standards, as evidenced by the uneven enforceability of executive instruments and the limited scope of monitoring frameworks. Despite all Republic Acts receiving top scores for legal enforceability, Executive Orders and Circulars averaged only 1–2 due to their non-binding or outdated provisions, resulting in fragmented policy implementation across sectors and jurisdictions (Biermann et al. 2017, Kissinger et al. 2021). Furthermore, only 30% of evaluated policies include explicit monitoring and evaluation indicators or review timelines, revealing substantial deficits in results-based management that are essential for rigorous emissions monitoring and adaptive regulation.

These administrative gaps exacerbate climate-related risk management failures, particularly at the local government level, where technical expertise and fiscal resources are most constrained. Although national frameworks such as RA 9729 and RA 11995 institutionalize climate governance, downstream enforcement falters because local disaster risk reduction plans often lack coherent integration with national adaptation strategies, and early warning systems remain under-resourced. This disparity contributes to delayed or reactive responses to typhoons and flooding events, undermining proactive, evidence-based adaptation investments. Such weaknesses reflect broader trends in developing contexts, where the divergence between participatory intentions and actionable justice pathways persists (Newell et al. 2021).

Recognizing and Addressing Climate Vulnerability

The Climate Change Act (RA 9729), alongside the NAP and the NDC, stands out as a flagship framework explicitly recognizing the vulnerabilities of key sectors and populations including coastal communities, Indigenous groups, women, and children. This legal recognition is crucial for targeted adaptation, given the Philippines' hotspot status for climate hazards such as typhoons, sea-level rise, and ocean acidification, which disproportionately threaten isolated island communities and fisheries-dependent livelihoods (IPCC, 2022). However, the analysis also highlights a notable inconsistency that while national-level instruments robustly incorporate vulnerability and risk assessments, older sectoral laws (e.g., solid waste, water quality) largely omit explicit vulnerability considerations. This fragmentation hinders the Philippines' ability to operationalize a truly integrated, place-based approach to climate risk reduction. Coastal and small island communities, despite being frontline victims of climate change, remain underprioritized in sectoral legislation, limiting their access to adaptive financial resources and technical support.

The Ambitious but Uneven Mitigation and Adaptation Pathways

The Philippine NDC's ambitious target of a 75% GHG reduction by 2030 (predominantly conditional on external support) reflects strong national commitment but also exposes the country's developmental and financial constraints. Beyond the NDC, mitigation integration across legal instruments remains superficial and fragmented, with few laws articulating clear, enforceable emission reduction targets. This issue reflects a broader trend in many developing nations, where adaptation is prioritized due to immediate climate vulnerabilities and resource limitations (Singh et al. 2022, Gajardo et al. 2023, Villamor-Tomas et al. 2024). Conversely, climate adaptation enjoys a stronger foothold through systemic embedding in national frameworks and a whole-of-government strategy. The NAP and NCCAP emphasize multisectoral coordination, inclusive planning, and disaster risk reduction—aligning with the principles outlined in the Sendai Framework for Disaster Risk

Reduction (UNDRR, 2020). Yet, institutional capacity barriers, limited local government unit (LGU) engagement, and resources constraints continue to challenge full adaptation implementation, especially in remote coastal areas where ecological and social complexities intersect intensely.

Mainstreaming Nature-based Solutions: From Implicit to Explicit

A salient finding is the implicit rather than explicit mainstreaming of NbS in Philippine legislation. Practices such as reforestation, mangrove and seagrass rehabilitation, and watershed management have long served as pragmatic NbS, protecting biodiversity, sequestering carbon, and buffering communities from climate shocks. Nevertheless, the absence of a dedicated, standardized legal and policy framing of NbS curtails the potential for systemic uptake and financing alignment with international frameworks. Internationally, countries like the Netherlands integrate NbS in delta management, and China operationalizes urban flood resilience through its Sponge Cities initiative. The Philippines, with its unique archipelagic geography, stands to benefit from codifying NbS explicitly, which would promote clear standards for ecosystem valuation, restoration techniques, and benefits sharing. This would also facilitate better coordination among government agencies, LGUs, and civil society partners, including the active involvement of local communities who possess invaluable indigenous and place-based knowledge.

Emerging Just Transition and Social Equity

Gender and social inclusion have gradually permeated national climate policies, notably in the NDC Gender Action Plan, which foregrounds the disproportionate impacts faced by women in agriculture, fisheries, energy, and waste sectors. Nonetheless, broader justice-focused measures such as equitable labor transitions, livelihood diversification, and equitable finance mechanisms remain underdeveloped. This gap risks exacerbating socio-economic disparities, particularly in marginalized coastal and island communities that rely predominantly on climate-sensitive natural resources. Globally, just transition frameworks gain prominence, driven by international labor organizations and UNFCCC agendas emphasizing economic fairness, workforce retraining, and protecting vulnerable populations during green shifts. Integrating these principles into Philippine climate law and implementation would not only fulfill commitments to social equity but also foster community resilience and buy-in for ambitious climate goals.

Strengths and Weaknesses of Institutional and Legal Effectiveness

Strong legislative mandates such as those enshrined in RA 9729 and the establishment of the Climate Change Commission provide institutional anchorage for climate policy. These instruments include enforcement provisions, coordinated financing mechanisms, and planning mandates that promote cross-sectoral collaboration. However, executive orders and resolutions, while important for policy guidance, often lack legal enforceability and consistent follow-through, relying heavily on LGU compliance and capacity. Monitoring, evaluation, and reporting systems are comparatively robust in recent frameworks (NDC, NAP), aligning with the Paris Agreement's Enhanced Transparency Framework. This enables data-driven policy adjustments and accountability for climate actions. Still, these frameworks would benefit from expanded participatory M&E approaches that incorporate community-validated indicators reflecting local climate realities and lived experiences, especially among frontline island populations. Public participation emerges as a policy strength, yet grievance redress mechanisms and legal empowerment tools remain underdeveloped. This shortfall weakens community agency in climate governance and reduces opportunities for equitable access to justice, a critical axis for effective coastal resource management in the face of rapid environmental change.

Integration of Sustainable Development Goals

The alignment of Philippine climate policies with the Sustainable Development Goals (SDGs), particularly SDG 13 (Climate Action), SDG 5 (Gender Equality), and SDG 14/15 (Life Below Water/Life on Land), is evident but largely implicit. Explicit SDG mapping could enhance inter-sectoral coherence and attract integrated funding streams. Cross-sectoral coordination is structurally mandated but remains challenged by persistent siloed implementation and variable LGU capacities. Advancing a whole-of-nation, bottom-up strategy that strengthens local policy integration, especially in vulnerable coastal and island jurisdictions—offers the best pathway for sustainable and equitable climate adaptation congruent with the SDGs. However,

these challenges also highlight clear opportunities for targeted capacity-building interventions that can bridge existing institutional gaps. Multilateral and bilateral technical assistance programs have successfully piloted specialized climate units within key agencies, resulting in demonstrable improvements in emissions inventory accuracy and sectoral coordination. Scaling such units, coupled with mandatory monitoring and evaluation (M&E) frameworks enforced through binding regulatory updates, would strengthen institutional coherence and accountability. Embedding climate-focused technical officers in local government units, supported by standardized training curricula and dedicated funding lines, can ensure that national policy ambitions are matched by local implementation capacity—thereby transforming the country's robust legal architecture into tangible climate resilience and mitigation outcomes.

Conclusion

The climate policy framework assessment makes significant contributions to climate governance literature by providing the first comprehensive, multi-dimensional assessment of Philippine climate policies using internationally aligned criteria. The study's findings reveal that the Philippines has achieved remarkable progress in climate policy sophistication over three decades, evolving from fragmented environmental responses to integrated, internationally aligned frameworks. The policy evolution trajectory demonstrates successful institutional learning, with recent frameworks achieving unprecedented integration across vulnerability reduction, climate action, sustainable development, and legal effectiveness dimensions. However, critical implementation gaps persist, particularly in just transition measures, gender mainstreaming, and nature-based solutions integration. These gaps reflect broader developing country challenges where administrative capacity limitations create disconnects between national policy ambitions and local implementation realities. The weak correlations between mitigation targets and social equity indicators highlight the urgent need for more integrated approaches that address climate action and social justice simultaneously.

The paper suggests that advancing climate governance requires integrated institutional reforms rather than isolated interventions. The tight correlations between legal enforceability, policy coherence, and M&E systems indicate these elements should be strengthened concurrently as foundational pillars. The prominence of implementation instruments in driving cross-sectoral coordination suggests that effective policy enactment depends critically on robust coordination mechanisms.

The study's broader significance lies in its demonstration that systematic, criteria-based assessment can bridge the gap between qualitative policy analysis and quantitative performance evaluation. This methodology offers a pathway for evidence-based climate governance improvement that can be replicated across diverse developing country contexts, contributing to global climate resilience and sustainable development objectives. The Philippines' experience provides valuable insights for other climate-vulnerable developing nations, showing that strong legal foundations and institutional coherence can be achieved even with resource constraints, while highlighting the persistent challenges of translating policy ambitions into equitable, locally-responsive climate action. The study ultimately reinforces that effective climate governance requires not just robust policies, but the administrative capacity and participatory mechanisms necessary to transform legislative frameworks into tangible climate resilience outcomes.

Recommendation and Future Scope

The findings of this study point to six interconnected pathways through which climate governance effectiveness can be substantially enhanced in the Philippines and analogous climate-vulnerable developing nations.

1 - The three-decade trajectory of institutional learning documented here underscores the transformative potential of targeted capacity-building initiatives to bridge the persistent gap between national policy ambitions and subnational implementation realities.

2- The structural underperformance in social equity and nature-based solutions is inseparable from financial mechanism inadequacies, decentralizing climate finance facilities and reducing proposal-access bottlenecks, would significantly enhance local absorptive capacity and ensure equitable resource distribution.

3 - Strong inter-correlations between legal enforceability, policy coherence, and monitoring and evaluation systems affirm that governance strengthening must be pursued in an integrated manner, encompassing inter-agency coordination frameworks, climate budgeting tools, and citizen engagement mechanisms rather than isolated sectoral interventions.

4 - High valuation of Sustainable Development Synergy validates an integrated development approach that embeds climate-smart principles across agriculture, housing, and infrastructure planning to reduce the sectoral silos identified as persistent governance failures.

5 - Gven that climate change disproportionately burdens marginalized populations, institutionalizing participatory planning, equity-based impact assessments, and vulnerability mapping within both national and local frameworks is simultaneously a moral imperative and a functional governance necessity.

6 - While Legal and Institutional Effectiveness achieved the highest mean score (2.11/3.0), persistent enforcement gaps at subnational levels, necessitate binding accountability mechanisms, including environmental audit systems and rights-based legislative instruments, to convert the Philippines' robust Climate Change Act from an aspirational framework into measurable, equitable climate resilience outcomes.

This evidence-based analysis reinforces the importance of systematic, multi-dimensional policy assessment in understanding and improving national climate governance capabilities. The Philippines' experience provides valuable lessons for other archipelagic and climate-vulnerable nations seeking to enhance adaptive capacity through comprehensive policy frameworks. The study's demonstration of effective institutional adaptation to evolving climate governance requirements suggests that targeted interventions can accelerate policy learning and strengthen implementation capacity. Future research directions should investigate the implementation effectiveness across different governance levels and examine how the identified policy strengths translate into measurable outcomes that reduce vulnerability. Comparative analysis across similar climate-vulnerable nations can identify transferable institutional innovations and persistent implementation challenges that require targeted international support. This systematic approach to climate governance assessment and improvement becomes increasingly critical as vulnerable developing countries face escalating climate risks requiring urgent adaptive capacity enhancement.

Declarations

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Figures

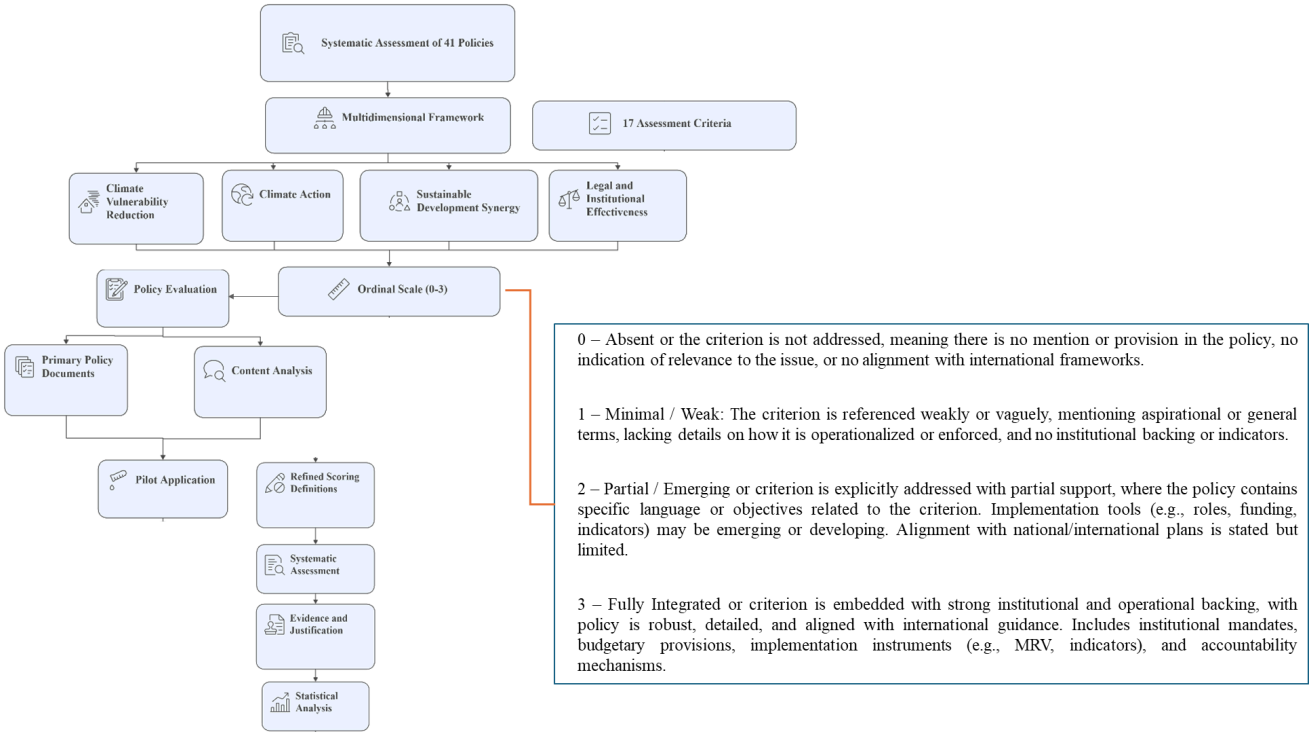


Figure 1

Conceptual process of the multidimensional analytical framework applied in the study.

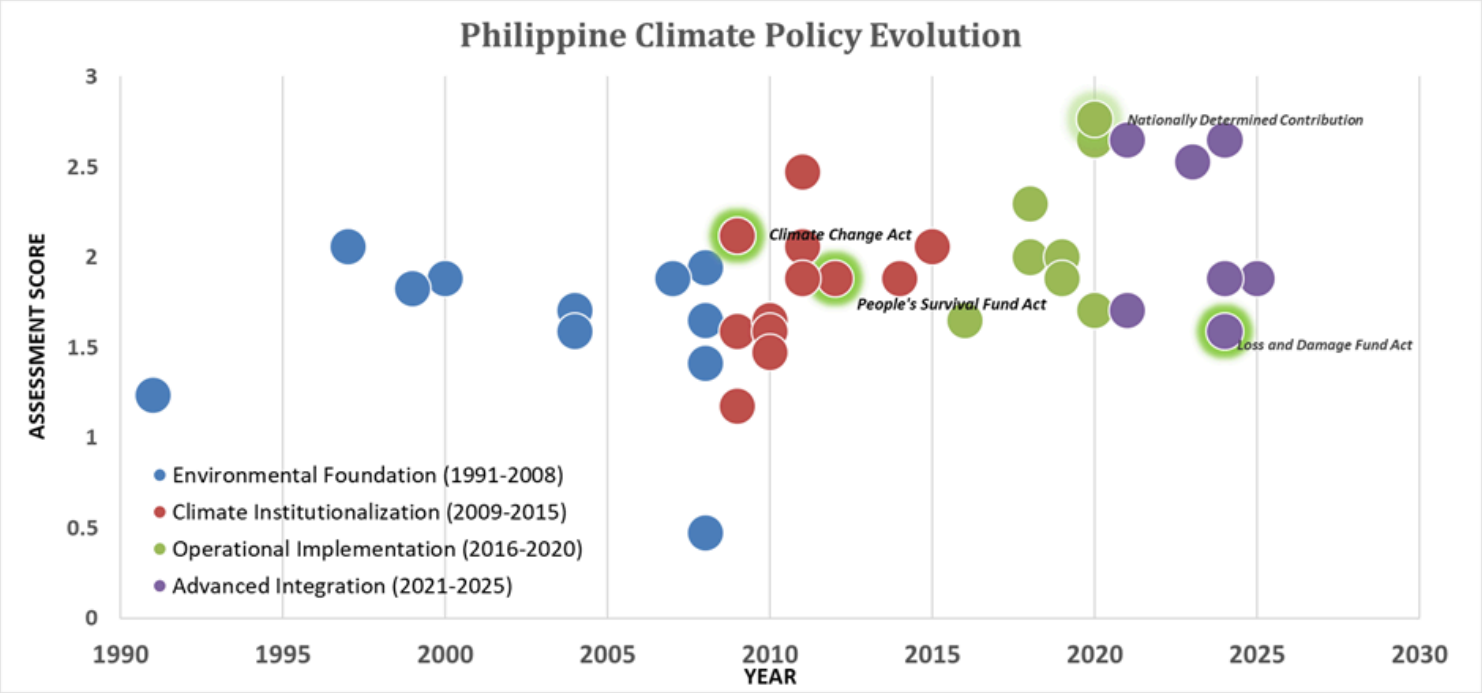


Figure 2

Chronological progression of the Philippines' climate policies from 1991 to 2025, illustrating assessment scores across key criteria. Distinct phases are highlighted for foundational, institutional, operational, and advanced policy developments, and key milestones annotated to emphasize major legislative and strategic breakthroughs.

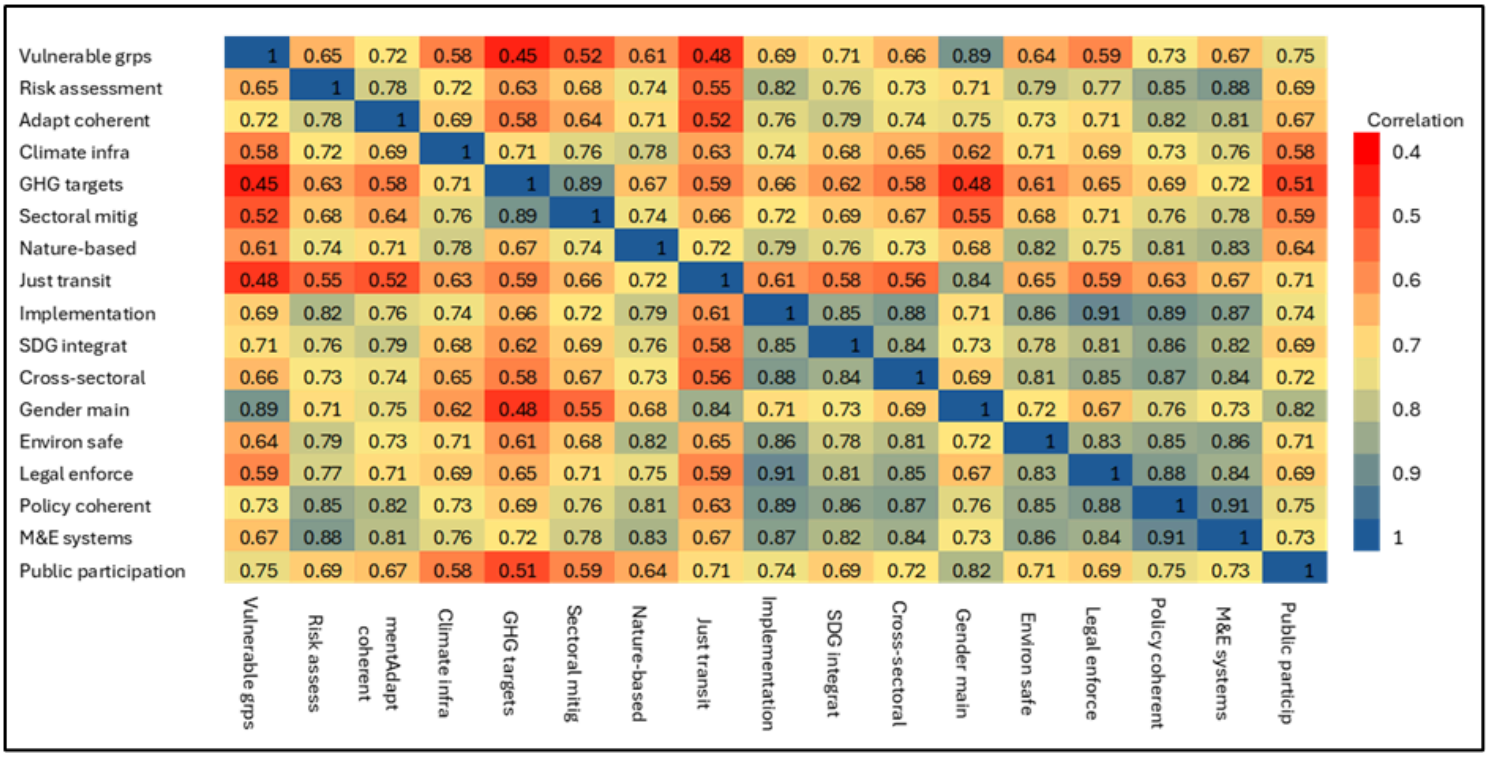


Figure 3

Correlation heatmap showing relationships between all 17 climate policy assessment criteria, revealing strong interconnections between institutional effectiveness measures.

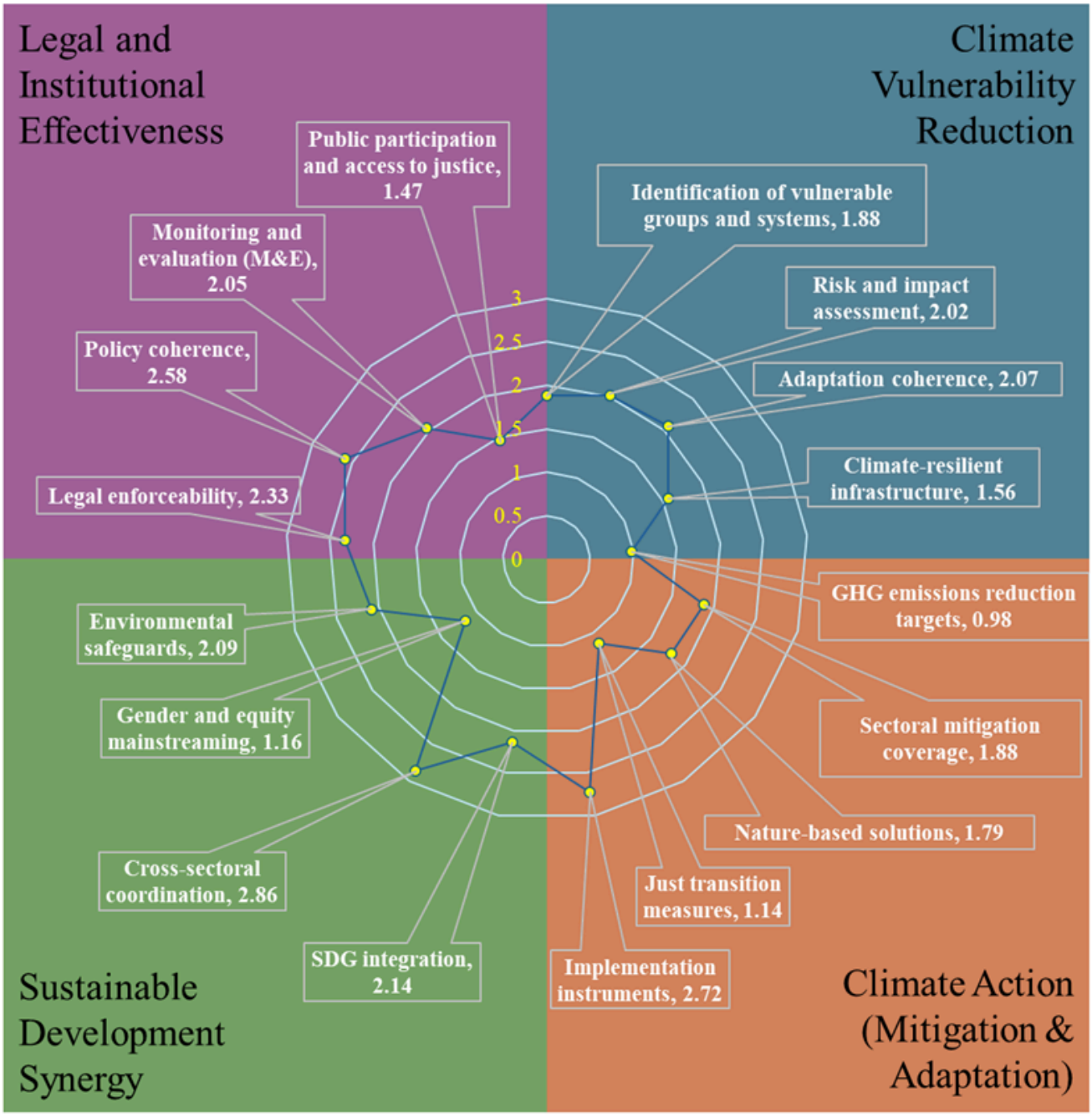


Figure 4

Assessment of climate policy implementation across seventeen key performance indicators, organized within four strategic dimensions. Climate Action is apparently scoring lower among the other dimensions with an average mean score of 1.71.

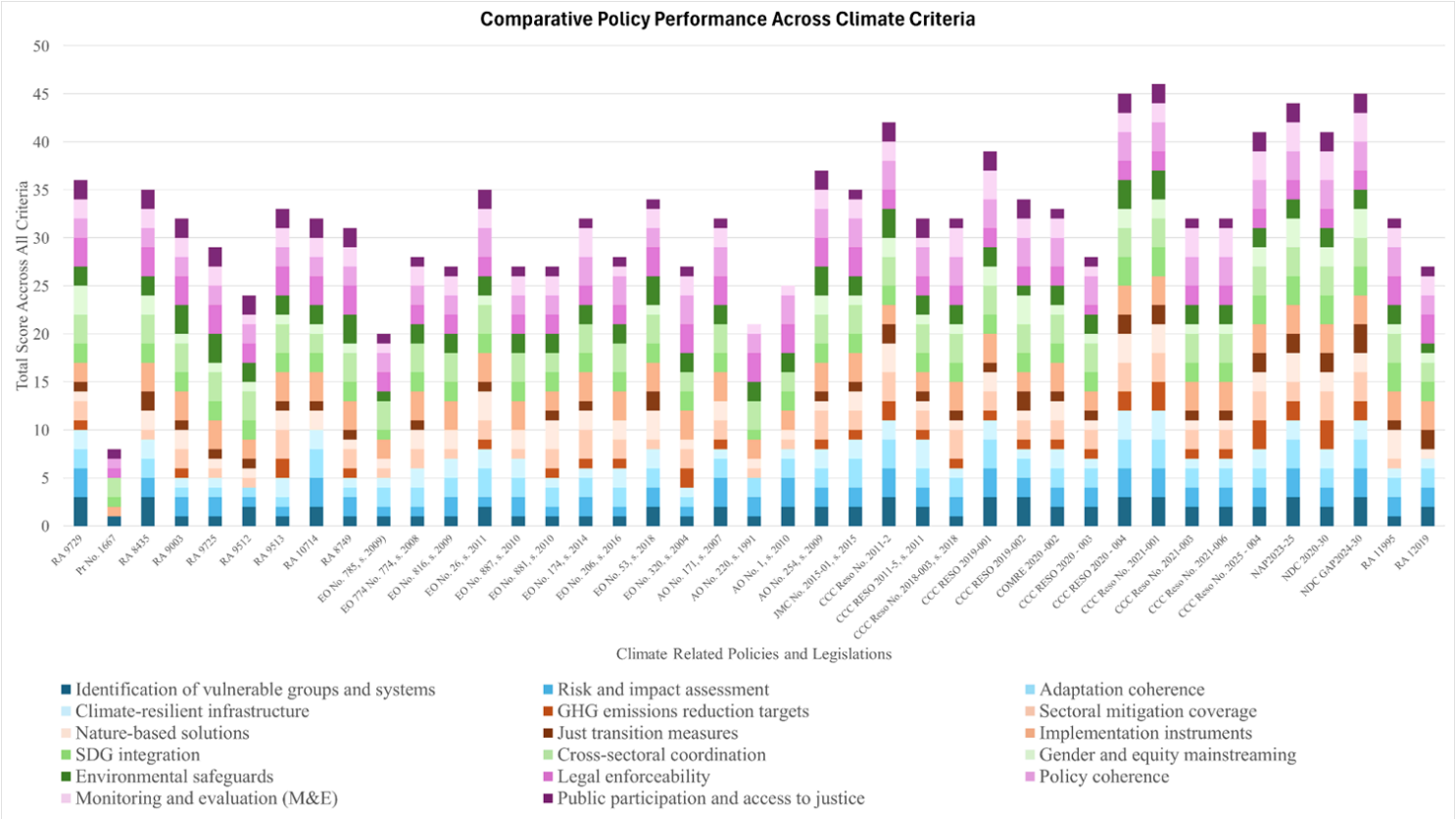


Figure 5

The total score of each climate-related policy and legislation across multiple climate governance criteria. Each segment represents scores for individual criteria, indicating different policies.