

Collaborative Governance in Natural Disaster Mitigation in Karimun District, Kepulauan Riau Province, Indonesia

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Abstract This study examines the implementation of collaborative governance in disaster mitigation efforts in Karimun Regency, Kepulauan Riau Province, Indonesia. As a disaster-prone region, effective mitigation requires the involvement of multiple stakeholders, including government agencies, non-governmental organizations, and local communities. Guided by the theory of collaborative governance, this research explores how stakeholder collaboration enhances disaster mitigation initiatives. This research uses a qualitative descriptive approach; data were collected through in-depth interviews, participant observation, and document analysis. Informants were purposively selected, including government officials, NGO representatives, and community leaders directly involved in disaster mitigation. Thematic analysis revealed three key findings: the role of stakeholder coordination in aligning mitigation efforts; the importance of community participation in fostering disaster preparedness; and the influence of local policies in shaping effective governance frameworks. The study highlights the significance of mutual trust, shared goals, and clear communication in achieving successful collaboration. However, challenges such as resource constraints and overlapping roles persist, requiring further policy refinement. This research contributes to the understanding of collaborative governance in disaster mitigation, providing insights for

policymakers and practitioners to strengthen multi-stakeholder coordination. The findings underscore the critical role of inclusive and participatory governance in addressing disaster risks in vulnerable regions. Contribution: This study provides input to stakeholders that disaster management are a shared responsibility. Collaborative governance is evidence that each stakeholder has capabilities that can be exchanged with other stakeholders (government, private sector, and community) so that together they can find solutions in dealing with disasters.

Keywords Collaborative Governance, Disaster Mitigation, Stakeholder Coordination, Community Participation, Karimun Regency

1. Introduction

Indonesia is one of the most disaster-prone countries in the world due to its geographical and geological conditions. Located at the confluence of four major tectonic plates—Eurasian, Indo-Australian, Philippine, and Pacific—Indonesia faces a high risk of earthquakes, tsunamis, and volcanic eruptions [1]. Furthermore, its tropical climate,

shaped by the intersection of the Hadley and Walker circulations, makes Indonesia susceptible to extreme weather events and climate change impacts [2]. These natural vulnerabilities are compounded by secondary hazards such as floods, landslides, droughts, wildfires, and coastal erosion [3],[4].

Beyond natural disasters, Indonesia faces a range of anthropogenic hazards, including urban fires, transportation and industrial accidents, public health emergencies, agricultural losses due to pests and diseases, and social conflicts that may escalate into riots or terrorism. [5],[6]. Rapid urbanization and industrialization exacerbate these risks by increasing population density in poorly planned urban areas, heightening the potential for technical and structural failures [7].

In the Riau Islands Province, specifically Karimun Regency, these risks are well-documented. With a geographic area of 912.75 km², Karimun has a topography that includes lowland regions highly susceptible to flooding [8]. Climate data from BMKG, reveals that the regency experiences high rainfall intensity, contributing to frequent flooding [8]. Additionally, the region has documented vulnerabilities to eleven types of disasters, including extreme weather, coastal erosion, and forest fires. The 2022 Disaster Risk Assessment of the Riau Islands further categorizes disaster risks in Karimun into hazard, vulnerability, and capacity classes, providing a framework for understanding and mitigating these risk.

Recurring disasters in Karimun Regency include land and forest fires, strong winds, high waves, and floods [8]. Between January and April 2023, key sub-districts such as Tebing, Meral, and Karimun recorded high frequencies of such events. Landslides, though less frequent, pose additional risks in areas with unstable slopes, as indicated by MAGMA Indonesia's 2021 report. These conditions necessitate a comprehensive and integrated approach to disaster risk reduction [7].

Given the multifaceted disaster risks faced by Karimun Regency, effective disaster management requires an integrated, multi-stakeholder approach. Previous studies have emphasized the importance of collaborative governance in disaster risk reduction, where coordination between governmental agencies, private organizations, and community groups plays a crucial role in enhancing resilience [9],[10]. However, a significant gap remains in understanding how such collaboration can be effectively institutionalized within decentralized disaster governance structures, particularly in Indonesia's archipelagic regions. Research on disaster risk reduction in Karimun has primarily focused on hazard mapping and emergency response strategies [8], with limited attention given to the governance mechanisms that facilitate long-term resilience. This study, therefore, aims to bridge this gap by examining the role of collaborative governance in disaster management in Karimun Regency, evaluating how stakeholder coordination, resource-sharing, and

participatory decision-making can enhance disaster preparedness and response capacities. By addressing these gaps, this research contributes to the broader discourse on disaster governance in Indonesia, offering insights into policy improvements that can strengthen adaptive and proactive disaster risk reduction efforts in coastal and small-island settings.

2. Literature Review

Collaborative governance offers significant advantages in public policy management through cooperation between government institutions and non-governmental stakeholders. Ansell and Gash [9] define collaborative governance as "a governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative, aiming at policy formulation, program management, or asset administration." This approach enhances policy effectiveness by fostering direct stakeholder participation, leading to more comprehensive and responsive decisions [9].

One of the key benefits of collaborative governance is its ability to improve decision-making transparency and inclusivity. Emerson, Nabatchi, and Balogh [10] highlight that this governance model enhances legitimacy and accountability in public policy by ensuring broader stakeholder engagement. Furthermore, it increases efficiency in addressing complex public issues by leveraging resources and expertise from multiple sectors. Agranoff and McGuire in [11] argue that voluntary collaboration and horizontal relationships among multi-sector participants can overcome the limitations of a single public organization in meeting complex societal demands.

Institutional frameworks play a crucial role in disaster mitigation efforts. In Indonesia, the National Disaster Management Authority (BNPB) coordinates disaster response, prevention, emergency preparedness, and post-disaster recovery [7]. Additionally, the Pentahelix model, which involves collaboration between government, society, academia, private sectors, and media, has been implemented to enhance disaster mitigation effectiveness [12]. Such collaborations enable optimal resource utilization and knowledge sharing, strengthening community resilience against disasters.

Despite its advantages, collaborative governance in disaster mitigation faces challenges, including weak coordination and leadership. Strengthening institutional frameworks and stakeholder coordination is essential to improving disaster response effectiveness [13]. In particular, research by Hasnaa and Darumurti [14] on flood disaster mitigation in Pekalongan demonstrates that collaboration between government agencies and non-governmental organizations significantly enhances disaster response capabilities.

Disaster mitigation involves structural measures, such as developing disaster-resistant infrastructure, and non-structural strategies like, public awareness campaigns. According to Carter in [15] [16], non-structural disaster mitigation comprises six key components: legal frameworks that support mitigation policies; effective planning and management strategies; information systems for disaster risk assessment, education and training to increase community preparedness, economic incentives for stakeholder participation; and social approaches that engage communities in disaster planning and response.

In Indonesia, the Center for Volcanology and Geological Hazard Mitigation (PVMBG) plays a vital role in monitoring and providing early warnings for geological disasters. As part of the Ministry of Energy and Mineral Resources, PVMBG serves as an information hub for disaster risk reduction efforts. The integration of collaborative governance with robust institutional support is essential to minimizing disaster risks and enhancing societal resilience against natural hazards.

3. Materials and Methods

The study was conducted in Karimun Regency, Riau Islands Province, Indonesia. The study took place from June to October 2024. This study used a descriptive qualitative approach that aimed to explore the depth of collaborative governance practices in disaster mitigation efforts in Karimun Regency. The qualitative approach allows researchers to comprehensively understand the dynamics of collaboration between stakeholders, as suggested by Creswell [13].

The research informants were actors involved in disaster mitigation. The informants came from government, private, and community elements. Specifically, one informant was selected from each category: 3 members of the DPRD, 3 government officials from BPBD, a member of the TNI, a member of the POLRI, one representative from PMI, one representative from BASARNAS, one academic, one traditional figure, one religious figure, one member of

Karang Taruna, and the Head of Destana. The total informants in this study were 16 people. These informants were selected based on their direct involvement in disaster mitigation efforts, which is in line with the purposive sampling technique [17]. This selection ensured a focused and in-depth understanding of disaster governance from multiple perspectives while maintaining methodological rigor. The research location was Karimun Regency, an area prone to natural disasters, making it an ideal location to analyze collaborative efforts in disaster mitigation.

Data collection methods included in-depth interviews, participant observation, and document analysis. Interviews were conducted with purposefully selected informants, ensuring representation of key stakeholder groups.

Participant observation involved direct involvement in a range of disaster-related activities, including simulations and community preparedness programs, which provided contextual insights into real-world collaborative practices. Document analysis focused on reviewing official reports, local regulations, and disaster maps to complement the interview and observation data.

Data analysis followed the thematic analysis technique outlined by Braun and Clarke in [18], which involves steps such as data reduction, categorization, and interpretation. Key themes explored included stakeholder coordination, community participation, and policy effectiveness in collaborative disaster governance. Triangulation techniques were applied to ensure the validity of the data, including source triangulation (e.g., cross-verifying data from different informants), method triangulation (e.g., comparing interview and observation data), and member checking (e.g., confirming findings with informants).

4. Result and Discussion

4.1. Result

Based on the data collected, stakeholders involved in natural disaster mitigation in Karimun Regency, Riau Islands Province can be mapped as follows:

Table 1. Actors Classification

Organization	Level	Actors
Nonexecutive organization		Regional People's Representative Council
Executive organizations	National	National Disaster Management Agency
	Province	Kepulauan Riau
	Regency	Regional Disaster Management Agency, National Search and Rescue Agency, Indonesian National Army, Police
Non-Governmental	Local	Disaster Response Village, Community Leaders, Academics, Media, Indonesian Red Cross

Source: Processed data, 2024

The table above illustrates that the management of natural disaster mitigation in Karimun Regency involves many diverse actors. The diversity of these actors can be seen from the organizational capacity they have and the level of their organizational coverage. The diversity of these actors tends to use different methods in handling natural disaster mitigation. The tasks and authorities they have are very diverse in terms of authority and resources.

The management of natural disaster mitigation in Indonesia has been regulated in various regulations at the national, provincial, and district levels, which emphasize the importance of coordination between institutions. At the national level, Law Number 24 of 2007 concerning Disaster Management is the main basis for disaster management, which mandates that the mitigation process must be carried out in a planned, integrated, and coordinated manner. In line with that, Government Regulation Number 21 of 2008 concerning the Implementation of Disaster Management also strengthens the principles of coordination, integration, and synchronization between institutions in disaster mitigation efforts.

At the provincial level, Riau Islands Provincial Regulation Number 5 of 2024 concerning the Implementation of Regional Disaster Management emphasizes the need for synergy between agencies in handling disasters that have the potential to occur in the

Riau Islands region. This reflects the commitment of the regional government in building an effective and responsive disaster management system to the geographical conditions of the archipelago which is vulnerable to natural disasters.

Meanwhile, at the district level, Karimun Regency Regulation Number 3 of 2021 concerning the Karimun Regency Spatial Plan for 2021-2041 also includes aspects of disaster mitigation in spatial planning policies, emphasizing the importance of coordination between agencies in its implementation. In practice, the Karimun Regency Regional Disaster Management Agency (BPBD) has been active in increasing preparedness, including alerting personnel 24 hours a day to anticipate hydro meteorological disasters that often hit the region.

With the regulations and concrete steps that have been taken at various levels of government, it is hoped that disaster mitigation management in Karimun Regency and Riau Islands Province can run more effectively, coordinately, and responsively to existing risks. Collaboration between institutions is key to ensuring public safety and minimizing the impact of possible disasters. Although the institutional capacity of each actor is different, they have similarities in disaster mitigation management. In general, the summary results of institutional statements regarding the implementation of disaster mitigation collaboration are as follows:

Table 2. Resume of Statement each Actors Collaboration

Collaborative Governance Aspects	Actors	Statement Resume
Pra condition	Non Ekektif Government	Have collaborated with other institutions but have different resources.
	Eksekutif Government	Have collaborated with other institutions, both government, private institutions, and communities. Differences in organizational capacity are an obstacle to collaboration.
	Non-Government	Only a small portion of non-governmental institutions were involved in previous collaborations. Community participation remains but is still dominated by institutions with large capacities.
Design Institutional	All actors	Collaborative Governance design must accommodate all actors regardless of differences in capacity.
Leadership	All actors	Leadership is very important to drive collaboration, more specifically in natural disaster mitigation. This leadership will influence many actors for the same interests.
Collaboration Process	Non Ekektif Government	The collaboration process tends to be difficult because it is still influenced by the egocentrism of the institution.
	Eksekutif Government	The collaboration process must look at the organizational structure involved. The collaboration process is bound by bureaucratic rules.
	Non-Government	The collaboration process is more fluid because non-governmental organizations are more egalitarian in terms of interaction protocols and communication between institutions.
Out Put	All actors	Not yet optimal, there has been no exchange of resources

Source: processed data, 2024

The summary of the data above illustrates that natural disaster mitigation in Karimun Regency is carried out collaboratively but not optimally. This suboptimal condition lies in the governance structure and the collaboration process which is not yet good. This condition is in line with the following statement from the informant from Academic Umrah Ali Haji:

“Our observations and experiences when collaborating with government and private institutions lie in the communication process. The communication process is not yet intensive and the frequency is rare. This is caused by technical constraints such as bureaucracy, distance, and even political reasons. These obstacles hinder the development of good collaboration” (interview, August 20, 2024)

A similar statement was also obtained from the informant Destana regarding the collaboration process:

“For us, volunteers located in the village certainly experience obstacles in collaboration. We are invited to communicate only when needed. Maybe because our location is far from the district center and the characteristics of our area are islands, to be able to communicate face to face, there must be geographical constraints. We usually wait for information and participate when we face a disaster” (interview, August 23, 2024)

The statements of some of the informants above clearly illustrate how the collaboration process is an important factor in forming collaboration. The collaboration process includes initial communication, building trust, and building commitment. These three important aspects can be realized if each institution interacts frequently and intensively.

In line with the description of the collaboration process that occurs institutionally above, the following are the results of the focus group discussion (FGD) between institutions. In essence, it is to optimize the management of natural disaster mitigation in Karimun Regency, through two major concepts. First is, the structure and governance of disaster mitigation. In this first concept, it is hoped that a good structure will be built between institutions with different capacities and authorities. The differences in capacity and authority will be built into collaborative governance through good communication, cooperation, and coordination. Second, the obstacles faced in managing natural disasters must be a joint solution. Obstacles must be solved through the process of identifying obstacles and opportunities, deliberation of authority to competent institutions, and planning real action. (FGD summaries, September 10, 2024)

4.2. Discussion

4.2.1. Structure and Governance in Collaborative Disaster Mitigation

Structural mitigation emphasizes physical development in disaster risk reduction. Currently, disaster mitigation

efforts in Karimun Regency still predominantly rely on structural measures such as constructing embankments, reinforcing riverbanks, and utilizing sandbags to prevent flooding. However, effective disaster mitigation requires not only physical interventions but also a robust governance structure that ensures efficient coordination among stakeholders. Collaborative governance, as outlined by Ansell and Gash [9], provides a framework for multi-stakeholder engagement in disaster risk reduction. This study adopts their model, which highlights key components such as face-to-face dialogue, trust-building, shared understanding, and institutional design to improve disaster mitigation efforts in Karimun Regency.

A well-defined governance structure is essential for effective collaboration among key actors, including government agencies, non-governmental organizations, private entities, and community representatives. The following elements characterize the governance framework for collaborative disaster mitigation in Karimun Regency:

- a) **Collaborative Forum:** A dedicated platform for stakeholders to meet, discuss, and coordinate disaster mitigation efforts. This forum includes representatives from BPBD, Social Services, Health Services, TNI, Police, PMI, BASARNAS, and community leaders;
- b) **Coordination Mechanism:** A designated coordinator or facilitator to oversee collaboration, mediate conflicts, and ensure the efficient implementation of mitigation programs;
- c) **Joint Action Plan:** A comprehensive plan outlining each stakeholder's roles, responsibilities, and disaster preparedness strategies. This plan aligns with local risk assessments and regulatory frameworks;
- d) **Resource Allocation and Financing:** Clear budgeting mechanisms for funding disaster mitigation efforts, including contributions from local government, NGOs, and private sector partnerships;
- e) **Stakeholder Partnerships:** Involvement of external entities such as academic institutions, research centers, and humanitarian organizations to enhance knowledge sharing and technical support;
- f) **Monitoring and Evaluation:** Regular assessment of mitigation efforts through performance indicators, feedback mechanisms, and periodic review sessions to improve future strategies; and
- g) **Community Engagement and Awareness:** Public education campaigns and disaster preparedness programs to enhance community resilience and encourage participatory governance.

4.2.2. Collaborative Governance in Natural Disaster Mitigation

Collaborative governance plays a crucial role in disaster mitigation, requiring coordinated efforts among multiple stakeholders. This study applies Ratner's (2012) Collaborative Governance Assessment framework, which consists of three key indicators: Identifying Obstacles and Opportunities, Debating Strategies for Influence, and Planning Collaborative Actions.

The Karimun Regency BPBD, in coordination with

relevant agencies, identifies major challenges in disaster mitigation, including overlapping responsibilities, logistical limitations, and geographical constraints. However, opportunities for enhanced collaboration have emerged through multi-stakeholder forums and community-based disaster response initiatives. Coordination with OPDs such as the Social Service, Health Service, TNI, Police, PMI, and BASARNAS has improved disaster preparedness efforts. Furthermore, digital platforms for information dissemination have increased public awareness and engagement.

Stakeholders engage in focused discussions through regular coordination meetings and Focus Group Discussions (FGDs). These discussions facilitate alignment of responsibilities and strategic decision-making. Key strategies developed include: a) **Preparedness Initiatives:** Social media campaigns and joint community clean-up activities with TNI and Police to prevent flooding; b) **Medical Readiness:** The Health Service and PMI provide emergency medical equipment in accordance with national health regulations; c) **Institutional Coordination:** Clear role delineation among OPDs, with Social Services managing logistics, TNI/Police training volunteers, and BASARNAS leading evacuation efforts; and d) **Community-Based Programs:** The establishment of Disaster-Resilient Villages (Destana) by BPBD to enhance local preparedness and disaster risk reduction.

These strategies align with the findings of Ansell and Gash [9], emphasizing the need for structured deliberation and consensus-building in collaborative governance. Successful disaster mitigation requires well-structured action plans, encompassing pre-disaster, disaster response, and post-disaster recovery measures. Key initiatives in Karimun Regency include: a) **Contingency Planning:** Regular risk assessments and development of preparedness strategies based on past disaster experiences, such as the 2022 tornado; b) **Public Education:** Strengthening disaster awareness campaigns through community engagement at the neighborhood level (RT/RW); c) **Logistical Support and Recovery:** Ensuring adequate resource allocation for post-disaster relief efforts, including emergency shelters, food supplies, and medical assistance; and d) **Continuous Evaluation:** Implementing feedback mechanisms to assess the effectiveness of mitigation strategies and adjust action plans accordingly.

By integrating Ansell and Gash's collaborative governance model with Ratner's assessment framework, this study provides a comprehensive approach to enhancing disaster mitigation efforts in Karimun Regency. Through structured collaboration, shared responsibilities, and continuous engagement, the region can build resilience and effectively manage disaster risks.

The results of this collaboration show an increase in disaster response and a reduction in the risk of loss of life, supporting the findings of a study by Bryson, Crosby, and Stone, which emphasizes that well-planned collaboration increases the efficiency and effectiveness of disaster

management [19].

4.3. Discussion

The findings of this study align with the collaborative governance framework proposed by Ansell and Gash [9], emphasizing the necessity of institutional reform, stakeholder engagement, and shared decision-making in disaster mitigation efforts. The observed challenges, such as overlapping responsibilities among government agencies and limited logistical resources, highlight the need for institutional restructuring to ensure clear role delineation and effective coordination. This is consistent with Ratner's [20] Collaborative Governance Assessment, which underscores the importance of identifying structural barriers and creating mechanisms for strategic collaboration. Additionally, the active participation of community members through disaster education programs and the establishment of Disaster Resilient Villages (Destana) reflects the core principles of inclusive governance, where legitimacy and trust among stakeholders are strengthened through deliberative engagement. However, sustainable collaborative governance in Karimun Regency requires more than structural adjustments; it demands substantial financial support, advanced technological integration, and a multi-stakeholder commitment to long-term disaster resilience. Strengthening financial mechanisms through government and private sector partnerships can enhance mitigation capacity, while technological advancements, such as real-time disaster monitoring and early warning systems, can improve responsiveness. Ultimately, fostering an adaptive and institutionalized collaborative governance framework will not only enhance disaster preparedness in Karimun but also serve as a model for effective disaster risk reduction in other high-risk regions.

The results of this study underline the importance of multisectoral collaboration in disaster mitigation in Karimun Regency. This finding is in line with Ratner's Collaborative Governance theory, which emphasizes the importance of the role of key actors in uniting various parties to achieve common goals [20].

The success of the Karimun Regency BPBD in integrating the roles of OPDs and other stakeholders shows that a flexible and responsive collaborative structure to local conditions is able to face various challenges. A study by Ansell and Gash supports that collaborative relationships built on trust and good communication are an important foundation in disaster mitigation [9],[15].

This study also reveals the gap between formal policies such as Law No. 24 of 2007 and practical implementation in the field. Barriers such as limited logistics and coordination are overcome through local innovations, including the use of social media for disaster information dissemination.

This study adds empirical evidence to the disaster mitigation literature, showing that a collaboration-based

approach can improve disaster preparedness and response. This is consistent with the findings of a study by Emerson et al. which states that collaboration improves community resilience to disasters [10].

5. Conclusions

The study illustrates the effectiveness of collaborative governance in disaster mitigation within the Karimun Regency. By aligning efforts across agencies, leveraging community participation, and adhering to regulatory frameworks, BPBD successfully implements strategies to mitigate disaster impacts. Challenges such as resource limitations and inter-agency coordination are addressed through regular stakeholder engagement and capacity-building initiatives. The collaborative model in Karimun Regency serves as a potential framework for disaster mitigation in similar regions.

6. Recommendation

Based on the results of research and discussions related to natural disaster mitigation through the Collaborative Governance approach in Karimun Regency, the following are suggestions and recommendations that can be given:

a. Strengthening Inter-Agency Coordination

Coordinating between OPD, BPBD, Indonesian National Army (TNI), Indonesian local Police (Polres), Indonesian Cross Red (PMI), and National Save and Rescue (BASARNAS) need to be strengthened by establishing a more structured communication mechanism. For example, an integrated digital platform could be used to avoid overlapping tasks and facilitate the division of responsibilities.

b. Development of a Disaster Information System

We are building a local disaster application that the public can access to obtain real-time information related to disaster risks, evacuation guides, and damage reports. This system can be integrated with WhatsApp and social media to facilitate the distribution of information.

c. Increasing Human Resource Capacity

All parties involved, including community volunteers, need regular and targeted training. Training can include disaster simulations, first aid techniques, and emergency logistics management.

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