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Collaborative Governance in Urban Flood Management: A Legal Perspective from Semarang City

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Abstract

Indonesia is highly prone to disasters, particularly floods that cause extensive socio-economic losses. Semarang City ranks among the most vulnerable urban areas due to its low-lying topography, rapid urbanization, and diminishing water catchment capacity. This study addresses the gap between the increasing frequency of floods and the limited effectiveness of mitigation strategies, focusing mainly on physical infrastructure. Using an empirical juridical approach, this research examines flood mitigation strategies in Semarang City in accordance with Law No. 24 of 2007 by evaluating structural and non-structural measures and their implementation challenges. Primary data were obtained through interviews, complemented by secondary legal literature, and analyzed qualitatively. The results indicate that effective mitigation requires strengthened infrastructure, such as embankments, retention ponds, and pumps, and active community involvement through education, evacuation simulations, and social media outreach by the Regional Disaster Management Agency (BPBD). The study contributes a cross-sectoral collaboration model integrating government, communities, private actors, and modern technology. It recommends sustainable spatial planning, digital-based early warning systems, long-term financing mechanisms, and institutionalized community participation to build urban flood resilience.
Keywords: *Collaboration; Disaster management; Flood mitigation; Law; Semarang City; Urban resilience.*

1. INTRODUCTION

Indonesia, as an archipelagic country with a strategic geographical position between two continents and two oceans, and located at the intersection of three major tectonic plates, faces a high risk of natural disasters, one of which is flooding. Semarang City is one of the urban areas that experiences flooding almost every rainy season due to low topography, poor drainage systems, massive urbanization, and reduced water catchment areas. Data from the Regional Disaster Management Agency (BPBD) indicate that flooding in Semarang causes significant yearly socio-economic losses, including damage to infrastructure, disruption of community activities, and threats to human safety. These conditions underscore that flood disaster mitigation must be a priority in sustainable urban development planning.[1]

Flood disaster mitigation is a crucial strategic step to minimize the impact, both in terms of material losses and casualties. Floods caused by heavy rains or overflowing rivers can cause significant damage to infrastructure, destroy homes, and damage crops that are a source of livelihood for communities.[2] Moreover, floods can also cause loss of life and seriously disrupt the local economy. Disaster mitigation should therefore be a top priority in disaster risk planning

[1] Nanda Galih Saputra, Maulana Rifai, and Prilla Marsingga, "Karawang Regency Flood Disaster Management Strategy in the Village of Karangligar Village as a Disaster Resilient Village," Dinamika: Scientific Journal of State Administration Science 8, no. 1 (2021): 62-76.

[2] Noven Purba Novendri Purba, "Strategy Of Mitigating Banjury Response In The City Of Tebing Tinggi, North Sumatera Province (Study on the Regional Disaster Management Agency of Tebing Tinggi City)" (Institute Of Government In Negeri, 2022).

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and management, to ensure that communities are better prepared and organized to deal with floods.[3]

In this context, Law No. 24/2007 on Disaster Management is an essential legal foundation in directing disaster mitigation efforts in Indonesia. This law emphasizes the importance of prevention, mitigation, and preparedness in the face of disasters, including floods.[4] The articles in the law provide the basis for better planning, comprehensive disaster risk management, and increasing the capacity of communities and governments to cope with the impacts of disasters. In addition, the law also encourages cooperation between government agencies, the private sector, and the community to jointly reduce the risks posed by disasters.[5]

In Semarang City, which has a high potential risk of flooding, mitigation must involve various stakeholders who have responsibilities in disaster management. The city government, through its Regional Disaster Management Agency (BPBD) and Public Works Agency (DPU), plays an important role in developing and implementing mitigation strategies based on risk analysis in flood-prone areas. Each region has different characteristics and potential risks; therefore, a risk analysis conducted by BPBD is needed to determine appropriate mitigation measures, be it in terms of strengthening infrastructure, spatial policies, or community education. For example, in areas prone to flooding, the construction of retention ponds, river normalization, or increased drainage capacity is needed to reduce waterlogging.[6]

In addition to the role of the government, community involvement is also crucial in the implementation of flood mitigation. The community, as the party directly affected by flooding, needs to be empowered to understand the existing risks and actively participate in mitigation measures.[7] This can be done through counseling programs, evacuation simulations, and environmental hygiene campaigns, such as maintaining drainage channels and reducing garbage that can obstruct water flow. Communities also need to be involved in tree planting activities in water catchment areas or the construction of infiltration wells to increase the soil's capacity to absorb rainwater. By increasing public awareness and participation, it is hoped that flood mitigation can run more effectively and provide maximum results.[8]

In order to improve mitigation effectiveness, stakeholders must work in a coordinated manner. Collaboration between the government, communities, and the private sector is essential to achieve better mitigation goals. The government, as the policy manager, must ensure that there are supporting regulations, such as spatial arrangements that pay attention to water catchment areas and restrictions on development in flood-prone areas. On the other hand, the private sector can also play a role in supporting mitigation projects, such as building flood control infrastructure and providing funds through public-private partnership schemes. This

[3] Warsono Hardi, "Collaborative Governance in the Perspective of Public Administration," 2020.

[4] Dedeh Fardiah et al., "JCC as Integrated Digital Communication of Disaster Information in West Java," Journal of Communication 18, no. 1 (2023).

[5] Aisyah Nur Rahma and Dini Gandini Purbaningrum, "Community Participation in Overcoming Flood Disasters in Bukit Sawangan Indah Housing Estate, Duren Mekar Village, Bojong Sari District, Depok City," Popular: Journal of Student Research 3, no. 3 (2024): 88-109.

[6] Oscar Radyan Danar, Disaster Governance: An Introduction (Diva Press, 2020).

[7] Ayu Sekar Ningrum and Kronika Br Ginting, "Flood Management Strategy Based on Disaster Mitigation in Flood Prone Areas in the Seulalah River Basin of Langsa.

[8] Aisyah Nur Rahma and Dini Gandini Purbaningrum, "Community Participation in Overcoming Flood Disasters in Bukit Sawangan Indah Housing Estate, Duren Mekar Village, Bojong Sari District, Depok City," Popular: Journal of Student Research 3, no. 3 (2024): 88–109.

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collaboration is expected to create a mitigation system that is more comprehensive, sustainable, and can face the challenges of flood disasters in the future.

Despite several measures such as polder construction and drainage improvements, flooding still occurs. This shows the ineffectiveness of the mitigation strategies implemented and the gap between policy and reality on the ground. Low-lying areas such as North Semarang become major areas of inundation every rainy season, disrupting community activities and causing billions of rupiah in losses. In addition, flooding affects access to transportation, economy, and health due to dirty water inundation.

Semarang City Government has made efforts to build reservoirs, normalize rivers, and improve drainage. However, these efforts have not been optimal, especially when the volume of rain exceeds the capacity of the infrastructure. The city's lack of drainage maintenance is a major cause of waterlogging in strategic locations. Law No. 24/2007 requires mitigation to be an integral part of urban planning, including prevention, improving community preparedness, and infrastructure readiness. This strategy requires the synergy of central, local, and community governments. The gap between regulation and implementation is evident in the lack of disaster mitigation in Semarang City. Early warning systems often do not function optimally, and communities are poorly prepared for flooding. Flood control infrastructure has not been supported by ecosystem-based planning.

To understand more about flood disaster mitigation efforts, this research also refers to several previous studies that are relevant and provide an overview of disaster mitigation strategies in various regions. The previous research data related to this research are Ayu Sekar Ningrum and Kronika Br. Ginting with the theme Flood Management Strategy Based on Disaster Mitigation in Flood Prone Areas in the Seulalah Watershed, Langsa City 2020. The results of this study explain the risk assessment of flood disasters in flood-prone areas in Seulalah Village, Langsa City, and disaster mitigation-based flood management strategies in flood-prone areas, especially in Seulalah Village and other villages that are also often affected by flooding.[9] Furthermore, research conducted by Saputrawith the theme Flood Disaster Management Strategy of Karawang Regency in Karangligar Village as a Disaster Resilient Village. The results of the study explain the Karawang Regency flood disaster management strategy in Karangligar Village as a disaster-resilient village using the Fred R David theory, as well as research by Purba with the theme Flood Disaster Mitigation Strategy in Tebing Tinggi City, North Sumatra Province 2024. The results of the study explain that the strategy carried out by BPBD, as an agency formed by the government as a forum for disaster management, can minimize and even anticipate flood disasters that occur, starting from the pre-disaster, emergency response, and post-disaster stages so as to create a community that is alert and resilient to disasters. [10]

The difference between this research and previous studies is that this research focuses on Semarang City as an urban area with climate change and urbanization challenges that require a collaborative approach across sectors. Unlike previous studies that focused more on villages or semi-urban areas, this study emphasizes the role of government, communities, and the private sector in disaster mitigation. In addition, the use of modern technology, such as early warning

[9] Nanda Galih Saputra, Maulana Rifai, and Prilla Marsingga, "Flood Disaster Management Strategy of Karawang Regency in Karangligar Village as a Disaster Resilient Village," Dinamika: Scientific Journal of State Administration Science 8, no. 1 (2021): 62–76.

[10] Novendri Purba, "Banjury Disaster Response Mitigation Strategy In The City Of Tebing Tinggi, North Sumatera Province (Study on the Tebing Tinggi City Regional Disaster Management Agency)."

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systems and flood reporting applications, is a strategic element that distinguishes this research. This research produces a cross-sector collaboration model based on Law No. 24/2007, which can be adapted to other urban areas, thus offering a more comprehensive approach than previous research's focus on local risks, disaster resilient villages, or physical infrastructure alone.

In an urban context like Semarang City, flooding challenges are not only influenced by rainfall intensity and climate change, but also by the impact of urbanization that reduces the environment's capacity to absorb water. These conditions drive the importance of mitigation strategies that are not only oriented towards physical infrastructure but also involve cross-sector coordination and sustainable spatial management. This research utilizes a collaborative framework involving the government, communities, and the private sector to ensure that every aspect of flood management, from planning to implementation, is integrated and effective.

One of the main factors exacerbating flood risk in Semarang City is the conversion of infiltration land into residential and commercial areas. This phenomenon points to the need for a mitigation strategy that focuses not only on short-term disaster management but also on long-term preservation of environmental functions. Using an approach based on Law No. 24/2007, this research analyzes how cross-sector integration and the use of modern technology can be a comprehensive solution to reduce flood risk while protecting the ecological balance of urban areas. The conversion of catchment land into residential and commercial areas exacerbates flood risk. This problem points to the need for a long-term approach to preserve water catchment areas as part of the mitigation strategy. Based on these issues, this research aims to analyze flood mitigation strategies in Semarang City in accordance with Law No. 24/2007.[11]

2. METHOD

This research employs an empirical juridical method to analyze the implementation of law in flood management in Semarang City, in accordance with Law No. 24 of 2007. The juridical approach examines written and unwritten legal norms, while the empirical approach sees the law in social practice by utilizing primary data from direct interviews and secondary data from legal literature. This research is descriptive and analytical, providing a factual picture of flood mitigation strategies and analyzing them in depth.[12] Data is collected through interviews with relevant resource persons and literature studies involving primary legal materials such as laws and regulations, secondary legal materials in the form of books and research, and tertiary legal materials such as dictionaries and encyclopedias. Data analysis techniques are carried out qualitatively by combining field facts and legal norms, then arranged systematically to produce a comprehensive conclusion related to the issues raised.[13]

[11] Laksni Sedyowati, "Flood-Free City: Between Hope and Reality" (Selaras Media Kreasindo, 2021).
[12] Warsono Hardi, "Collaborative Governance in the Perspective of Public Administration," 2020.
[13] Muhammad Yusri Rizki, "Lack of Coordination between Regional Stakeholders Responsible for the Ciliwung Watershed," n.d.

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3. RESULTS AND DISCUSSION

Flooding in Semarang City is a result of high rainfall intensity that exceeds the capacity of rivers and drainage systems. In response, a disaster mitigation strategy was designed in accordance with Law No. 24/2007 on Disaster Management. The strategy aims to reduce disaster risk through collaboration between government agencies and communities. The disaster mitigation strategy implemented in Semarang City aims to deal with the increasing complexity of flooding problems due to urbanization and climate change.[14] Law No. 24/2007 provides a strong legal foundation for this effort, emphasizing the importance of collaboration between various parties, including the government, communities, and the private sector. This approach allows flood management to be not only reactive, but also preventive through comprehensive planning that is oriented towards long-term risk reduction.[15]

As an implementation of the strategy, the involvement of agencies such as Semarang's Public Works Department (DPU) and Regional Disaster Management Agency (BPBD) is crucial. This inter-agency collaboration not only strengthens infrastructure planning and development but also ensures that community education becomes an integral part of flood mitigation. With this synergy, the risk analysis conducted by BPBD can be translated into concrete measures, such as increasing the capacity of drainage systems, normalizing rivers, and building retention ponds, which directly contribute to reducing the impact of flooding in flood-prone areas.[16]

Collaboration between the Department of Public Works (DPU) and Semarang's Regional Disaster Management Agency (BPBD) is key to flood management. This collaboration includes mitigation planning, infrastructure operation, and community education to improve flood preparedness. In mitigation planning, efforts include the construction of better drainage systems, river normalization, and the construction of retention ponds. All of these measures are based on a risk analysis conducted by BPBD.[17]

The collaboration between Semarang's Public Works Department (DPU) and the Regional Disaster Management Agency (BPBD) plays a crucial role in addressing flooding issues. This collaboration ensures that flood mitigation is carried out in a comprehensive manner, involving both technical and social aspects.[18] DPU is responsible for the construction and management of infrastructure that supports flood mitigation, such as drainage systems, embankments, and retention ponds. BPBD, on the other hand, focuses on risk analysis and the development of mitigation strategies that are integrated with infrastructure development plans, taking into account environmental and social factors that may affect the effectiveness of countermeasures. All these measures are carried out in close coordination, allowing both agencies to complement each other in facing the challenges of flooding in Semarang City.

The importance of strengthening infrastructure cannot be underestimated, given that the impacts caused by flooding can threaten people's safety and lives. Embankments, retention

[14] Ali Zainuddin, "Legal Research Methods," 2015.

[15] Findayani Aprilia, "Community Preparedness in Flood Management," Journal of Information Media for the Development of Geography Science and Profession. 12, no. 1 (2018): 102–14, https://journal.unnes.ac.id/nju/index.php/JG/article/view/8019.

[16] Saputra, Rifai, and Marsingga, "Flood Disaster Management Strategy of Karawang Regency in Karangligar Village as a Disaster Resilient Village."

[17] Danianti and Sariffuddin, "Level of Community Vulnerability to Flood Disaster in Perumnas Tlogosari, Semarang City."

[18] Rizka Utami Indra, Retna Hanani, and Kismartini Kismartini, "Analyzing The Role Of Stakeholders In Flood Disaster Management In Semarang City," *Journal of Public Policy and Management Review* 12, no. 4 (2023): 700–712.

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ponds, and water pumps are part of constructive efforts aimed at mitigating the damage caused by overflowing water. However, to ensure their continued functionality, such infrastructure requires regular care and maintenance. Without adequate maintenance, these infrastructures may suffer degradation that reduces their effectiveness in dealing with floods. Therefore, the role of BPBD in educating the community through counseling and evacuation simulations is crucial so that the community is mentally and physically prepared to face such disasters.

In addition to strengthening infrastructure, community involvement in maintaining environmental cleanliness is also a determining factor in the effectiveness of flood management. BPBD routinely conducts campaigns on social media, as well as organizing counseling activities and evacuation simulations to increase public understanding of the importance of flood preparedness. Through this program, the community is not only taught to keep the drainage clean, but also involved in mitigation programs such as planting trees in water catchment areas and making biopores. The active participation of the community is vital, as they are at the forefront of protecting the environment and reducing the potential for flooding in vulnerable residential areas. With the collaboration between the government and the community, flood mitigation in Semarang City can be more effective and sustainable.[19]

Strengthening infrastructure such as embankments, retention ponds, and water pumps is an important element in reducing the impact of flooding. However, their effectiveness requires regular care and maintenance. On the other hand, BPBD routinely educates the public through counseling, evacuation simulations, and social media campaigns. The community is invited to actively participate in keeping drainage clean and supporting mitigation programs such as biopores.[20] Strengthening physical infrastructure such as embankments, retention ponds, and water pumps represents a crucial component in minimizing the adverse impacts of flooding. Nevertheless, the effectiveness of these structural measures is highly dependent on consistent maintenance and monitoring, without which their capacity to control flood risks gradually diminishes. In parallel, the Regional Disaster Management Agency (BPBD) implements non-structural measures by routinely educating the public through counseling, evacuation simulations, and the use of social media campaigns to raise awareness. These initiatives encourage communities to take an active role in maintaining drainage systems and participating in mitigation programs such as the creation of biopores. The combination of structural and non-structural strategies highlights the necessity of an integrated approach, where infrastructure development is complemented by sustained community engagement. This dual strategy not only enhances technical resilience but also fosters a culture of shared responsibility, thereby increasing the overall effectiveness of flood mitigation efforts in urban contexts.

To ensure the success of flood mitigation strategies, infrastructure strengthening must be supported by community awareness and active participation. In addition to adequate infrastructure maintenance, education, and simulations conducted by BPBD, play an important role in shaping community preparedness for flooding. Collaboration between the government and the community in maintaining drainage cleanliness and supporting mitigation programs, such as biopori, strengthens preventive efforts. In this regard, cross-sector coordination between DPU, BPBD, and related agencies is crucial for the implementation of broader mitigation programs, including the normalization of major rivers such as the West and East Flood Canals,

[19] Fitri Anisai Rohmah, "An Overview Of The Implementation Of The Environmental Care And Culture Movement At School In Provincial Adiwiyata Schools In Bojonegoro District" (Airlangga University), 2022).

[20] Himawan Putranta et al., Disaster Mitigation Education Module (UIN Sunan Kalijaga Yogyakarta, 2024).

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which help reduce the risk of inundation and facilitate water flow, while the involvement of local communities ensures information dissemination and preparedness at the community level. Cross-sector coordination involving DPU, BPBD, and other agencies facilitates the implementation of mitigation programs. One example is the normalization of major rivers such as the West and East Flood Canals, which aim to facilitate the flow of water, reduce the risk of inundation, and increase the capacity of the river. In addition, the involvement of local communities, including neighborhood associations and community leaders, ensures that information related to flood mitigation reaches the local level.[21]

To ensure the effectiveness of flood mitigation programs, efforts to strengthen infrastructure and educate communities need to be supported by solid cross-sector coordination. Inter-agency collaboration is key in integrating various strategic steps, so that each party can contribute maximally in reducing flood risk. Climate change that causes erratic rainfall is a new challenge. This requires technological adaptations such as early warning systems and real-time data collection to improve preparedness. In addition, population growth narrows the space for new infrastructure. The government is addressing this by optimizing existing infrastructure, such as enlarging drainage capacity.[22]

The level of community participation in disaster mitigation programs still varies, depending on the effectiveness of socialization by the government. Therefore, more intensive efforts are needed to increase community involvement. On the other hand, DPU has an important role in maintaining drainage, embankments, and ensuring water pumps function optimally during the rainy season.

Collaboration with the private sector and international institutions also helps fund major mitigation projects, such as embankment construction and river normalization. The government also tightened spatial planning rules to protect water catchment areas and prevent development in flood-prone zones. This measure is supported by sustainable water resources management through tree planting in catchment areas and the construction of infiltration wells to increase water absorption capacity.

Modern technologies, such as automatic water pumps and flood reporting apps, are used to speed up disaster response. However, budget constraints force the government to prioritize critical projects and seek additional funding support from the central government or overseas grants. In this case, the central government provided technical assistance and additional funding for major projects such as river normalization, which helped lower flood risks.

In addition to collaborative measures and water resource management, the application of modern technology is an important element in improving the effectiveness of flood mitigation strategies. The integration of technology-based approaches with environmental protection efforts and spatial planning provides a more comprehensive solution. Nevertheless, budget constraints remain a major challenge, so the government continues to seek additional funding and technical support from various parties to ensure the sustainability of strategic mitigation projects. Mitigation programs are continuously evaluated and adjusted based on the latest data to ensure measures remain effective. Going forward, Semarang City needs to continue its mitigation-based

[21] Sudarmanto Budi Nugroho, Junichi Fujino, And D A N Tomoko Ishikawa, "Low-Carbon Development In Indonesia's Cities," City Climate Resilience, n.d., 55.

[22] H M Harry Mulya Zein and Sisca Septiani, Digitalization of Local Government: A Catalyst for Integration and Optimization of Good Governance (Sada Kurnia Pustaka, 2024).

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approach by enhancing cross-sector collaboration, utilizing modern technology, and actively engaging the community. These measures are expected to create a more flood-resilient environment and provide long-term protection for Semarang residents.[23]

4. CONCLUSION

This research finds that flood mitigation efforts in Semarang City, guided by Law No. 24 of 2007 on Disaster Management, have been carried out through both structural and non-structural measures. Structural strategies include river normalization, retention pond construction, and drainage improvement, while non-structural measures consist of community education, simulation exercises, and public awareness campaigns. However, the persistence of flooding reveals several obstacles, such as limited budget allocation, weak infrastructure maintenance, rapid land conversion, and low levels of community participation, which together hinder the overall effectiveness of the existing strategies. These findings confirm the urgent need for more comprehensive and integrated approaches in urban flood risk management. The novelty of this study lies in its proposal of a cross-sectoral collaboration model that goes beyond physical infrastructure, integrating government agencies, local communities, and the private sector with the support of modern technologies such as early warning systems and flood-reporting applications. Unlike previous studies that concentrated on rural or semi-urban settings, this research addresses the complex challenges of urban flooding under the pressures of climate change and rapid urbanization. The study recommends strengthening spatial planning regulations, optimizing funding through public-private partnerships, and enhancing community engagement with sustainable education and tangible incentives. These recommendations not only aim to improve the resilience of Semarang but also provide a framework that can be replicated in other urban areas across Indonesia.

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[23] M Si Kusuma et al., *Disaster Mitigation and Preparedness* (Indonesia Emas Group, 2024)

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