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Manuscript Status Update On (ID: 14041016): Current Status – Under Peer Review- COLLABORATIVE GOVERNANCE IN NATURAL DISASTER MITIGATION IN KARIMUN DISTRICT, KEPULAUAN RIAU PROVINCE

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Dear Bambang Puijyono,

Thank you very much for submitting your manuscript to HRPUB. In order to expedite the publication process, your manuscript entitled "COLLABORATIVE GOVERNANCE IN NATURAL DISASTER MITIGATION IN KARIMUN DISTRICT, KEPULAUAN RIAU PROVINCE" has been sent out to evaluate. But some problems need to be addressed. We would be grateful to you if you could revise your manuscript according to the following comments:

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[1] Clarke A., Mike F., S. Mary, "The Use of Technology in Education," Universal Journal of Educational Research, vol. 1, no. 1, pp. 1-10, 2015.

DOI: 10.13189/ujer.2015.010829

Books

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[1] Tom B, Jack E, R. Voss, "The Current Situation of Education," in Current Situation and Development of Contemporary Education, 1st ed,

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[1] David H., Tim P., "The Use of Technology in Teaching," The Third International Conference, LA, USA, Jul., 2013, pp. 19-23. (The year may be omitted if it has been given in the conference title) (DOI or URL, if possible).

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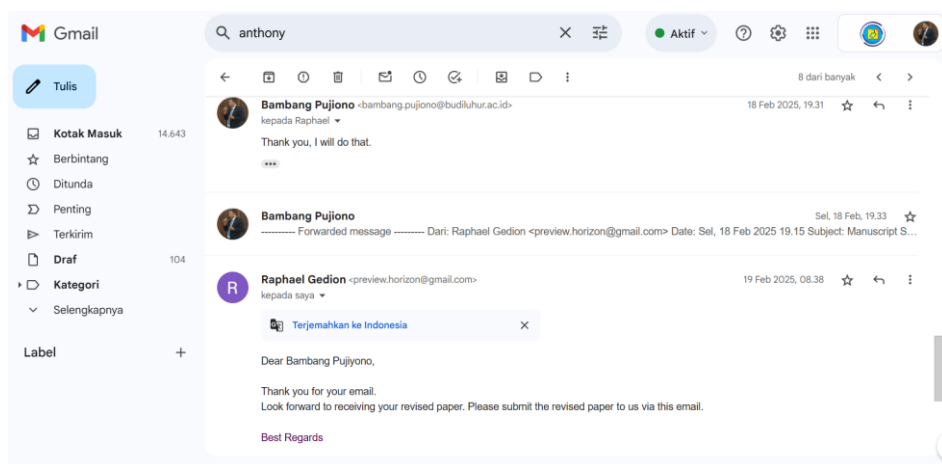
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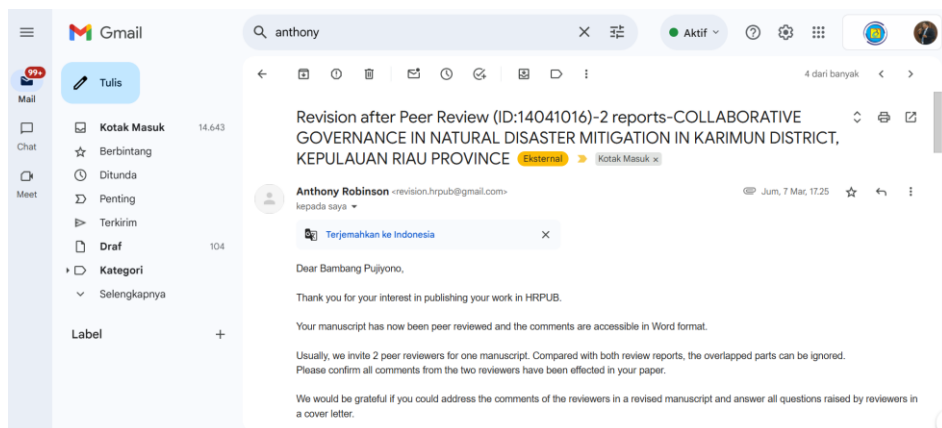
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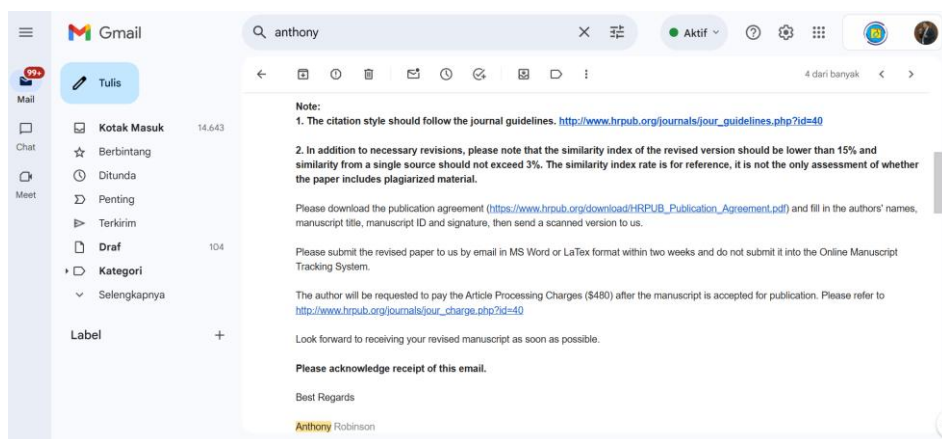
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Lampiran Catatan Reviewer :

COLLABORATIVE GOVERNANCE IN NATURAL DISASTER MITIGATION IN KARIMUN DISTRICT, KEPULAUAN RIAU PROVINCE

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Abstract This study examines the implementation of collaborative governance in disaster mitigation efforts in Karimun Regency. 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: (1) the role of stakeholder coordination in aligning mitigation efforts; (2) the importance of community participation in fostering disaster preparedness; and (3) 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,

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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 (Rochmansjah, 2022). 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 (BMKG, 2019). These natural vulnerabilities are compounded by secondary hazards such as floods, landslides, droughts, wildfires, and coastal erosion.

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. Rapid urbanization and industrialization exacerbate these risks by increasing population density in poorly planned urban areas, heightening the potential for technical and structural failures (BNPB, 2020).

These risks are well documented with regard to the Riau Islands Province, specifically Karimun Regency. . With a geographic area of 912.75 km², Karimun has a topography that includes lowland regions highly susceptible to flooding (BIG, 2016).

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Climate data from BMKG (2019) reveals that the regency experiences high rainfall intensity, contributing to frequent flooding. Additionally, the region has documented vulnerabilities to eleven types of disasters, including extreme weather, coastal erosion, and forest fires (BNPB, 2020). The 2022 Disaster Risk Assessment of the Riau Islands further categorizes disaster risks in Karimun into hazard, vulnerability, and capacity classes; thereby, providing a framework for understanding and mitigating these risks (BNPB, 2022).

Recurring disasters in Karimun Regency include land and forest fires, strong winds, high waves, and floods. Between January and April 2023, key sub-districts such as Tebing, Meral, and Karimun recorded high frequencies of such events (BNPB, 2023). 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.

Collaborative governance plays a critical role in minimizing disaster risks in the Karimun Regency. Disasters often occur suddenly, with widespread impacts on the environment and local communities. Collaborative governance involve coordinated efforts among government, private sector, civil society, and local communities, and is essential to ensure the effective implementation of disaster management policies. By fostering cooperation and leveraging resources, this approach can enhance the region's resilience to natural and anthropogenic hazards (Ansell & Gash, 2008).

This paper explores the disaster risks in Karimun Regency and the importance of collaborative governance in mitigating these risks. It emphasizes the need for a robust governance framework that integrates hazard assessment, community preparedness, and policy implementation to reduce the impact of disasters in the region.

2. Materials and Methods

This study employs a qualitative descriptive approach, which is appropriate for exploring the depth of collaborative governance practices in disaster mitigation efforts in Karimun Regency. A qualitative approach allows the researcher to comprehensively understand the dynamics of collaboration among stakeholders, as suggested by Creswell (2014). The study focuses on multiple actors involved in disaster mitigation, including government agencies, such as the Regional Disaster Management Agency (BPBD), and non-governmental organizations, such as PMI and BASARNAS, alongside community representatives.

The research site is Karimun Regency, a region prone to natural disasters, making it an ideal location for analyzing collaborative efforts in disaster mitigation. Data collection methods include in-depth interviews, participant observation, and document analysis. Interviews are conducted with purposively selected informants, such as policymakers, government officials, NGO representatives, and community leaders. These informants were chosen based on their direct involvement in disaster mitigation efforts, aligning with the purposive sampling technique advocated by Patton (2015). Participant observation involves direct engagement in disaster-related activities, including simulations and community preparedness programs, while document analysis focused on reviewing official reports, regional regulations, and disaster maps.

Data analysis followed the thematic analysis technique outlined by Braun and Clarke (2006), involving 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 data validity, including triangulation of sources (e.g., cross-verifying data from different informants), triangulation of methods (e.g., comparing interview and observational data), and member checks (e.g., confirming findings with informants).

This method provided a comprehensive framework for understanding how collaborative governance theory was operationalized in the context of disaster mitigation, ensuring robust and reliable findings grounded in the empirical realities of Karimun Regency.

3. Result and Discussion

3.1. Structure and Governance

Structural mitigation is a mitigation that emphasizes physical development. At this time, efforts to mitigate disasters still rely on physical activities, such as building barriers in flood-prone areas or filling sacks with sand and stones, which will then be used as the foundation for making embankments independently by the surrounding community (Boudreaux et al., 2023; Rus et al., 2018). The construction of barriers on the riverbanks aims to prevent the overflow of water of a certain height that can enter the floodplain.

Structure and Governance in Collaborative Governance in natural disaster mitigation in Karimun Regency is a

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framework that regulates how the collaboration process between various stakeholders operates. Good structure and Governance will ensure effective coordination, clear responsibilities, and active participation from all parties involved in disaster mitigation efforts. The following are some elements that can exist in the structure and Governance of collaborative Governance in natural disaster mitigation.

a) Collaborative Forum: The collaborative governance approach requires a forum or platform where all stakeholders can meet, discuss and coordinate. This forum can be regular meetings, periodic gatherings, or working groups dedicated to natural disaster mitigation. The forum should also include representation from different sectors of society, including government, private sector, civil society and academia.

b) Coordinator or Facilitator: Within the collaborative governance structure, a coordinator or facilitator may be appointed responsible for facilitating the collaboration process and coordinating activities related to natural disaster mitigation. This coordinator is a mediator and leader to maintain harmony between various stakeholders.

c) Joint Action Plan: The collaborative governance structure should include developing a joint action plan for natural disaster mitigation. This plan should include each stakeholder's goals, strategies, actions and responsibilities. This action plan can serve as a guideline for steps to be taken in the face of natural disasters.

d) Division of Responsibilities: The collaboration structure should clearly define the responsibilities of each stakeholder in implementing the action plan. A clear division of responsibilities will minimize potential overlaps and reduce communication errors.

e) Resources and Financing: Governance should consider resources and financing to support natural disaster mitigation efforts. This includes budget allocation, utilization of human resources, technology and logistics for implementing mitigation actions.

f) Partnership with External Parties: The structure and Governance of collaborative Governance can also involve partnerships with external parties, such as research institutions, international organizations, and humanitarian aid agencies. These partnerships can provide access to wider knowledge, resources and technical support.

g) Monitoring and Evaluation: The governance structure should include a monitoring and evaluation system to track the progress and effectiveness of natural disaster mitigation efforts. The results of this monitoring and evaluation can be used to make improvements and adjustments to the established action plan.

h) Public Awareness: Governance should also consider efforts to raise public awareness about natural disaster mitigation. Awareness and education campaigns will help increase participation and support from local communities.

It is important to note that the structure and Governance of collaborative Governance in natural disaster mitigation in Karimun Regency should be inclusive, transparent and sustainable. By actively involving all stakeholders, Collaboration can be more effective in reducing disaster risk and protecting communities from its impacts.

3.2. Collaborative Governance in Natural Disaster Mitigation

Collaborative governance plays a pivotal role in addressing and mitigating disasters, requiring thorough preparation and readiness to face potential challenges. Specifically, natural disaster mitigation necessitates strict planning and preparedness while acknowledging the need to address non-natural disasters due to their potentially severe impacts. This study examines how the Karimun Regency Government collaborates to mitigate natural disasters by applying Ratner's (2012) Collaborative Governance Assessment framework, which comprises three sub-indicators: (1) Identifying Obstacles and Opportunities, (2) Debating Strategies for Influence, and (3) Planning Collaborative Actions. The following subsections discuss the research findings that are aligned with these indicators.

Identifying obstacles and opportunities is a fundamental element in the disaster mitigation framework carried out by the Karimun Regency Government, especially through the Regional Disaster Management Agency (BPBD). Based on the Collaborative Governance Assessment theory by Ratner (2012), this phase involves strategic planning that involves various parties both directly and indirectly.

The Karimun Regency BPBD collaborates with Regional Apparatus Organizations (OPD) such as the Social Service, Health Service, TNI, Karimun Police, Indonesian Red Cross (PMI), and BASARNAS. The main obstacles identified are overlapping tasks between OPDs, limited equipment and logistics, and geographical location far from the provincial government center. As an opportunity, BPBD has formed a collaboration forum involving community elements to anticipate potential problems and post-disaster strategies. The results show that Dissemination of disaster information through social media is effective in increasing public awareness. Coordination between OPDs in providing logistics, medical equipment, and emergency response continues to be improved. Community education, including training of young people to assist the elderly during evacuation, improves local preparedness.

Obstacles in the form of overlapping tasks are addressed through clear division of roles at regular coordination meetings.

This opportunity reflects collaborative efforts that are able to reduce disaster risk through cross-sectoral involvement.

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The obstacles found are in line with the findings of a study by Ansell and Gash (2008), which stated that successful collaboration depends on division of roles and clarity of objectives.

Debating strategies in disaster mitigation forums are used to reach effective agreements among stakeholders. Based on Ratner's theory (2012), focus group discussions (FGDs) are the main tool for aligning the tasks of each party. Some of the main points produced are:

- a) Preparedness Concept: Providing appeals through social media and working together to clean gutters with the TNI and Karimun Police to prevent flooding.
- b) Preparation of Medical Equipment: The Health Office and PMI provide medical equipment and emergency medical services in accordance with the Decree of the Minister of Health No. 1653/MENKES/SK/XII/2005.
- c) Coordination of Each Institution: Clear division of roles among OPDs such as the Social Service for logistics, TNI/Polres for volunteer training, and BASARNAS for victim evacuation.
- d) Disaster Resilient Village (Destana): The establishment of Destana by BPBD increases community understanding of disaster risk reduction.

A study by Emerson et al. (2012) supports the importance of a debate structure that focuses on reaching agreement on crucial issues. In the context of Karimun Regency, this debate strategy resulted in better coordination and mature preparedness.

Planning collaborative actions includes pre-disaster, disaster, and post-disaster preparation. According to Ratner's theory (2012), two important prerequisites for collaboration are agreement on common goals and shared perceptions between parties.

The Karimun Regency BPBD has designed a strategy through monthly FGDs involving OPD, TNI, Polres, PMI, and BASARNAS. Several strategic steps identified are the preparation of contingency plans based on local risk analysis; Public education through RT/RW to increase disaster awareness; Routine evaluation of preparedness programs based on previous disaster experiences, such as the 2022 tornado; Provision of logistics and post-disaster health services by the Social Service and Health Service.

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 (2006), which emphasizes that well-planned collaboration increases the efficiency and effectiveness of disaster management.

3.3. Discussion

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 (2012) Collaborative Governance theory, which emphasizes the importance of the role of key actors in uniting various parties to achieve common goals.

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 (2008) supports that collaborative relationships built on trust and good communication are an important foundation in disaster mitigation.

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. (2012) which states that collaboration improves community resilience to disasters.

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..

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4. 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, TNI, Polres, PMI, and BASARNAS needs 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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Manuscript Information

Manuscript ID:	14041016
Manuscript Title:	COLLABORATIVE GOVERNANCE IN NATURAL DISASTER MITIGATION IN KARIMUN DISTRICT, KEPULAUAN RIAU PROVINCE

Evaluation Report

General Comments	▪ This article provides a comprehensive exploration of collaborative governance in disaster mitigation efforts in Karimun Regency. The article successfully identifies key stakeholders, challenges, and strategies involved in disaster preparedness and response. However, there are some areas that could be improved in terms of clarity, structure, theoretical depth, and critical engagement with existing literature. ▪ Collaborative governance in Karimun District involves government agencies, local communities, NGOs, and private organizations in disaster preparedness, response, and recovery, enhancing resilience and inclusivity. ▪ However, challenges such as coordination inefficiencies, funding constraints, unclear stakeholder roles, and limited public awareness weaken its effectiveness. ▪ Additionally, low community engagement due to inadequate disaster education and training hinders mitigation efforts.
Advantage & Disadvantage	Advantages • The study addresses a significant issue—disaster mitigation in a high-risk region. Research on collaborative governance in disaster management is highly relevant for policymakers, practitioners, and researchers considering Indonesia's vulnerability to natural disasters. • The study adopted a qualitative descriptive approach, which is appropriate for exploring stakeholder collaboration. The use of in-depth interviews, participant observation, and document analysis strengthens the validity of the findings by providing multiple sources of data. • The study highlights the importance of mutual trust, shared goals, and clear communication in collaborative governance. It also identifies real-world challenges, such as resource constraints and overlapping responsibilities, offering practical recommendations for improving multi-stakeholder collaboration. Disadvantages • The introduction provides background information on disaster risks in Indonesia and Karimun Regency. It does not, however, clearly define the specific research problem or research objectives. • The study references collaborative governance theory (Ansell & Gash, 2008; Ratner, 2012) but does not provide an in-depth discussion of how these frameworks apply to the study. • While the study uses a qualitative approach, it does not clearly state the number of informants interviewed and the criteria used to select specific stakeholders beyond stating that they were “purposively selected.”
How to improve	• Revise the introduction to outline the gap in knowledge this study is addressing and the specific research questions or hypotheses it aims to explore. • Provide more details on the sample size, participant selection criteria, and potential methodological limitations. • Present the results and findings based on the objectives of the study, indicating their sources in consideration of the three data collection methods. • Provide a clear theoretical discussion by explicitly linking the study's findings to the theoretical framework. • Provide a clear theoretical discussion by explicitly linking the study's findings to the theoretical framework. • To enhance collaborative governance in natural disaster mitigation in Karimun District requires institutional reforms, community involvement, financial support, technological upgrades, and multi-stakeholder cooperation. • By improving coordination, raising public awareness, and utilizing technology, the district can establish a resilient and adaptive disaster management system that safeguards lives and livelihoods.
Please rate the following: (1 = Excellent) (2 = Good) (3 = Fair) (4 = Poor)	
Originality:	2
Contribution to the Field:	2
Technical Quality:	3

Clarity of Presentation :	3
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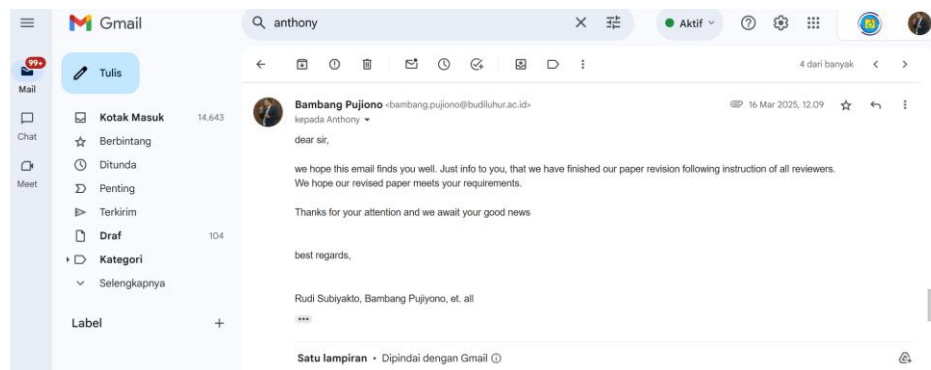
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Evaluation Report

General Comments	The topic is much needed. Overall the points made are relevant. However, there is no literature review, which should synthesize disaster mitigation, governance, and most importantly, collaboration theory. The results should reveal themes and direct quotes the strengthen the information	
Advantage & Disadvantage	Advantage: Mitigation is a much needed part of disaster management and little research exists. Collaboration is another area of disaster that needs improvement. Disadvantage: Much of the needed background should be present to allow the reader to understand the “why” of the recommendations	
How to improve	Full literature review to cover disaster mitigation, governance at the local level, and collaboration theory. Need to include themes from interviews, as well as, some direct quotes. Need much more in terms of references to support. In the materials and methods much more details are needed about the number of interviews, number of documents, etc.	
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Lampiran revisi

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 is 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 risks.

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. Literatur 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, such as 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

Organisasi	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 hydrometeorological 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, coordinated, and responsive 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 eac Actors Collaboration

Collaborative Governance Aspects	Actors	Stateman Resume
Pra condition	Non Ekekutif 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 Ekektuf 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 Umrh 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, to optimize the management of natural disaster mitigation in Karimun Regency, through two major concepts. First, 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 or 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; 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. Conclusion

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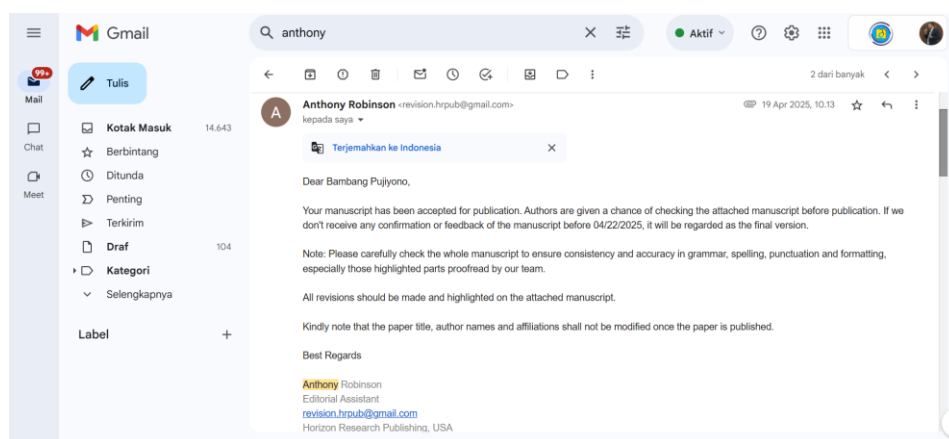
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Collaborative Governance in Natural Disaster Mitigation in Karimun District, Kepulauan Riau Province, Indonesia

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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. **thisThis** 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

OrganizationOrganisasi	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 hydrometeorological 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, coordinatedly, 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 eac Actors Collaboration

Collaborative Governance Aspects	Actors	Statement Resume
Pra condition	Non Ekecutif	Have collaborated with other institutions but have different resources.

	GovernmentGovernment	
	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 GovernmentGovernment	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 nNon-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 or 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.

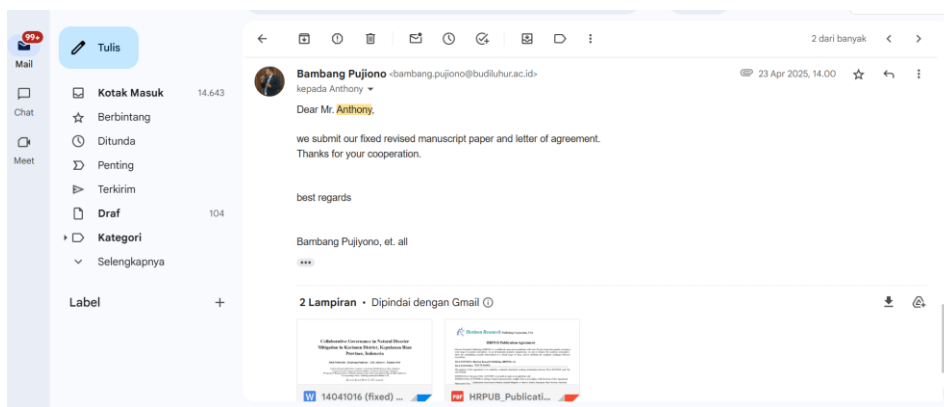
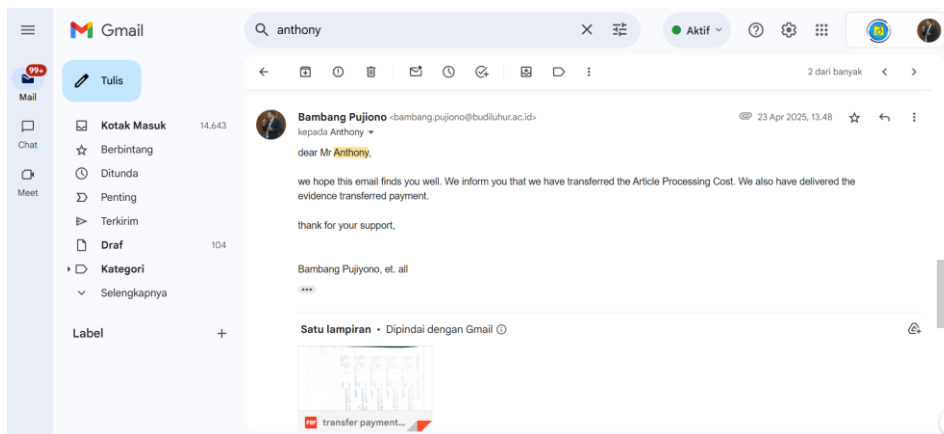
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Collaborative Governance in Natural Disaster Mitigation in Karimun District, Kepulauan Riau Province, Indonesia

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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
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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 increase 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 hydrometeorological 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 eac Actors Collaboration

Collaborative Governance Aspects	Actors	Statement Resume
Pra condition	Non Ekekutif G overnment	Have collaborated with other institutions but have different resources.
	Ekekutif 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 Ekekutif G overnment	The collaboration process tends to be difficult because it is still influenced by the egocentrism of the institution.
	Ekekutif 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:

d. 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.

e. 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.

f. 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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