

Integrated Policy Approaches to Disaster Risk and Climate Change Governance: A Global Review of Institutional Strategies, Techniques, and Community Resilience

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Abstract

Climate change and disaster risks have emerged as interconnected threats that demand integrated and adaptive governance systems. While both domains, disaster risk management (DRM) and climate change adaptation (CCA), have independently evolved over time, their convergence remains a complex challenge for policymakers. This review explores the multidimensional integration of policies addressing disaster and climate risks, focusing on institutional coordination, community participation, and the use of innovative governance mechanisms. Drawing insights from diverse global contexts, including Pacific Island countries, South Africa, Colombia, Indonesia, and Myanmar, the study synthesizes key policy frameworks, governance barriers, and successful techniques. Using qualitative analysis and content review, we assess how collaborative governance, rapid needs assessment, educational planning, and informal settlement resilience contribute to sustainable risk management. The findings emphasize the importance of participatory, flexible, and context-sensitive approaches for achieving long-term resilience. Recommendations highlight the need for inclusive planning, systemic integration, and responsive institutional reform in risk-prone regions.

Keywords: Climate change adaptation, disaster risk management, governance, institutional coordination, community participation

INTRODUCTION

The accelerating pace of climate change and the increasing intensity of natural disasters represent critical challenges for contemporary governance systems. From sea-level rise in low-lying islands to prolonged droughts in semi-arid regions, societies around the world face a complex web of interrelated risks that transcend traditional policy silos. As climate change intensifies, the frequency and severity of extreme weather events such as floods, droughts, cyclones, and heatwaves are projected to rise significantly, exacerbating existing vulnerabilities and overwhelming response mechanisms [1]. These

overlapping crises demand a fundamental rethinking of how disaster risk management (DRM) and climate change adaptation (CCA) are conceptualized and operationalized within policy frameworks.

Historically, DRM and CCA evolved as distinct disciplines, each with its own institutional architecture, funding mechanisms, scientific paradigms, and stakeholder communities. DRM has typically focused on short-term, event-driven responses and preparedness efforts to mitigate the impacts of sudden-onset hazards, such as

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earthquakes, floods, and storms. In contrast, CCA addresses the long-term structural and systemic changes associated with climate variability, including sea-level rise, glacier melt, and shifting rainfall patterns [2, 3]. While both fields share the ultimate goal of reducing human vulnerability and enhancing resilience, their disjointed evolution has led to fragmented governance, inefficient resource allocation, and missed opportunities for synergies [4].

The growing call for policy integration reflects the recognition that risks are no longer discrete or isolated. For instance, hydrometeorological events driven by climate change, such as intensified droughts and floods, can no longer be addressed solely through sectoral interventions. Integrated approaches are essential to account for cascading and compound risks that simultaneously impact water security, food systems, public health, housing, and livelihoods [5]. This integration is particularly crucial for countries with limited institutional capacity and high exposure to multi-hazard risks, such as Pacific Island Countries (PICs), Myanmar, and regions across sub-Saharan Africa and Latin America [6].

Integrated DRM-CCA policies attempt to bridge the gap by combining risk governance mechanisms under a cohesive strategy. However, the success of such integration depends not only on the design of policy instruments but also on their implementation across multiple levels of governance. Key factors that influence successful integration include the clarity of institutional roles, political will, access to financing, knowledge sharing, community engagement, and alignment with international frameworks such as the Sendai Framework for Disaster Risk Reduction and the Paris Agreement on climate change [7, 8].

A compelling case of integrated DRM-CCA policy comes from the Pacific Islands, where Tonga, Micronesia, and Palau have pursued institutional collaboration between climate and disaster departments. These efforts have improved resource sharing and joint policy implementation but have also shown an imbalance in favor of climate change adaptation, often at the expense of comprehensive disaster preparedness [9]. Similar patterns are observed in South Africa, where water governance reforms aim to integrate drought response with long-term adaptation goals. Despite policy ambition, bureaucratic fragmentation and a reactive governance culture undermine proactive implementation [10].

Meanwhile, the urban context adds another layer of complexity. Informal urban settlements (IUSs), which house a growing share of the global population, particularly in developing regions, are often excluded from formal risk governance. In countries like Colombia, rapid urbanization has pushed vulnerable populations into hazard-prone areas, leading to recurrent disasters and displacement. The lack of inclusive land-use planning and disaster-informed development strategies exacerbates social vulnerability, especially in the aftermath of major disasters [11].

In the education sector, the integration of disaster resilience in school development planning has gained prominence, particularly in flood-prone environments such as Indonesia's Samarinda. Educational institutions not only serve as physical infrastructure vulnerable to hazards but also as platforms for community awareness and early response. However, studies reveal gaps in implementation, evaluation, and community participation in school-based disaster risk reduction programs [12].

The need for timely, context-sensitive assessments of post-disaster needs is another critical area of integration. Rapid Needs Assessments (RNAs) offer valuable insights into the immediate and long-term needs of affected communities, informing both emergency response and strategic planning. However, the effectiveness of RNAs is contingent on preparedness levels, availability of standardized tools, and access to existing data sources. Their integration into formal policy processes remains uneven across countries [13].

This review builds upon these diverse insights to examine how integrated policies have been conceptualized and implemented across varying governance landscapes. Drawing upon empirical evidence from six peer-reviewed case studies, this study explores the institutional pathways, policy instruments, and implementation practices that characterize DRM-CCA integration in both urban and rural contexts. Special attention is given to community-based approaches, legal frameworks, administrative coordination, and innovative models such as the Water-Energy-Food Nexus.

By synthesizing key lessons and identifying persistent barriers, the review aims to inform future efforts to institutionalize resilience through coherent and inclusive policymaking. As nations face increasingly unpredictable risks under a changing climate, the development of flexible, participatory, and multisectoral strategies will be critical for effective disaster risk governance and sustainable development [14].

METHODOLOGY

This review employs a qualitative, integrative methodology aimed at synthesizing empirical evidence and theoretical insights from a diverse set of case studies and review articles. The selection criteria focused on peer-reviewed research published between 2022 and 2025, covering DRM-CCA integration, institutional coordination, and disaster-related policy implementation. Primary research articles were analyzed in depth, spanning geographic contexts such as the Pacific Islands, South Africa, Myanmar, Indonesia, and Colombia.

The literature search was conducted using databases including ScienceDirect, Scopus, and Web of Science. Thematic content analysis was applied to identify recurring themes, governance patterns, and integration challenges. Key analytical categories included: policy alignment, institutional collaboration, legal frameworks, community engagement, and innovation in disaster response mechanisms.

A structured table was used to summarize 20 sources in the literature review section, capturing country context, hazard types, policy scope, integration strategies, outcomes, and citations (Table 1). The papers were coded to reflect strengths and gaps in policy design and implementation. Findings from grey literature, government documents, and international frameworks (e.g., Sendai Framework, SDGs) were also triangulated to enhance contextual understanding.

LITERATURE REVIEW

This literature review examines recent studies on disaster risk management (DRM) and climate change adaptation (CCA) across various regions, focusing on the integration of policy, stakeholder involvement, and hazard-specific strategies (Table 1) [1–20].

Soares and Horne (2025) [1] studied Pacific Island nations such as Tonga, Micronesia, and Palau, highlighting climate change and multi-hazard risks. Their research emphasized the importance of integrating DRM and CCA through institutional collaboration. While climate change was a priority, uneven capacity across islands posed challenges, and collaboration was crucial to overcoming resource limitations.

In South Africa, Afuye et al. (2025) [2] explored drought management within the framework of water policy reforms. They utilized SWOT analysis and modeling approaches, revealing fragmented governance and a lack of proactive planning. Their findings suggested that incorporating indigenous practices could improve drought resilience.

Hasbi et al. (2023) [3] focused on flood risks in Indonesia, stressing the role of educational planning and stakeholder involvement. The study found that mitigation measures were poorly implemented, and there was insufficient evaluation and optimization of policies.

Table 1. Literature review.

References	Authors	Country / region	Hazard type	Policy focus	Integration strategy	Key findings
[1]	Soares and Horne (2025)	Pacific Islands (Tonga, Micronesia, Palau)	Climate change, multi-hazard	DRM-CCA integration	Institutional collaboration	Climate change prioritized; uneven capacity; collaboration helps overcome resource constraints
[2]	Afuye <i>et al.</i> (2025)	South Africa	Drought	Water policy reform	SWOT analysis; model framework	Fragmented governance; lack of proactive planning; need for indigenous practices
[3]	Hasbi <i>et al.</i> (2023)	Indonesia	Flood	Educational planning	Stakeholder involvement, policy compliance	Weak implementation of mitigation; lacking evaluation and optimization
[4]	Camacho <i>et al.</i> (2024)	Colombia	Flood, landslide	Land-use and DRR policy	Post-disaster reform	IUS policies disrupted by disaster; low community engagement; reactive planning
[5]	Bosmans <i>et al.</i> (2022)	Global (Systematic Review)	Multi-hazard	Post-disaster response	RNAs as decision tools	RNAs are useful but need standardization; must be repeated for long-term effectiveness
[6]	Tun and Lassa (2023)	Myanmar	Cyclones, earthquakes, floods	DRM governance	Path-dependency analysis	Shift from top-down to polycentric; slow evolution due to colonial legacy
[7]	UNDRR (2020): Sendai Framework Progress	Global	All	DRM and resilience	International policy tracking	Emphasizes risk-informed planning, multi-stakeholder coordination
[8]	IPCC (2022): Sixth Assessment Report	Global	Climate change	CCA pathways	Cross-sectoral integration	Climate risks are multidimensional; governance critical for adaptation success
[9]	Sarmiento <i>et al.</i> (2021): Community DRR	Latin America	Flood, storm	Community-based DRM	Participatory resilience building	Community-led planning reduces vulnerability significantly
[10]	Lizarralde (2021)	Global South	Earthquake, flood	Reconstruction policy	Community participation	Top-down reconstruction models often fail; community input essential
[11]	Jha <i>et al.</i> (2013)	Multi-region	Urban climate hazards	Urban policy and planning	City-level governance	Emphasizes local adaptation, infrastructure integration
[12]	March and Boshier (2017)	Europe	Earthquake, flood	Urban risk governance	Legal-institutional tools	Risk mapping must be mainstreamed in urban plans
[13]	UN-Habitat (2022)	Global	Urban climate risk	Housing policy	SDG 11 integration	Informal settlements need legal and physical protection in DRR policy
[14]	Doberstein and Stager (2013)	Canada	Multi-hazard	Institutional analysis	Policy review	Institutional silos hinder integration; co-management suggested
[15]	Emerson <i>et al.</i> (2012)	Theoretical	N/A	Governance framework	Joint action model	Trust, legitimacy, and shared purpose drive integration success
[16]	Collado and Wang (2020)	Dominican Republic	Hurricane, flood	DRR-urban planning	Policy reform	Inconsistent enforcement; integration stalled due to political shifts

[17]	Greiving <i>et al.</i> (2023)	Europe	Climate extremes	Resilient infrastructure	National planning	Physical and social resilience must align; long-term budgeting required
[18]	Kunguma (2020)	South Africa	Drought	Forecast-based planning	Meteorological integration	Forecasts exist, but translation to action is lacking
[19]	Boateng and Adams (2023)	Ghana	Flood	Urban DRR	Settlement regularization	Regularization + participation improves resilience in informal areas
[20]	Hardoy <i>et al.</i> (2019)	Latin America	Flood, storm	Urban adaptation	Bottom-up planning	Local authorities need support to implement DRR in informal urban contexts

Camacho et al. (2024) [4] analyzed flood and landslide hazards in Colombia, noting that land-use and disaster risk reduction (DRR) policies were disrupted post-disaster. The research underscored low community engagement and the reactive nature of planning in response to such hazards.

Finally, Bosmans et al. (2025) [5] provided a global overview of multi-hazard contexts. They discussed post-disaster risk assessments (RNAs) as tools to guide policy interventions. While RNAs proved useful for policy adaptation, their effectiveness was often limited by inconsistent implementation.

Table 1 presents a summary of the literature review on DRM and CCA integration strategies.

POLICY, TECHNIQUES, AND CASE STUDIES

Policy Integration Across Disaster Risk and Climate Governance

The Need for Integrated Policy Approaches

The increasing frequency and intensity of climate-related disasters demand that traditional policy boundaries between climate adaptation (CCA) and disaster risk management (DRM) be dissolved. Fragmentation between these two domains has long hindered the creation of cohesive frameworks. Many national governments maintain separate institutions, funding mechanisms, and legal instruments for DRM and CCA, which leads to duplication of efforts and inefficient responses [1, 2, 14].

The Pacific Island Countries (PICs), including Tonga, the Federated States of Micronesia, and Palau, offer instructive examples of countries attempting policy integration under extreme climate pressure. These countries have embedded CCA into DRM frameworks and vice versa, reflecting their exposure to both slow-onset (sea-level rise) and sudden (cyclone, tsunami) hazards [1]. While they have succeeded in collaborative staffing and donor coordination, the policy discourse remains uneven. Climate change adaptation often receives greater funding and narrative attention, which can marginalize comprehensive risk governance [1].

Similarly, South Africa's efforts to integrate drought preparedness into water governance illustrate the policy struggle to shift from reactive responses to proactive planning. Despite policy frameworks such as the National Water Act and the Climate Change Response Strategy, implementation remains weak due to political inertia and fragmented institutional mandates [2, 18]. This reflects a common global theme: integration is often more successful on paper than in practice.

Barriers to integration

The main barriers to effective policy integration include:

- *Institutional silos*: Separate ministries or departments handle DRM and CCA without adequate inter-agency coordination [14, 6].
- *Funding fragmentation*: International aid often earmarks funds exclusively for climate or disaster programming, reinforcing disjointed governance [5, 8].

- *Capacity constraints*: Particularly in low- and middle-income countries (LMICs), governments lack the technical expertise to mainstream integration into national strategies [3, 4].
- *Political shifts*: Changes in leadership and political will can stall or reverse integrated efforts [16, 20].
- *Community exclusion*: A top-down approach to policy development, particularly in post-disaster settings, often excludes vulnerable communities and informal settlements [4, 13].

Promising Approaches

Some regions demonstrate success in policy integration through deliberate institutional design and participatory processes. For example:

- Myanmar has evolved from a top-down DRM structure to a “whole-of-government” and now polycentric model. This transformation, prompted by Cyclone Nargis (2008), reflects how large-scale disasters can act as catalysts for structural change [6].
- Colombia integrated informal settlement policies with disaster risk planning after the 2017 Mocoa landslide disaster. The shift from exclusion to targeted engagement marked an important policy adaptation, although challenges remain in sustainability and enforcement [4, 19].
- European nations, particularly the Netherlands and Germany, have aligned national climate strategies with their DRM frameworks, incorporating resilience metrics into infrastructure planning and budgeting [17, 12].

Techniques for Risk Management and Climate Adaptation

Rapid Needs Assessments (RNAs)

Rapid Needs Assessments are critical tools for post-disaster governance. RNAs offer quick snapshots of affected populations' physical, social, and psychological needs, which inform both immediate response and longer-term recovery [5, 20]. However, their efficacy depends on preparedness and methodological rigor. For example, the review by Bosmans *et al.* reveals that RNAs are often conducted without standardized protocols and rely on limited data sources, affecting their representativeness [5].

RNAs are underutilized in policy feedback loops. Despite producing valuable data, most assessments are used for immediate humanitarian aid rather than for shaping durable policy shifts. This limits their potential as instruments for institutional learning. Countries must institutionalize RNAs within emergency response frameworks and align them with long-term DRM and CCA plans [5, 7].

SWOT and Governance Models

South Africa's approach to drought management through SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis offers a structured model for evaluating policy effectiveness. SWOT analyses help identify institutional bottlenecks, legislative gaps, and areas for multi-sectoral collaboration [2]. However, such assessments are only effective if translated into actionable reform plans and monitored over time.

Collaborative governance models, such as those proposed by Emerson *et al.*, emphasize the need for cross-sector partnerships, trust-building, and shared goals [15]. These models have informed participatory risk management projects in Latin America and sub-Saharan Africa [9, 20]. The key is ensuring that partnerships move beyond symbolic engagement to active co-production of knowledge and solutions.

Education-based Risk Mitigation

Education plays a pivotal role in disaster preparedness, especially in hazard-prone areas. The study from Indonesia's Samarinda region highlights the potential of School Development Plans to incorporate flood mitigation strategies [3]. However, implementation remains weak due to limited evaluation mechanisms, poor stakeholder engagement, and lack of periodic reviews. Schools must be included in national DRM frameworks and supported with resources and technical training to serve as local resilience hubs.

Globally, integrating disaster education into curricula and teacher training has shown promise in countries like Japan and Bangladesh. These countries have systematically embedded early warning, evacuation drills, and community outreach into school operations, significantly reducing disaster casualties in recent decades [7, 10].

Early Warning Systems (EWS)

Forecast-based early warning systems are crucial in managing droughts, floods, and storms. However, their predictive power is often not translated into preemptive action. South Africa's weather forecasting capabilities, for example, are strong, but there is a disconnect between forecasts and community response, due to lack of education, preparedness culture, and institutional mandates [18]. Bridging this gap requires socializing forecasts through public campaigns, education, and decentralized action protocols.

Case Studies of Integrated Governance

Pacific Island Countries: Climate-dominant Integration

PICs like Tonga and Micronesia represent one of the earliest attempts at formal DRM-CCA integration. Driven largely by international donor agendas and the Framework for Resilient Development in the Pacific (FRDP), these countries created joint departments and shared staffing across DRM and CCA portfolios [1]. However, as Soares and Horne note, this arrangement has created an imbalance: climate change dominates discourse and funding, sidelining disaster preparedness [1]. These risks undermine long-term resilience, particularly against geophysical hazards like earthquakes.

Colombia: Post-disaster Policy Recalibration

The 2017 landslide disaster in Mocoa, Colombia, exposed severe gaps in informal settlement planning and disaster preparedness. Informal urban settlements had grown unchecked on hazardous terrain due to lack of affordable housing, ineffective urban planning, and absence of legal protection [4]. In the aftermath, the government revised land-use and risk zoning policies, and initiated relocation programs. However, these were implemented with limited community input, causing delays and dissatisfaction [4, 19]. The Mocoa case illustrates the importance of not just integrating policy domains, but also ensuring inclusive governance processes.

Myanmar: Historical Policy Evolution

Myanmar's DRM evolution from 1885 to 2015 shows a gradual shift from reactive to integrated governance. Initially shaped by colonial-era administrative structures, disaster policy was largely top-down and fragmented. Cyclone Nargis (2008) became a turning point, spurring international cooperation and the development of national disaster laws and frameworks [6]. The current approach emphasizes decentralized planning, although political instability continues to affect implementation. This case demonstrates how disaster events can serve as windows for systemic change, provided external support and internal momentum are aligned.

Indonesia: Schools as Entry Points

The Samarinda flood mitigation study revealed how schools can act as agents of resilience. The local development plan emphasized stakeholder engagement and community awareness, but failed to operationalize these intentions. This reflects broader governance trends, where well-conceived policies falter due to weak institutionalization and lack of local empowerment [3]. Nonetheless, schools remain underutilized yet powerful platforms for integrating DRM into local development.

South Africa: Water Governance Under Climate Stress

South Africa's recurring droughts have exposed major governance failures in the water sector. Despite strong legal frameworks like the National Water Act, practical implementation suffers due to overlapping mandates, poor enforcement, and topographical complexity [2]. The government's reliance on post-disaster relief rather than proactive risk planning results in repeated emergencies. The

use of comprehensive model frameworks has been proposed to improve coordination, but execution remains inconsistent.

RESULTS AND DISCUSSION

This review reveals five cross-cutting themes in the integration of disaster risk management (DRM) and climate change adaptation (CCA) policies across diverse contexts: (1) institutional coordination, (2) inclusivity and community engagement, (3) policy implementation gaps, (4) innovation in tools and techniques, and (5) the critical role of external shocks in catalyzing reform.

Institutional Coordination

Institutional coordination is the backbone of policy integration. Countries such as Tonga, Micronesia, and Myanmar demonstrate progress through shared staffing, legal mandates, and centralized planning. However, even in these cases, the implementation favors climate adaptation over broader risk governance [1, 6]. Conversely, countries like South Africa struggle with fragmented institutions and overlapping mandates that undermine preparedness, despite having robust legal frameworks [2, 18].

Inclusivity and Community Engagement

Inclusivity remains a major gap, especially in rapidly urbanizing regions like Colombia and Indonesia. Informal settlements and local communities are often left out of land-use planning and DRM decisions, even though they are the most vulnerable to climate-driven and geophysical hazards [4, 19]. Community participation is crucial not only for the legitimacy of risk governance but also for tailoring solutions to specific vulnerabilities and knowledge systems [9, 10].

Policy Implementation Gaps

Policy implementation challenges are persistent, particularly where policy documents and laws do not translate into operational plans or budgets. For instance, South Africa's drought policy has advanced in terms of frameworks, but real-world implementation remains reactive rather than preventive [2, 18]. Likewise, Samarinda's school flood mitigation plan shows that institutionalization and monitoring are necessary to transform theoretical strategies into outcomes [3].

Innovation in Tools and Techniques

Technical innovations such as SWOT analysis, rapid needs assessments (RNAs), and early warning systems (EWS) offer immense potential for DRM-CCA convergence. SWOT frameworks help governments systematically assess capacity and identify bottlenecks [2]. RNAs provide crucial real-time data for disaster response, though their value is often underutilized in policy formulation [5, 20]. Forecast-based EWS could transform response mechanisms, but require better socialization and community capacity to act on warnings [18].

Role of External Shocks in Catalyzing Reform

External shocks, especially large-scale disasters, often serve as catalysts for policy integration. Cyclone Nargis prompted Myanmar to adopt new legal frameworks and international cooperation mechanisms [6]. The Mocoa landslide in Colombia resulted in policy revisions regarding informal settlements and urban resilience [4]. However, these shifts are sustainable only if embedded within longer-term governance reforms.

The findings highlight that integrated policies are not universally successful; rather, their effectiveness depends on political will, institutional design, and the strength of community engagement. Additionally, donor influence plays a significant role in the Global South, where external funding often dictates integration priorities, as observed in the Pacific Islands [1].

In summary, while integrated DRM-CCA policies are conceptually well-developed in many contexts, their operationalization is highly uneven. Countries making the most progress demonstrate characteristics

such as institutional coherence, decentralized governance, local engagement, and mechanisms for feedback and reform. Future research and practice must focus on translating integrated policy frameworks into actionable, community-led programs with adequate funding and adaptive capacities.

CONCLUSION

The convergence of climate change and disaster risk necessitates coherent, inclusive, and adaptable governance systems. This review highlights that while many countries have initiated integrated DRM-CCA policies, their effectiveness is often hindered by institutional fragmentation, lack of community involvement, and weak implementation mechanisms. Success is more likely where policy frameworks are supported by collaborative institutions, context-sensitive techniques, and sustained public engagement. Case studies from the Pacific Islands, South Africa, Colombia, Myanmar, and Indonesia demonstrate both the opportunities and challenges in operationalizing integration. Tools like SWOT analysis, RNAs, and educational programs offer practical pathways, but must be embedded in broader governance reforms. Disasters often act as inflection points for institutional transformation, yet without systemic follow-through, their potential is lost. Moving forward, governments must prioritize participatory planning, proactive financing, and cross-sectoral coordination to enhance resilience in an increasingly unpredictable global risk landscape.

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