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Strengthening Multi-level Governance for Drought Emergency Response under Climate Change in Bekasi Regency, Indonesia

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ABSTRACT

Multi-level governance (MLG) explains how authority and coordination are distributed vertically across government tiers and horizontally across sectors and among non-state actors. In drought emergencies, which are typically slow-onset and increasingly shaped by climate change, such coordination is critical. Bekasi Regency experienced severe water scarcity during the 2023 dry season, affecting more than 40 villages by October 2023. This study examines how MLG operates in Bekasi Regency's drought emergency response and develops a framework to strengthen MLG in the context of climate change. Using a qualitative case study design, data were collected through semi-structured interviews with nine key informants across national, provincial, and local institutions and non-governmental actors, complemented by a document review. The analysis applied thematic analysis. This study proposes an MLG strengthening framework that links contingency planning, operational plans, and emergency status decrees, thereby clarifying and making the vertical–horizontal lines of authority more consistent and measurable. The framework emphasizes an integrated command mechanism connected to climate indicators and early warning systems, an integrated multilevel emergency financing scheme, strengthened actor capacity, and an information system combining climate and spatial data. Non-governmental actors are positioned as co-governance partners, while cross-level monitoring and evaluation are institutionalized as learning mechanisms for SOP refinement, plan updating, and long-term adaptation.

Introduction

Multi-level Governance (MLG) has increasingly become an important approach for understanding how cross-level and cross-sector coordination operates in addressing global issues of growing complexity. The concept of MLG was first introduced by Marks and later elaborated by Hooghe and Marks into two types: Type I, characterized by nested and relatively stable jurisdictions, and Type II, which is more flexible, task-specific, and operates across administrative boundaries (Hooghe and Marks, 2003). As global governance dynamics have evolved, the MLG approach has expanded beyond its original context of European Union integration to a wide range of complex issues, such as environmental policy, climate change governance, and other cross-sectoral policy arenas, reflecting the need for intergovernmental coordination to confront transnational challenges (Stephenson, 2013). This approach is often considered advantageous because it can mitigate governance fragmentation through cross-level and cross-sector coordination and collaboration mechanisms while also enabling broader actor participation in policy formulation and implementation processes (Tasan-kok et al., 2001).

Climate change has become a global phenomenon with far-reaching impacts on hydrological systems and ecosystems, contributing to the increased frequency and intensity of hydrometeorological

hazards such as floods, tropical storms, and droughts. In Asia, particularly in East Asia, South Asia, and Southeast Asia, drought disasters are exhibiting increasingly pronounced spatial patterns, intensities, and durations as a consequence of climate change, with monsoon regions experiencing shifts in precipitation regimes alongside significant temperature increases (Wei et al., 2025; Wu et al., 2022). Monsoon-climate areas, such as northern Thailand and Laos, have shown high drought intensity, whereas equatorial regions, such as southern Indonesia, are experiencing lengthening dry periods driven by El Niño influences and changing monsoon patterns (Ibrahim et al., 2021).

In Indonesia, high climate variability (exacerbated by El Niño) has contributed to recurrent episodes of extreme drought, including those during the dry seasons of 2015 and 2019, affecting more than 90% of the national territory and resulting in a clean water crisis across 16 provinces (Ibrahim et al., 2021). Several regions in Indonesia exhibit high vulnerability to droughts. In East Nusa Tenggara, areas such as Lembata, East Sumba, and Rote Ndao experience recurrent extreme droughts with rainfall far below normal and short return periods, threatening local food security (Kuswanto et al., 2021). Avia et al. (2023) showed that areas with high drought risk indices are concentrated across five main provinces, Yogyakarta, West Java, Banten, Central Java, and East Java, where substantial sub-regional coverage requires priority attention in drought disaster mitigation. In the northern coastal plain (Pantura) of West Java, Bekasi Regency ranks among the top three areas in terms of water deficit, particularly in August, which represents the peak of the dry season (Nasution & Syaifullah 2018). According to the Bekasi Regency Disaster Risk Assessment 2022–2026, Bekasi is classified as a high-risk drought area. Drought in Bekasi is predominantly hydrological and agricultural, marked by declining surface water and groundwater availability due to prolonged rainfall deficits and/or excessive water use (Herdiansyah, 2024). In 2023, based on data from the Indonesian Agency for Meteorological, Climatological, and Geophysics (BMKG), Bekasi Regency experienced below-normal (BN) rainfall and an extreme category of consecutive dry days, coinciding with a moderate El Niño event and a positive Indian Ocean Dipole (IOD) that weakened precipitation. Climate change also contributes to shifts in the onset of the rainy season, lengthening of the dry season, and declines in precipitation, thereby amplifying the likelihood of droughts that are more frequent, prolonged, and intense in the future. The impacts of drought in Bekasi extend across multiple sectors, ranging from socioeconomic conditions to agriculture and industry (Bakti et al., 2024; Gusdini et al., 2016; Nilawangsa et al., 2023; Rahmawati & Firman, 2021; Rumondor & Wibowo, 2024).

In 2023, a significant reduction in rainfall during the dry season triggered drought disasters in several provinces, including West Java. Drought also affected the Bekasi Regency. According to the Emergency Operations Center (Pusdalops) of the BPBD (regional disaster management agencies) of Bekasi Regency, by October 2023, a total of 47 villages across 11 sub-districts were recorded as experiencing clean water scarcity, affecting 178,176 residents. In response, the Bekasi Regency Government declared a Drought Disaster Emergency Response status starting on August 31, 2023, which was extended through the end of September 2023 via Regent Decree No. HK.02.02/Kep.567-BPBD/2023. The response involved multiple actors across government levels and sectors. Although Bekasi Regency has a formal policy framework for disaster management, local-level implementation continues to face challenges, particularly in terms of cross-actor coordination. A literature review by Kusuma et al. (2022) indicates that inter-agency coordination in Bekasi Regency remains structural in nature with limited horizontal coordination, and that the engagement of BPBD, village apparatus, and community capacity strengthening has not yet been optimal in this regard.

The complexity of drought emergency response under climate change requires a governance framework that can effectively bridge cross-level coordination. Multi-level governance (MLG) provides a crucial conceptual framework for addressing coordination challenges in disaster emergency response (Maldonado et al., 2010). However, MLG-based research specifically focusing on the emergency phase of disasters remains limited. Chang Seng (2013) argues that while national disaster preparedness policy frameworks exist, local implementation often encounters structural constraints, including resource limitations and weak inter-agency coordination.

Although MLG has been widely studied in public policy and disaster risk management, research on the emergency response phase remains relatively scarce. In Indonesia, prior studies have largely emphasized horizontal coordination among local actors, whereas the vertical–horizontal interaction dynamics across levels of government during drought emergency response have not been examined in a structured manner. Simultaneously, droughts as slow-onset disasters demand coordination mechanisms that are not only responsive to spatial and temporal complexity but also effective in aligning policies across governmental tiers that are often fragmented. Accordingly, this study is important because it contributes to the scholarship on disaster governance by providing a comprehensive analysis of vertical and horizontal coordination dynamics, with the aim of developing a framework to strengthen multilevel governance for drought emergency response in Bekasi Regency that is resilient and adaptive to climate change.

1.1. Multi-level Governance

Multi-Level Governance (MLG) refers to a system of governance characterized by continuous negotiation processes among governmental actors distributed across multiple territorial levels, ranging from supranational, national, and regional to local levels (Hooghe & Marks, 2003). MLG serves as an analytical framework for explaining the distribution of power and decision-making that is dispersed vertically across tiers of government (national, regional, and local) and horizontally among institutions, sectors, and non-governmental organizations. The idea was first introduced by Gary Marks in 1992 in his study of European Union's cohesion policy (**Table 1**) and was subsequently developed more systematically by Hooghe and Marks into two main typologies. Type I is characterized by nested and relatively stable jurisdictions, resembling formal federal or administrative systems, whereas Type II is more flexible, task-specific, and often operates across administrative boundaries (Hooghe and Marks, 2003).

Table 1. The Evolution of Multi-Level Governance

Period	Historical Category	Key Scholar(s) / Institution(s)	Description of Development
1993 –	Original uses	Gary Marks	MLG was introduced to explain interactions across levels of government and with non-state actors in European Union policymaking.
2001 –	Functional uses	Liesbet Hooghe & Gary Marks	Developed the Type I and Type II MLG typology to support sectoral governance analysis.
2003 –	Combined uses	Ian Bache, Matthew Flinders	Combined MLG with institutional theory and principal–agent approaches to explain accountability and control dynamics.

2004 –	Normative uses	European Commission, Hooghe & Marks	MLG was adopted as a good-governance principle emphasizing participation and efficiency, though often regarded as complex in practice.
2007 –	Comparative uses	Enderlein, Wälti, Zürn	MLG began to be used in cross-country and cross-sector studies to analyze variations in governance structures, including in water, climate, and health policy research.

Source: Stephenson (2013)

1.2. Multi-Level Governance Indicators for Drought Disaster Emergency Response

To examine the complexity of drought emergency governance, this study employs a Multi-Level Governance (MLG) approach as a conceptual framework that enables a systematic analysis of interactions across governmental tiers and cross-sector actors (Okunola, 2025). The indicators used in this research were developed through a synthesis of MLG theories and relevant empirical evidence from prior studies, which were then critically examined and adapted by the author to reflect the specific context of subnational drought emergency responses. The indicators comprise institutional arrangements, integrated emergency command, emergency financing and accountability, capacity strengthening, technology and information management, community participation, and monitoring and evaluation. Collectively, these indicators represent key dimensions for strengthening cross-government governance that is responsive, adaptive, and inclusive in addressing drought as a dynamic climate-related risk.

1.2.1. Institutional Arrangements

Institutional arrangements constitute a foundational element of MLG because the effectiveness of cross-level coordination is strongly contingent upon the clarity of roles and the distribution of authority among central, provincial, and local governments. Lane and Hesselman (2017) show that limited institutional integration can impede rapid decision-making and generate fragmented coordination on the ground. Tasan-kok et al. (2001) highlight the importance of adaptive and decentralized institutional structures as prerequisites for inclusive and responsive governance in the face of evolving disaster risks.

1.2.2. Integrated Emergency Command

Integrated emergency command is a strategic component of operational coordination once an emergency status is formally declared, as regulated by BNPB Regulation No. 3 of 2016. This indicator covers the establishment and functioning of an integrated command post, the conduct of interagency coordination meetings, and the effectiveness of reporting flows and logistics distribution. A clear and integrated command structure is essential for preventing role duplication and accelerating decision-making. Najafi et al. (2020) emphasize that a functional command post plays a central role in ensuring coherence of actions across levels of government, thereby operationalizing vertical and horizontal coordination within an MLG framework. Moreover, effective emergency management under multilevel governance depends heavily on leadership that can facilitate collaboration, coordinate across actors, and integrate information flows to support evidence-informed decision-making (de Sá Freire et al., 2023).

1.2.3. Emergency Financing and Accountability

Rapid and accountable access to funding is a core prerequisite for drought responses. This dimension includes the allocation of contingency funds (Biaya Tak Terduga/BTT), ease of access by the regional disaster

management agency (BPBD), relevant technical agencies, and transparent financial reporting. Tasan-kok et al. (2001) argue that without flexible and decentralized financing arrangements, local governments face significant constraints in responding quickly and effectively to urgent needs. In Indonesia, these mechanisms are governed by Dana Siap Pakai (DSP) and BTT, as stipulated in Government Regulation No. 12 of 2019 and BNPB Regulation No. 4 of 2020.

1.2.4. Capacity Strengthening

Capacity strengthening encompasses improvements in competencies, personnel preparedness, and the availability of supporting infrastructure for drought-emergency management. This includes technical training, the readiness of disaster response human resources, and the enabling of facilities and equipment. Asibey et al. (2024) underscore that local adaptive capacity is a critical determinant of disaster policy effectiveness during climate crises. Consistent with the Sphere Handbook (Sphere Association, 2018), institutional readiness and resource availability are prerequisites for effective and sustainable emergency responses.

1.2.5. Technology and Information Management

Effective data management supports timely and accurate decision-making during emergencies. This indicator addresses the functionality of subnational disaster information systems, integration of spatial and logistics data, and use of reporting applications for clean water distribution. Calle Müller et al. (2024) argue that integrating predictive technologies and inter-agency data-sharing platforms enhances response efficiency and accelerates aid delivery. Therefore, digital information systems are crucial for enabling real-time multi-actor coordination. Okunola (2025) further notes that integrated information systems strengthen vertical and horizontal collaboration and improve accountability across disaster management phases, particularly in settings with complex social and ecological dynamics.

1.2.6. Community Participation

The involvement of communities and local organizations is a key pillar of responsive governance, particularly during drought emergencies. Chanza et al. (2020) highlight that community engagement improves intervention effectiveness and strengthens policy legitimacy at the grassroots level. Similar principles are reinforced by the World Health Organization (2013) and Sphere Handbook (Sphere Association, 2018) as part of rights-based approaches to disaster response.

1.2.7. Monitoring and Evaluation

Monitoring and evaluation are essential for assessing the performance of emergency governance and ensuring continuous system improvement. This component includes daily situation reporting, monitoring and evaluation recommendations, and cross-sector involvement in post-emergency review. (Wankmüller 2021) emphasizes that multilevel and inclusive evaluation systems can identify coordination gaps and enhance institutional preparedness capacities. BNPB Regulation No. 3 of 2016 also underscores the importance of involving diverse actors in evaluative processes.

Methods

This study adopts a qualitative research approach because its primary emphasis lies in examining, in depth, the processes, meanings, and coordination dynamics across levels of government (multi-level governance) in the context of drought emergency response. Consistent with Denzin and Lincoln (2011),

a qualitative approach enables the researcher to apprehend social reality as a dynamic and subjective construction and to interpret actors' actions and decisions within the broader relations of power, institutional arrangements, and adaptation to climate change.

Bekasi Regency was selected as the study site because it represents salient drought disaster management policy dynamics, particularly following the 2023 emergency response declaration that signaled the activation of formal institutional mechanisms. Moreover, Bekasi Regency reflects a spatially complex setting as one of Indonesia's—and even Southeast Asia's—largest industrial areas, characterized by high urbanization levels. This context illuminates the multi-level governance challenges in water resource management and aid distribution under intensifying climate pressures.

Table 2. Informant Characteristics

No.	Informant Code	Age (years)	Sex	Position	Institution
1	A1	44	Female	Technical Policy Analyst	National Disaster Management Authority (BNPB)
2	A2	56	Male	Head of Emergency and Logistics Division	West Java Provincial Disaster Management Agency (BPBD)
3	A3	46	Male	Head of Emergency and Logistics Division	Bekasi Regency Disaster Management Agency (BPBD)
4	A4	32	Male	Junior Water Resources Engineer	asi Regency Water Resources Agency, Highways (Roads) and Construction Development Agency (Dinas SDABMBK)
5	A5	56	Female	Head of Food Crops Division	Bekasi Regency Agriculture Agency (Dinas Pertanian)
6	A6	53	Male	Territorial Section Officer	Bekasi District Military Command 0509 (Kodim 0509)
7	A7	51	Female	Assistant Head of Operations Subdivision	Bekasi Metro Police Resort (Polres Metro Bekasi)
8	A8	51	Male	Assistant Head of Distribution Subdivision	Perumda Tirta Bhagasasi (Bekasi)
9	A9	31	Female	Chairperson	Bekasi Regency Disaster Risk Reduction Forum (FPRB)

To develop a comprehensive understanding of multilevel governance practices in drought emergency response, this study draws on both primary and secondary data. Primary data were collected through semi-structured interviews and field documentation involving actors across the national, provincial, and district/local levels. Informants were selected through purposive sampling based on the relevance of their roles, experience, and authority in the drought emergency response in Bekasi. Nine key informants were engaged in this study (**Table 2**). Secondary data were obtained from official documents, including laws and regulations, emergency declaration decrees, contingency plans, command post operational reports, and water distribution records from the relevant agencies. In addition, scholarly publications, technical assessments produced by government institutions, and relevant prior studies were used to provide normative and theoretical foundations for the analysis, support field-based interpretation, and enable comparisons with governance practices in similar contexts.

Data analysis in this study employed Thematic Analysis as developed by Braun and Clarke (2006), a flexible yet systematic qualitative method for identifying, analyzing, and reporting patterns or themes within the data. The analytical process was supported by NVivo software to enhance rigor and ensure consistency in the management and coding of qualitative data (Endah et al., 2020).

Results and Discussion

The following section presents the field findings on how Multi-Level Governance (MLG) operates in the practical implementation of drought emergency response in Bekasi Regency. The results are structured around seven indicators: institutional arrangements, integrated emergency command, emergency financing, capacity strengthening, technology and information management, community participation, and monitoring and evaluation. The analysis is grounded in semi-structured interviews with nine informants and is complemented by document review covering sources from the national to community level.

Analysis of Multi-Level Governance in Emergency Drought Response in Bekasi Regency under Climate Change

3.1. Institutional Arrangements

The vertical–horizontal coordination dynamics connecting the full constellation of actors reveal an institutional configuration marked by tensions between mandate-based hierarchies and networked collaborations. Vertically, the allocation of authority across government tiers reflects the logic of Type I MLG, in which the BNPB provides the regulatory framework and disaster-related financial support, the BPBD of West Java Province coordinates across districts/cities, and the BPBD of Bekasi Regency serves as the principal implementing node.

Horizontally, coordination at the regency level displays features of Type II MLG, characterized by greater flexibility and network-based interactions. Although the Emergency Response Decree and the Command Post Decree formally stipulate the command structure, cluster arrangements, and functional leads, field-level coordination is frequently mediated through informal mechanisms, notably intensive cross-agency communication via inter-institutional WhatsApp groups. Consequently, initiatives by technical agencies, the local water utility (Perumda Tirta Bhagasasi), and the FPRB to respond to community complaints, such as requests for water distribution to particular villages or channel normalization interventions, often proceed more rapidly than formally documented procedures.

The institutional indicator suggests that Bekasi Regency possesses a relatively comprehensive MLG framework supported by national and local regulations, contingency plans, operational plans, and emergency decrees that activate cross-sector structures. Nevertheless, this normative framework has not been fully translated into an operational institutional system that is preventive and adaptive to droughts as climate-related hazards. Fragmented authority in the water resource and agriculture sectors, dependence on emergency declarations as the primary trigger for coordination, and enduring tensions between formal command and informal coordination constitute critical limitations in the quality of Bekasi's MLG institutional arrangements. Consistent with the findings from climate adaptation MLG studies, multi-actor configurations that are not matched by a clear delineation of roles risk generating overlapping responsibilities, mandate conflicts, and coordination dilemmas that ultimately impede governance processes (Ishtiaque et al., 2021). This configuration indicates that policies, roles, capacities, and power relations across levels and sectors have not been consistently oriented toward long-term learning and the transformation of climate risk governance; rather, they remain dominated by short-term crisis-response logics.

3.2. Integrated Emergency Command

Drought response in Bekasi Regency in 2023 was implemented through a command structure normatively aligned with the principles of the Disaster Emergency Management Command System. In practice, however, the system remains episodic, highly dependent on formal emergency activation, and has not fully evolved into a command arrangement that is adaptive to recurrent drought risks under climate change. BNPB Regulation No. 3 of 2016 defines the Disaster Emergency Management Command System as a structured and unified command effort used to integrate disaster emergency response activities.

In Bekasi, the drought emergency command was formally activated through two principal instruments: (1) the decree establishing drought emergency response status issued by the Acting Regent (Pj. Bupati) of Bekasi, and (2) the decree establishing the Drought Emergency Command Post (Posko), following cross-sector coordination meetings that set the organizational structure, functional divisions, and cluster leads (e.g., clean water, logistics, and data–information). The Acting Regent served as the overall responsible authority; the District Military Commander (Dandim) and Police Chief (Kapolres) acted as incident commanders (Kalakhar); and BPBD of Bekasi Regency functioned as the central mobilizing node and lead coordinator. A BPBD informant underscored the binding role of the decrees in aligning local agencies and partners:

> "*Once the Emergency Status Decree and the Command Post Decree are issued, all local agencies and partners must refer to them. It clearly states who is the PIC for clean water, who handles logistics, and who manages data and information; this is what makes agencies more compliant because it is written in the decree.*" (BPBD of Bekasi Regency, 9 September 2025)

Bekasi Regency has a relatively adequate formal command structure with the capacity to integrate governmental and non-governmental actors in drought response. Its principal strengths lie in the effectiveness of the emergency status and command-post decrees in consolidating cross-sector authority, as well as the flexibility of coordination networks that enable rapid responses to field dynamics. In line with de Sá Freire et al. (2023), the effectiveness of emergency management in a multilevel governance setting is strongly shaped by leadership that can enable collaboration, align diverse actors, and integrate information flows to support evidence-based decisions. Nevertheless, fundamental weaknesses remain, such as a strong dependence on decree activation, predominance of undocumented informal coordination, disconnects between contingency and operational planning, and absence of a command mechanism directly linked to indicators of recurrent drought risks driven by climate change. From a multi-level governance perspective, this configuration reflects a hybrid of mandate-based hierarchy and function-based networks that have not yet become fully adaptive to climate-risk governance.

3.3. Emergency Financing

Bekasi Regency has access to multi-level financing instruments such as Emergency Funds (Dana Siap Pakai/DSP) at the national level, Unexpected Budget (Belanja Tak Terduga/BTT) at provincial and regency levels, and locally managed CSR funds coordinated through BAZNAS which effectively supported the 2023 drought response. The main strengths lie in the flexibility of DSP and the contribution of non-governmental resources that can bridge local fiscal gaps in the program. However, the system continues to face three major limitations: reliance on formal emergency status declarations, slow BTT procedures, and the absence of integration between emergency financing and climate change adaptation. Prior MLG research shows that disaster finance is frequently constrained by bureaucratic inefficiencies and delays

in fund disbursement, causing resources intended for local communities to arrive too late—or not reach them at all—thereby revealing structural and institutional barriers in multilevel financing arrangements (Okunola, 2025). Conceptually, this pattern reflects a fiscal governance model oriented toward emergency financing rather than climate-resilient financing. Going forward, stronger vertical synchronization between national financing policies and local practices, together with horizontal collaboration across OPDs, BUMD, and non-governmental actors, is needed to develop adaptive financing arrangements oriented toward long-term resilience to climate-driven drought risks.

3.4. Capacity Strengthening

Capacity strengthening findings indicate that Bekasi Regency has developed key capacity assets—trained personnel, operational fleets, service infrastructure, and partnership networks with local enterprises and community organizations—which proved crucial during the 2023 drought emergency. The main strength lies in the BPBD and partners' ability to consolidate cross-sector operational capacities within a relatively short period once the emergency status is activated. Previous studies on MLG for climate action argue that the institutional framework should stimulate horizontal and vertical learning across levels and be supported by mechanisms such as capacity-needs assessments and mandatory periodic training to sustain long-term adaptation-oriented capacity (Asibey et al., 2024). However, from an MLG perspective informed by climate change adaptation, capacity strengthening remains dominated by short-term response orientations and has not been fully connected to long-term learning, systematic capacity-gap mapping, or integration with climate risk scenarios. Accordingly, the forward challenge is to shift from "capacity to respond to an event" toward "cross-level adaptive capacity" that can anticipate, absorb, and transform in response to droughts as part of Bekasi's evolving climate-risk dynamics.

3.5. Technology and Information Management

Technology and information management in Bekasi Regency exhibit an ambivalent configuration. On the one hand, it is connected to the national disaster information system ecosystem and supported by Pusdalops as a data consolidation node, complemented by community networks such as FPRB and Perumda Tirta Bhagasasi, which facilitate information dissemination at the local level. The literature emphasizes that effective disaster management systems depend on accurate data, reliable and streamlined communication networks, and collaboration among stakeholders (Calle Müller et al., 2024). However, limited data-management capacity, the dominance of informal communication, weak integration with climate information, and the lack of real-time reporting systems mean that information governance remains largely reactive. This suggests that the disaster information system has not yet functioned as a climate-informed risk information system that is adaptive to climate change. Therefore, the system needs to be repositioned as a shared knowledge space that integrates climate, social, and operational data across actors, enabling emergency decision-making to better anticipate recurrent drought risks.

3.6. Community Participation

Community participation in Bekasi Regency primarily functions as a gap-filling mechanism when formal systems are overwhelmed, rather than being leveraged as social capital for climate adaptation. The literature similarly shows that when formal responses are delayed, local actors mobilizing social networks can fill institutional voids and accelerate emergency action, even though such community responses are often spontaneous and loosely coordinated (Chanza et al., 2020). Uneven engagement across penta-helix

stakeholders is evident, with business and media participation tending to be episodic, while sustained support for strengthening community capacity is limited. Although volunteer networks, the FPRB, and Destana contribute to faster information flow and aid distribution, community participation has not been formally integrated into the regency's disaster information system or decision-making processes. This indicates that, from an MLG perspective, communities have become important partners in emergency response but have not been fully recognized as strategic actors in building drought-risk governance that is resilient and adaptive to climate change.

3.7. Monitoring and Evaluation

Monitoring and evaluation should ideally perform three functions: continuously monitoring risk status and service delivery, assessing cross-level and cross-actor governance performance, and serving as a platform for adaptive policy learning that enables the revision of plans and institutional structures based on empirical experience. Cosoveanu et al. (2025) argue that without exploratory monitoring and evaluation, emergency responses risk becoming a sequence of incidental trials that yields limited structural change in climate-risk governance.

In Bekasi, drought monitoring and evaluation remain oriented toward outputs, such as the number of affected villages, volumes of water distributed, and the duration of emergency response, without corresponding outcome or process indicators that assess the effectiveness and equity of cross-level governance. The absence of measures such as household water needs fulfillment, the quality of community participation, or decision-making speed means that monitoring and evaluation cannot yet determine whether the system is genuinely adaptive to climate risk. Although the command post and Pusdalops function effectively for operational data consolidation and community-based social monitoring, monitoring and evaluation remain reactive and administrative rather than serving as instruments of institutional learning. From a multilevel governance standpoint, strengthening should link monitoring to climate risk indicators and broaden evaluation in cross-sectoral and participatory ways so that drought experience becomes a basis for transformation toward adaptive and resilient governance.

Multi-level Governance Framework for Drought Emergency Response in Bekasi Regency under Climate Change

The proposed multi-level governance (MLG) framework for drought emergency response in Bekasi Regency is designed to strengthen the core principles of emergency governance from a climate change adaptation perspective. Accordingly, drought emergency response is conceptualized not merely as a short-term reaction but as an integral component of a broader, longer-term effort to build adaptive resilience. The synthesis of the seven MLG indicators provided the foundation for developing this framework (**Figure 1**).

Under the **institutional arrangements** indicator, efforts are oriented toward building institutions that are integrated and adaptive to drought as a recurrent climate-related risk. This requires strengthening regulatory coherence and the principle of subsidiarity by explicitly linking regulations across national, provincial, and regency levelsdown to cross-sector standard operating procedures (SOPs), while positioning drought as a priority threat directly associated with climate change. The drought contingency plan should be reconstructed to include cross-actor resource mapping and projections of operational needs under multiple scenarios, so that when risk indicators escalate, operational plans can be activated on the basis

of pre-defined scenarios rather than being developed ad hoc at the command post. The integration of authority across the water resource and agriculture sectors should be formalized through emergency coordination SOPs between central and local governments that function both in normal times and during crises, thereby reducing the fragmentation of mandates. Simultaneously, local penta-helix actors—such as Perumda Tirta Bhagasasi, the district military command (Kodim), the local police (Polres), and FPRB—should be explicitly institutionalized in emergency planning documents with clearly defined mandates, so that their contributions no longer depend primarily on MoUs or ad hoc decrees.

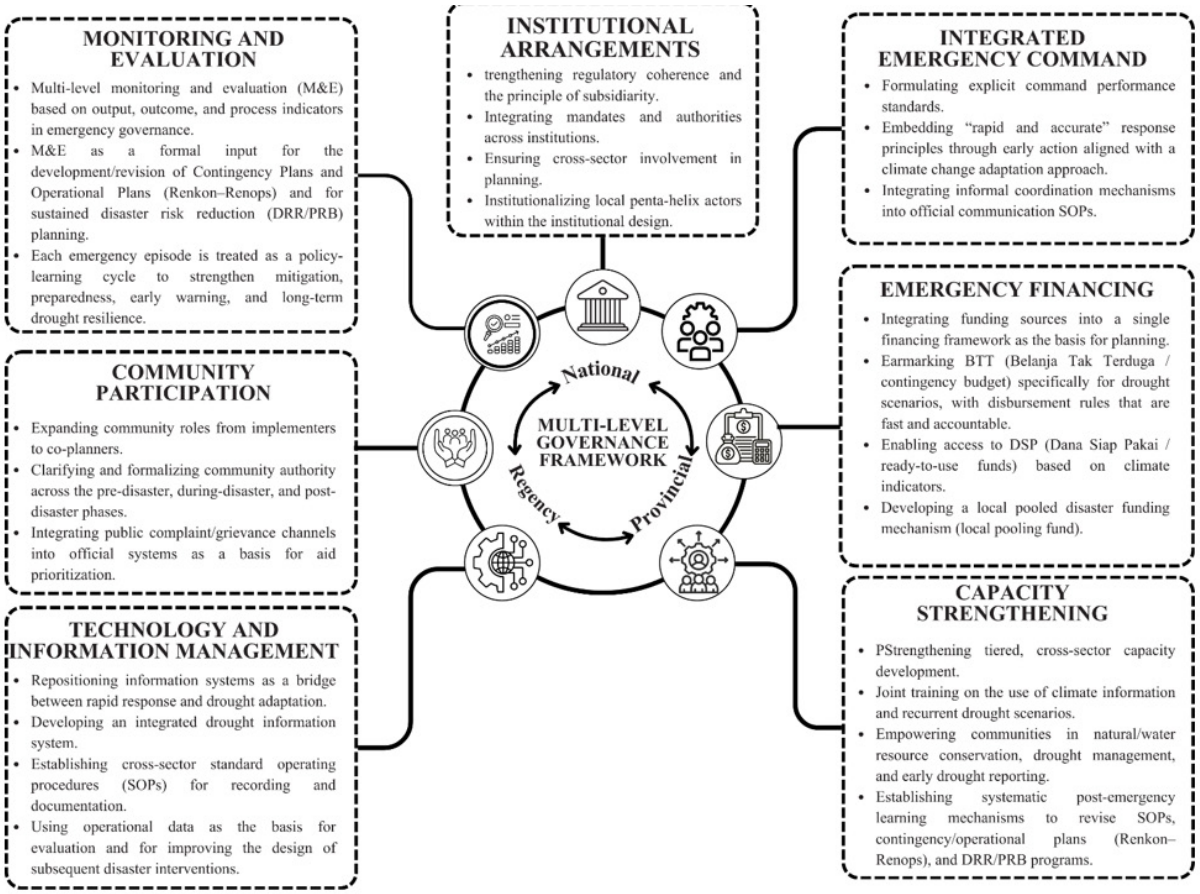

Figure 1. Multi-level Governance Framework
for Drought Emergency Response in Bekasi Regency under Climate Change
Source: Developed by the author based on the study's analytical findings

Under the **integrated emergency command** indicator, Bekasi's command structure is normatively aligned with the Disaster Emergency Management Command System. However, in practice, it becomes active only once an emergency decree is issued and is not systematically linked to climate information or drought indicators. The proposed framework integrates the principle of a "rapid and appropriate" response through early action within the command system, informed by climate-adaptation logic via the introduction of indicator-based escalation stages and early reports from villages. Within the command post, minimum command performance standards, such as response time following warnings, frequency of coordination meetings, and clarity of cross-sector liaison officer roles, should be explicitly specified. In addition, informal coordination practices that currently rely on rapid communication through instant messaging groups should be incorporated into official communication SOPs to maintain field flexibility

without compromising accountability. Thus, emergency command retains its emphasis on speed and coordination while becoming more sensitive to evolving climate risk dynamics.

Under the **emergency financing** indicator, Bekasi's financing architecture rests on three pillars: Dana Siap Pakai (DSP) from the national budget, Belanja Tidak Terduga (BTT) from subnational budgets, and non-state support through CSR and the BAZNAS. While this configuration is potentially sufficient to enable rapid emergency action, its utilization remains largely event-based, with funds mobilized primarily after an emergency status is declared. Therefore, the proposed framework emphasizes the need for a drought-specific financing framework that links DSP, BTT, and non-governmental sources within a unified financing design formalized in the Contingency Plan and Operational Plan. At the regency level, a portion of the BTT should be pre-committed for drought scenarios with clearly defined accelerated disbursement procedures, while access to the DSP should be prepared through an application protocol based on climate indicators and field conditions. In addition, a local pooling fund mechanism drawing from the subnational budget, CSR, and BAZNAS can be directed not only to cover emergency operational costs but also to support resilience-building measures such as irrigation network improvements, raw-water infrastructure development, and strengthening village-level water storage facilities.

Under the **capacity strengthening** indicator, the findings show that response capacities have begun to consolidate, including increased fleet availability, operational experience in water distribution, and the organization of volunteer networks. However, the capacity to interpret and anticipate drought risk within the context of climate change remains limited. The framework proposes tiered capacity strengthening that includes joint training for BPBD, technical agencies, Perumda, the military and police, and FPRB on the use of climate information and drought indices, management of recurrent drought scenarios, and integration of vulnerable-group prioritization principles in operational decisions. At the community level, Destana and farmer groups should be supported to improve their understanding of water management, conservation of local water sources, and early reporting mechanisms when drought signals emerge. A structured post-emergency lessons-learned mechanism is essential to ensure that the response experience is converted into adjustments to SOPs, contingency plans, and risk-reduction program planning.

Under the **technology and information management** indicator, the existing information architecture—DIBI and SIMAMPU at the national level, Barata at the provincial level, and SITANGGUH at the regency level—still functions primarily as reporting and data-recap channels rather than as a foundation for adaptive decision making. The proposed framework positions information systems as connectors between "rapid and appropriate" response principles and adaptation needs. At the regency level, this requires the development of a drought information system that integrates climate data, spatial data on water source locations, data on affected villages, and water distribution traceability. Ideally, the system should generate priority service maps, monitor changes in conditions over time, and support dynamic resource reallocation decisions. Cross-actor minimum standards for recording distribution locations, volumes, and timing are required to ensure traceability and service equity, while also providing an evaluative basis for improving intervention design in the subsequent dry seasons.

Under the **community participation** indicator, FPRB and volunteer networks have served as a "bridge" between the government and residents, both in channeling complaints and in ensuring that water distribution reaches the intended targets. In the proposed framework, this role is expanded from field implementation to risk governance partnership. FPRB and Destana should be explicitly incorporated into contingency plans, command-post decrees, and SOPs with clear mandates across phases: pre-disaster (water-source mapping, water conservation education, and identification of vulnerable groups), during the

disaster (needs assessment, distribution oversight, and grievance handling), and post-disaster (reflection and advocacy for service improvements). Managed grievance and feedback channels, such as an emergency hotline or messaging channel linked to Pusdalops, should be positioned as part of the official system so that community voices become an explicit basis for aid prioritization and strategy refinement.

Under the **monitoring and evaluation** indicator, practices in Bekasi remain dominated by administrative reporting and operational output monitoring, while substantive evaluation of cross-level governance effectiveness and climate adaptation learning has not been institutionalized. The framework proposes a multilevel monitoring and evaluation design covering output indicators (e.g., service area coverage and water volume), outcome indicators (e.g., household water needs fulfillment and agricultural production stability), and governance process indicators (e.g., response speed, quality of cross-sector coordination, and community participation). Post-emergency after-action reviews should be mandated, and their results should be used as formal inputs for revising contingency plans, developing operational plans, and designing drought risk-reduction programs. In this way, each emergency cycle does not end with reporting but becomes part of an institutional learning cycle that strengthens mitigation, preparedness, early warning systems, and long-term resilience.

Overall, the seven-pillar MLG framework conceptualizes drought emergency response in Bekasi Regency as a convergence point between the need for rapid, appropriate, coordinated, and priority-oriented emergency action and the climate adaptation agenda that requires enhanced preparedness, strengthened early warning systems, and the development of societal and infrastructural resilience. Strengthening vertical arrangements (through regulatory pathways, financing, and technical support from national and provincial levels) is combined with strengthening horizontal arrangements (through cross-sector integration, institutionalization of non-state actors' roles, and community participation in planning and evaluation). Through this approach, drought emergency response not only addresses immediate needs but also directly contributes to long-term risk reduction and adaptation to droughts as a consequence of climate change.

Conclusion

Based on the analysis of multilevel governance dynamics in drought emergency response in Bekasi Regency, this study proposes a framework to strengthen multilevel governance for drought emergency management under climate change. The framework emphasizes institutional reconfiguration that explicitly links the drought contingency plan with the operational plan and emergency status decision-making, thereby rendering vertical and horizontal lines of authority clearer, more consistent, and measurable. In the command dimension, an integrated emergency command system connected to climate indicators and early warning systems is proposed as a trigger for escalation and command-post activation. In financing, the framework promotes a multilevel funding design that integrates DSP, BTT, and non-governmental sources into a more adaptive drought risk financing scheme. Strengthening the technical and coordination capacities of BPBD, technical sector agencies, and other key actors is essential to enable adaptive responses to recurrent drought risks. Furthermore, the development of an integrated information system is directed toward the real-time linkage of climate, spatial, and logistics data to support decision-making and prioritization. The framework also positions Perumda Tirta Bhagasasi and the FPRB as governance partners in clean water provision and community mobilization. Finally, cross-level monitoring and evaluation should not be designed merely as an administrative exercise, but as an institutional learning mechanism that ensures evaluation findings inform SOP improvements, plan updates, and the strengthening of long-term drought adaptation policies.

Based on the study's findings and conclusions, it is recommended that government agencies institutionalize the multi-level governance (MLG) framework within official drought emergency policy instruments by clearly specifying cross-tier and cross-sector roles to ensure consistent vertical–horizontal coordination, accountability, and evaluation through measurable performance indicators; that non-governmental actors strengthen their contribution as implementation partners through collaborative programs, such as pooled funding mechanisms for emergency water supply, expansion of water-service networks, water-source conservation, and community reporting channels integrated into government information systems; and that future research develop and validate MLG governance performance indicators for drought and other hazards while conducting comparative studies across regions to deepen both theoretical and practical understanding of MLG and local-level climate adaptation.

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