

Policy Evaluation of Flood Mitigation in Samarinda City, Indonesia

Andi Ade Lepu^{1*}, Rifdan², Risma Niswaty³, Andi Kasmawati⁴

Department of Public Administration, Faculty of Social Sciences and Law,
Universitas Negeri Makassar

Corresponding Author: Andi Ade Lepu andiadelepustudent@gmail.com

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ABSTRACT

Flooding remains one of the most critical urban environmental challenges in Indonesia, requiring effective public policy to reduce its impacts. This study aims to evaluate the flood mitigation policy implemented in Samarinda City during the 2021–2024 period using William N. Dunn's public policy evaluation framework, which encompasses effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness. A qualitative phenomenological approach was employed to explore stakeholders' experiences and perceptions regarding policy implementation. Data were collected through field observations, in-depth interviews, documentation, and policy document analysis involving government agencies, academics, community leaders, journalists, and flood-affected residents. The findings indicate that the Modern Drainage Development Program has achieved positive outcomes in terms of effectiveness, responsiveness, and appropriateness by reducing flood inundation in priority areas. However, the policy has not fully satisfied the criteria of efficiency, adequacy, and equity due to uneven benefits and limited integration with broader flood governance measures. The study highlights the need for an integrated flood governance approach through cross-sectoral coordination, watershed management, spatial planning, and community participation to enhance the sustainability and effectiveness of flood mitigation policies.

INTRODUCTION

Flooding is one of the most frequent hydrometeorological disasters worldwide and has become a major challenge to sustainable urban development. The increasing frequency and intensity of flood events are driven by climate change, rapid urbanization, land-use change, and environmental degradation, all of which increase the vulnerability of urban areas to flood hazards (Gao et al., 2022; IPCC, 2022). Floods not only cause substantial economic losses and damage to infrastructure but also disrupt public services, social activities, and the continuity of urban development. Consequently, contemporary flood management has shifted beyond a sole emphasis on structural infrastructure toward adaptive, collaborative, and resilience-based governance approaches aimed at strengthening urban flood resilience (Prashar et al., 2023).

Indonesia is among the countries most vulnerable to flooding, where flood disasters have evolved into a complex national governance challenge. According to the National Disaster Management Agency (BNPB), a total of 4,491 flood events occurred between 2020 and 2023, averaging more than one thousand incidents annually. In 2023 alone, floods accounted for 989 incidents, representing approximately 28.34% of the 3,489 disasters recorded nationwide, making flooding the most frequently occurring disaster and significantly disrupting public activities and the delivery of public services (BNPB, 2023; Databoks, 2024). These conditions indicate that flooding should no longer be viewed merely as a hydrometeorological phenomenon but rather as a public governance and policy issue that requires integrated, adaptive, and sustainable management approaches (Bappenas, 2010; Setiadi et al., 2023).

From a public administration perspective, flooding is regarded as a collective problem that cannot be addressed through individual efforts alone but requires well-planned, coordinated, and sustainable government intervention through public policy (Abdul Wahab, 2012). Flood mitigation policies extend beyond the construction of flood control infrastructure to encompass spatial planning, watershed management, environmental conservation, land-use regulation, inter-agency coordination, community participation, and the effective implementation of public administration. Therefore, the success of flood mitigation should not be measured solely by the amount of infrastructure constructed but also by the extent to which public policies reduce flood frequency, inundation extent, flood duration, and the resulting socio-economic impacts.

One of the regions that has long experienced chronic flooding is Samarinda City, the capital of East Kalimantan Province, Indonesia. As both the provincial capital and a regional economic growth center, Samarinda has undergone rapid urban expansion over the past two decades. Population growth, urban settlement expansion, land-use conversion, mining activities, and increasing pressure on water catchment areas have significantly heightened the city's vulnerability to flooding. Geographically, Samarinda covers approximately 718 km², of which about 180 km² consists of water catchment areas. The city is also influenced by approximately 20 watersheds, including the Karang Mumus River, which flows through the urban area and has become one of the primary

contributors to flooding when river capacity is insufficient to accommodate stormwater runoff (BPS Kota Samarinda, 2023).

The topographical characteristics of Samarinda City further increase its vulnerability to flooding. Parts of the urban area are situated in low-lying terrain influenced by the tidal fluctuations of the Mahakam River, while rapid urban development has progressively reduced the land's capacity to absorb rainfall. In addition, coal mining activities in the upstream and peri-urban areas have altered the hydrological characteristics of the watershed, leading to increased surface runoff. The interaction of these factors has transformed flooding in Samarinda into a multidimensional problem driven not only by natural conditions but also by rapid urban development and environmental governance challenges.

Data from the Disaster Management Operations Control Center (Pusdalops-PB) of the Samarinda Regional Disaster Management Agency (BPBD) indicate that flood occurrences between 2014 and 2023 exhibited a fluctuating pattern, with an overall expansion of affected areas. Flood events declined from 24 incidents in 2014 to nine incidents in both 2018 and 2019, before increasing sharply to 33 incidents in 2020 and 34 incidents in 2021. Although the number of incidents decreased to 13 in 2022, flood events rose again to 19 in 2023, accompanied by a broader spatial distribution of affected areas (BPBD Kota Samarinda, 2024). These trends suggest that the success of flood mitigation policies cannot be assessed solely by changes in the frequency of flood events, as the spatial distribution and severity of flood impacts continue to evolve dynamically.

The Samarinda City Government has designated flood mitigation as one of its key regional development priorities through a series of policies and regulatory frameworks. These include Regional Regulation No. 2 of 2014 on the Spatial Plan, Regional Regulation No. 4 of 2015 on the Regional Long-Term Development Plan (RPJPD), Regional Regulation No. 5 of 2016 on the Regional Medium-Term Development Plan (RPJMD), and Mayor Regulation No. 15 of 2016 concerning the relocation of settlements along the Karang Mumus River. In addition, the local government has implemented several strategic initiatives, including river normalization, retention pond development, the construction of a Modern Drainage System, infiltration wells, and the living with water approach. During the 2021–2024 administration, the municipal government substantially increased budget allocations for flood mitigation, with major investments directed toward the development of modern urban drainage infrastructure.

Despite these substantial policy investments, flood risk has not been comprehensively reduced across the city. While flood inundation has declined in several locations, new flood-prone areas have emerged in places that had not previously experienced flooding. This phenomenon suggests that the existing flood mitigation policy has yet to generate a comprehensive impact on the overall urban flood management system. In other words, the successful delivery of flood control infrastructure does not necessarily reflect the success of public policy if implementation effectiveness, institutional coordination, resource efficiency,

program relevance, and the sustainability of policy outcomes have not been fully achieved.

From the perspective of public policy evaluation, this condition indicates a potential gap between policy objectives and actual policy outcomes. Dye (1992) defines public policy as whatever governments choose to do or not to do. Accordingly, policy evaluation is intended not only to assess whether programs have been successfully implemented but also to determine the extent to which public policies effectively, efficiently, responsively, and sustainably address public problems (Anggara, 2016). Similarly, Abdul Wahab (2012) argues that the success of a public policy ultimately depends on the effectiveness of its implementation in producing changes consistent with its intended objectives.

Previous studies on flood mitigation in Indonesia have primarily focused on hydrological engineering, infrastructure development, flood modeling, and disaster mitigation. For example, a study by Bappenas (2010) identified that the major challenges in flood management across Indonesian cities extend beyond technical issues and are strongly influenced by weak inter-agency coordination, limited community participation, inadequate local regulations, and financial constraints. Likewise, Astuti and Warsono (2020) emphasized the importance of positioning local communities as active stakeholders rather than passive beneficiaries in flood management. Nevertheless, studies specifically evaluating the effectiveness of flood mitigation policies from a public administration perspective at the local government level, particularly in Samarinda City, remain limited. Most previous research has concentrated on evaluating the implementation of physical infrastructure projects rather than comprehensively assessing policy performance and governance effectiveness.

Based on these conditions, a significant research gap remains. To date, no study has comprehensively evaluated the effectiveness of flood mitigation policy in Samarinda City by incorporating the key dimensions of public policy evaluation, including effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness. Addressing this gap is particularly important because Samarinda is one of the most flood-prone cities in East Kalimantan and is currently undergoing a major transformation through the implementation of a Modern Drainage System and various flood control initiatives. A comprehensive policy evaluation is therefore essential to determine whether these interventions have achieved their intended objectives and to identify areas requiring further improvement.

Accordingly, this study aims to evaluate the flood mitigation policy implemented in Samarinda City during the 2021–2024 period using a public policy evaluation perspective based on William N. Dunn's evaluation framework. The findings are expected to contribute not only to the empirical advancement of public policy evaluation studies within the field of public administration but also to provide strategic recommendations for local governments in designing more effective, adaptive, and sustainable flood mitigation policies.

LITERATURE REVIEW

Public administration has evolved from the traditional paradigm of public administration, which primarily emphasized bureaucratic efficiency, toward a modern public administration paradigm that places the resolution of public problems at its core. The foundations of public administration were established by Wilson (1887) through the distinction between politics and administration, and further developed by Goodnow (1900) and White (1948) as the basis for effective governmental management. Subsequent developments shifted the focus of public administration beyond governmental organizations to public governance, emphasizing collaboration among government, the private sector, and civil society in delivering public services and addressing collective problems (Dwiyanto, 2007; Utomo, 2007). In the context of urban flooding, public administration views flood mitigation not merely as a matter of engineering infrastructure but as a governance issue requiring cross-sectoral coordination, institutional capacity, and sustained community participation.

From a public policy perspective, flooding is regarded as a collective problem that requires systematic government intervention through well-formulated, effectively implemented, and continuously evaluated public policies. Anderson (1990) defines public policy as a series of actions undertaken by government to address public problems, whereas Dye (1981) describes public policy as whatever governments choose to do or not to do. Abdul Wahab (2008) argues that public policy is a continuous process encompassing policy formulation, implementation, and evaluation. Accordingly, policy success depends not only on sound policy formulation but also on effective implementation, which is influenced by communication, resources, bureaucratic structure, and the commitment of implementing agencies, as proposed by Edwards III (1980). Furthermore, Van Meter and Van Horn (1975), Mazmanian and Sabatier (1983), and Grindle (1980) emphasize that successful policy implementation is determined by the clarity of policy objectives, organizational capacity, socio-political support, and inter-organizational coordination.

Policy evaluation constitutes a critical stage in the public policy cycle because it assesses the extent to which policies achieve their intended objectives while providing feedback for future policy improvement. According to Dunn (2018), policy evaluation extends beyond measuring policy outcomes to clarifying the value, usefulness, and relevance of public policies in addressing societal problems. Dunn's evaluation framework is among the most widely applied approaches in policy analysis because it integrates six principal evaluation criteria: effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness. These dimensions enable a comprehensive assessment by examining not only policy outputs but also outcomes and broader societal benefits. This perspective is consistent with the views of Jones (1975), Winarno (2013), and Lester and Stewart (2007), who regard policy evaluation as a systematic process of measuring policy performance, analyzing empirical evidence, and formulating recommendations for policy improvement. Accordingly, this study adopts William N. Dunn's public policy evaluation

framework as the principal analytical framework for evaluating flood mitigation policy in Samarinda City.

METHODOLOGY

This study employed a qualitative approach with a phenomenological research design to gain an in-depth understanding of the meanings, processes, and experiences of stakeholders involved in the implementation of flood mitigation policy in Samarinda City, Indonesia. A phenomenological approach was selected because it enables researchers to explore the realities underlying policy implementation and to understand how public policies are perceived, implemented, and evaluated by the actors directly involved (Creswell & Creswell, 2018; Anggito & Setiawan, 2018; Sugiyono, 2018). The research was conducted in Samarinda City, East Kalimantan Province, from January to June 2025, considering the city's persistent flood vulnerability and its designation of flood mitigation as one of its regional development priorities.

The study utilized both primary and secondary data sources. Primary data were collected through field observations, in-depth interviews, and document review. Informants were selected using purposive sampling based on their relevance to and involvement in flood mitigation policy. They included representatives from the Samarinda City Government, the Regional Disaster Management Agency (BPBD), the Public Works and Spatial Planning Agency (PUPR), the Regional Development Planning, Research, and Innovation Agency (Bapperida), academics, community leaders, journalists, and residents living in flood-prone areas. In addition, road users with direct experience of flood events, including ride-hailing drivers, were interviewed to provide further insights into the policy's impact on urban mobility. Secondary data were obtained from policy documents, government reports, BPBD archives, publications issued by the Central Statistics Agency (BPS), and relevant scientific literature.

The data were analyzed using thematic analysis through an iterative process of data reduction, data display, and conclusion drawing, following the analytical framework proposed by Miles, Huberman, and Saldaña (2014). Policy evaluation was conducted using William N. Dunn's (2018) public policy evaluation framework, which consists of six evaluation criteria: effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness. To ensure the trustworthiness of the findings, source triangulation, methodological triangulation, and document triangulation were employed, thereby enhancing the credibility, consistency, and validity of the research findings.

RESEARCH RESULT AND DISCUSSION

Effectiveness

Effectiveness is a fundamental dimension of policy evaluation that reflects the extent to which a policy achieves its intended objectives. According to Dunn (2018), effectiveness refers to the degree to which a policy successfully produces the expected policy outcomes in accordance with its predefined goals. Therefore, policy effectiveness is assessed not only by the implementation of programs or the amount of budget allocated but also by the tangible improvements

experienced by the target beneficiaries. The findings of this study indicate that the flood mitigation policy implemented in Samarinda City during the 2021–2024 period has generally fulfilled the effectiveness criterion. A total of 79.2% of respondents reported that flood conditions had improved compared with previous years, particularly in areas targeted by the Modern Drainage Development Program. Most respondents also stated that the duration of flood inundation had been substantially reduced, allowing economic activities and urban mobility to resume with significantly fewer disruptions. These findings suggest that the short-term objective of the policy – namely, reducing flooding in priority locations – has largely been achieved.

These findings are further supported by in-depth interviews with academics, community leaders, members of the Regional House of Representatives (DPRD), journalists, and representatives of civil society organizations, all of whom acknowledged that the construction of the modern drainage system has produced tangible improvements in flood conditions within the targeted areas. Nevertheless, most informants emphasized that these positive outcomes remain spatially limited and have not yet benefited the entire city. Field observations revealed significant reductions in both flood depth and inundation duration in several major locations, including Lembuswana Intersection, Sempaja Intersection, Alaya Intersection, Gatot Subroto Street, S. Parman Street, and Dr. Sutomo Street. In contrast, other areas such as Bengkuring, Rapak Dalam, Mugirejo, and Damanhuri continue to experience recurrent flooding due to a combination of hydrological factors, river sedimentation, upstream flood inflows, and the ongoing decline of water catchment areas. These findings indicate that the effectiveness of the modern drainage program is strongly influenced by local geographical and hydrological characteristics and, therefore, cannot serve as a stand-alone solution for comprehensive urban flood management.

The findings of this study are consistent with Edwards III's (1980) policy implementation theory, which argues that successful policy implementation is determined by four key factors: communication, resources, the disposition of implementers, and bureaucratic structure. In the present study, the commitment of the Samarinda City Government to prioritizing flood mitigation has been translated into increased investment in modern drainage infrastructure and improved coordination among local government agencies. However, the effectiveness of policy implementation continues to be constrained by external factors, including land-use change, urban expansion, mining activities, and increasing surface runoff. These findings are also consistent with the implementation model proposed by Van Meter and Van Horn (1975), which emphasizes that policy implementation is influenced not only by the capacity of implementing organizations but also by the broader social, economic, and political environment. Therefore, the effectiveness of flood mitigation policy depends not only on the quality of physical infrastructure but also on the government's ability to address the external factors that shape urban flood risk.

The results are further supported by previous studies on flood governance. Bappenas (2010) reported that effective flood management in

Indonesia requires not only infrastructure development but also cross-sectoral coordination, institutional strengthening, and active community participation. Similarly, Astuti and Warsono (2020) argued that local communities should be positioned as active stakeholders rather than passive beneficiaries in flood management, indicating that policy success cannot rely solely on government intervention. Likewise, Morrison et al. (2018), in the *Journal of Flood Risk Management*, emphasized that modern flood management should integrate structural measures with a flood resilience governance approach, as infrastructure alone is unlikely to achieve sustainable long-term outcomes without adaptive governance. Furthermore, the OECD (2019) highlighted that effective flood governance depends on clear institutional responsibilities, strong inter-agency coordination, institutional capacity, and policy coherence across the sectors of spatial planning, environmental management, and water resources management. Institutional fragmentation has been identified as one of the principal causes of ineffective flood mitigation policies in many countries. Consequently, the improvements observed in several flood-prone areas of Samarinda City indicate enhanced implementation capacity, although stronger cross-sectoral coordination remains necessary to ensure that the benefits of flood mitigation policies are distributed throughout the entire city.

Overall, the findings demonstrate that the 2021–2024 flood mitigation policy in Samarinda City has fulfilled the effectiveness criterion of William N. Dunn's policy evaluation framework, as reflected by measurable reductions in flood frequency, inundation depth, and flood duration within priority areas, as well as positive public perceptions of policy performance. Nevertheless, these achievements remain geographically limited and have not yet resolved the city's flood problems comprehensively. The findings reinforce the argument that successful flood mitigation requires an integrated flood governance approach that combines modern drainage development with river normalization, watershed rehabilitation, land-use control, retention basin construction, institutional capacity building, and active community participation in flood risk management. Such an integrated approach is also recommended under the OECD Water Governance Principles, which emphasize coordinated, adaptive, and sustainable governance as the foundation for improving the long-term effectiveness of flood mitigation policies.

Efficiency

Efficiency is one of the principal dimensions of policy evaluation, measuring the relationship between the resources utilized and the outcomes achieved. According to Dunn (2018), efficiency refers to the extent to which policy objectives are accomplished with the minimum possible use of resources or by generating the greatest benefits relative to the costs incurred. In the context of public policy, efficiency is assessed not merely by the amount of budget expenditure but also by the relationship between policy costs, outputs, and the outcomes delivered to society. Consequently, a policy may be considered effective without necessarily being efficient if its achievements are attained through disproportionately high expenditures. The findings of this study

indicate that although the Modern Drainage Development Program has successfully reduced flood inundation in several priority areas, most informants considered the policy to be insufficiently efficient from a budgetary perspective. This assessment was based on the substantial public investment made relative to the limited geographical coverage of flood mitigation and the continued occurrence of flooding in many parts of the city.

An analysis of budget data revealed that during the 2021–2024 period, the Samarinda City Government allocated approximately IDR 1.52 trillion for the construction of the modern drainage system, resulting in the development of approximately 327,842 meters of drainage infrastructure. Based on a simple calculation, the average construction cost amounted to approximately IDR 4.64 million per meter of drainage. Although these physical achievements are substantial, interviews with academics, members of the Regional House of Representatives (DPRD), and community leaders revealed that the benefits of the policy have not been distributed evenly, as most infrastructure development has remained concentrated in selected priority areas. Several informants further argued that the increased investment has not been fully proportional to the reduction of flood risk at the city-wide level. These findings suggest that the policy has not yet achieved optimal efficiency, as the considerable increase in public expenditure has not generated benefits that are proportionate to the scale of flooding experienced across the entire urban area.

The findings are consistent with Dunn's (2018) policy evaluation framework, which emphasizes that efficiency should be assessed by comparing the costs incurred with the benefits generated by a policy. From a policy implementation perspective, efficiency also reflects the government's ability to allocate resources appropriately while minimizing waste. The OECD (2019) argues that efficient flood governance requires sustainable financing mechanisms, a clear regulatory framework, reliable data utilization, and effective inter-agency coordination to ensure that every public investment generates optimal social benefits. Conversely, policy fragmentation, weak institutional coordination, and poorly aligned investment priorities often increase the costs of flood mitigation without corresponding improvements in policy performance.

The findings of this study are further supported by previous research on flood governance. Morrison, Westbrook, and Noble (2018) argued that investments in flood control infrastructure are unlikely to achieve optimal efficiency unless they are integrated within an adaptive and resilience-based governance framework (flood resilience governance). Their study demonstrated that infrastructure development alone provides only short-term benefits unless it is accompanied by watershed management, spatial planning control, and effective cross-sectoral coordination. Similarly, Bappenas (2010) identified that flood mitigation programs in Indonesia frequently suffer from inefficiency due to weak institutional coordination, inadequate synchronization of development planning, and limited community participation. The findings of the present study reveal a comparable situation in Samarinda City, where the construction of the modern drainage system has produced tangible benefits in selected locations but has not yet maximized the overall return on public investment

because several underlying structural factors remain insufficiently addressed through an integrated policy approach.

Based on these findings, it can be concluded that the flood mitigation policy of Samarinda City has not yet fully satisfied the efficiency criterion of William N. Dunn's policy evaluation framework. Although the program has generated significant improvements in priority areas, the substantial public investment has not yet produced benefits that extend across all flood-prone areas of the city. Therefore, improving policy efficiency in future flood mitigation efforts requires adopting a value-for-money approach by prioritizing investments based on flood risk, integrating modern drainage development with river normalization and retention basin construction, strengthening cross-sectoral coordination, and incorporating cost-benefit analysis into policy decision-making. Such an approach would enable every public expenditure on flood mitigation to generate broader, more sustainable public benefits while adhering to the principles of effective and efficient flood governance.

Adequacy

Adequacy is a policy evaluation dimension that assesses the extent to which policy outcomes are capable of addressing or reducing the public problems targeted by the policy. According to Dunn (2018), adequacy is concerned not only with whether policy objectives have been achieved but also with whether the level of achievement is sufficient to resolve the underlying problems faced by society. Consequently, a policy may be considered effective because it produces measurable improvements, yet it cannot be regarded as adequate if those improvements fail to comprehensively address the problem. The findings of this study indicate that the flood mitigation policy in Samarinda City has generated positive impacts through the construction of modern drainage systems, channel normalization, and increased drainage network capacity in several priority areas. Nevertheless, most informants considered these achievements insufficient to address flood problems at the citywide level, as recurrent flooding continues to occur in several areas, particularly those affected by upstream flooding, river sedimentation, the reduction of water catchment areas, and land-use change.

Field observations revealed that the modern drainage system has successfully reduced flood depth and accelerated water recession along several major roads. However, these benefits have not been experienced equally by residents living in suburban areas or locations with different hydrological characteristics. Interviews with community members and key stakeholders indicated that flooding in Samarinda is no longer attributable solely to inadequate drainage capacity but is also driven by increasing surface runoff resulting from rapid urbanization, upstream mining activities, river channel narrowing, and the conversion of water catchment areas. These findings suggest that while government interventions have produced measurable improvements, they remain insufficient to keep pace with the growing complexity of flood drivers. This finding is consistent with Dunn's (2018) policy evaluation framework, which argues that adequacy should be assessed based on a policy's

ability to reduce the magnitude of the underlying problem rather than merely producing program outputs.

The findings of this study are supported by a growing body of international literature on flood risk governance. The OECD (2019) emphasizes that effective flood management policies require a combination of structural measures—such as drainage systems, levees, and retention ponds—and non-structural measures, including spatial planning, regulatory strengthening, institutional coordination, and community participation. Reliance on a single type of intervention is unlikely to produce adequate policy responses to the increasingly complex dynamics of flood risk. The OECD further argues that a hybrid flood governance approach, which integrates policy, institutional arrangements, and physical infrastructure, is significantly more effective in enhancing regional flood resilience than an approach focused solely on engineering solutions. Likewise, Morrison et al. (2018) emphasize that contemporary flood governance requires the integration of technical, ecological, social, and institutional dimensions to achieve sustainable flood resilience.

The results of this study are also consistent with the findings of Bappenas (2010), which reported that the limitations of flood mitigation efforts in Indonesia are primarily attributable not to insufficient infrastructure development but to weak inter-agency coordination, poor integration of spatial planning policies, and limited community participation. Similarly, Astuti and Warsono (2020) argue that successful flood management largely depends on the capacity of local communities to support policy implementation. From a governance perspective, Alexander, Priest, and Mees (2018) developed a flood risk governance evaluation framework that conceptualizes policy adequacy as the outcome of a balance among effectiveness, efficiency, legitimacy, and resilience. They contend that a policy cannot be regarded as adequate if it merely reduces flooding in selected locations without enhancing the overall capacity of the system to cope with future flood risks.

Based on the overall findings and discussion, it can be concluded that the flood mitigation policy of Samarinda City has not yet fully satisfied the adequacy dimension of William N. Dunn's policy evaluation framework. Although the Modern Drainage Development Program has made a significant contribution to reducing flooding in several priority areas, its benefits remain insufficient to comprehensively address the city's flood problems. Therefore, improving policy adequacy requires the adoption of an integrated flood governance approach by synchronizing drainage development with watershed rehabilitation, land-use control, conservation of water catchment areas, strengthened environmental regulations, and enhanced cross-sectoral and multi-level governmental coordination. Such an integrated approach is expected to strengthen the capacity of flood mitigation policies to address the increasingly complex flood risks driven by climate change and rapid urbanization.

Equity

Equity in policy evaluation refers to the extent to which the benefits of a policy are distributed fairly among all target groups without creating disparities

between social groups or geographic areas. According to Dunn (2018), a policy fulfills the equity criterion when both its benefits and burdens are allocated proportionally according to the needs of the community. The findings of this study indicate that the Modern Drainage Development Program in Samarinda has generated tangible benefits in several areas that have historically experienced severe flooding, including Simpang Lembuswana, Jalan S. Parman, Jalan Gatot Subroto, and the city center. However, interviews with community members, academics, and local leaders revealed that these benefits have not been distributed evenly across the city. Several peripheral areas, such as Bengkuring, Mugirejo, Rapak Dalam, and parts of North Samarinda, continue to experience flooding of relatively high intensity. These findings suggest that the distribution of policy benefits remains influenced by development priorities and the fiscal constraints of the local government, resulting in unequal access to flood protection across different communities.

These findings indicate that the local government has adopted a priority-based intervention strategy by concentrating infrastructure development in areas characterized by high flood vulnerability and significant economic activity. While such an approach may be justified from the perspective of resource efficiency, it still creates disparities in the distribution of policy benefits from an equity perspective. Alexander, Priest, and Mees (2016) argue that effective flood risk governance should not only emphasize effectiveness and efficiency, but also uphold the principles of legitimacy and equity, ensuring that all segments of society receive fair and adequate protection from flood risks. Their flood risk governance evaluation framework identifies equity as a key indicator of successful public policy because unequal distribution of policy benefits may generate new forms of vulnerability and erode public trust in government.

The findings of this study are also consistent with previous research on flood governance. The OECD (2019) emphasizes that the equitable distribution of benefits derived from flood management policies requires cross-sectoral coordination, transparent priority-setting processes, and inclusive decision-making mechanisms to ensure that policy interventions benefit not only selected areas but all vulnerable communities. Similarly, Mees et al. (2018) argue that involving citizens in policy formulation and implementation enhances the fairness of benefit distribution while strengthening the legitimacy of public policies. In the Indonesian context, Bappenas (2010) identified that inequalities in the benefits of flood mitigation programs are often caused by weak integration between spatial planning policies, watershed management, and infrastructure development. A similar pattern was observed in Samarinda City, where the construction of modern drainage systems has successfully reduced flooding in several locations but has not yet adequately addressed the needs of rapidly growing residential areas on the urban periphery.

Based on the overall findings and discussion, it can be concluded that the equity dimension of the flood mitigation policy in Samarinda City has not yet been fully achieved. Although the local government has successfully delivered the benefits of infrastructure development to priority areas, these benefits have not been distributed evenly across all flood-prone areas. Consequently, future

flood mitigation policies should adopt an integrated and equitable flood governance approach that combines technical priorities with the principle of spatial equity. Such an approach would ensure that public investment is directed not only toward strategically important urban areas but also toward providing greater protection for communities with high levels of flood vulnerability. Ultimately, this strategy is expected to strengthen the legitimacy of public policy while enhancing the quality and sustainability of flood governance in Samarinda City.

Responsiveness

Responsiveness refers to the government's ability to recognize community needs, respond promptly to emerging problems, and formulate policies that reflect public expectations. Within the policy evaluation framework, Dunn (2018) defines responsiveness as the extent to which policy outcomes address the preferences, needs, and aspirations of target groups. The findings of this study indicate that the flood mitigation policy in Samarinda City has demonstrated improved responsiveness compared with previous administrations. This improvement is reflected in the designation of flood control as a regional development priority, accompanied by increased budget allocations, accelerated construction of modern drainage systems, drainage channel normalization, and the mitigation of flood-prone locations that had long been major public concerns. Interviews with affected residents revealed that the local government has become more responsive in addressing reports of flooding, conducting drainage maintenance, and expediting infrastructure development in high-risk areas. Nevertheless, several informants noted that government responsiveness has not yet been evenly distributed, as some residential areas continue to experience considerable delays before receiving comparable interventions.

These findings suggest that policy responsiveness is influenced not only by the bureaucracy's capacity to respond to public complaints but also by the government's ability to translate public needs into implementable policy programs. From the perspective of public administration, responsiveness is regarded as a fundamental indicator of good governance, as it reflects a government's commitment to serving the public interest (Denhardt & Denhardt, 2015). Likewise, the OECD (2019) emphasizes that responsive flood governance requires effective two-way communication mechanisms, transparency in information sharing, stakeholder engagement, and robust monitoring and evaluation systems that enable governments to adapt policies to evolving flood risks. Regular policy evaluation allows governments to identify implementation shortcomings and make evidence-based policy adjustments, thereby ensuring that flood mitigation policies remain relevant to changing environmental conditions and the evolving needs of society.

The findings of this study are also consistent with previous research on flood governance. Bappenas (2010) emphasizes that low policy responsiveness is often attributable to weak inter-agency coordination and limited public participation in decision-making processes. Similarly, Mees et al. (2018) argue that involving communities throughout the policy cycle—from planning to

evaluation—enhances policy legitimacy while strengthening public trust in government. Likewise, Alexander, Priest, and Mees (2016) contend that effective flood risk governance should be built upon mutual trust, transparency, and meaningful community engagement, enabling policies to achieve not only technical effectiveness but also broad social acceptance. The findings from Samarinda City indicate that improved communication between the local government and the community has enhanced public perceptions of governmental performance. Nevertheless, more systematic mechanisms for public participation are still required to ensure that community perspectives are adequately incorporated into the prioritization of flood mitigation measures.

Based on the overall findings of this study, it can be concluded that the responsiveness dimension of the flood mitigation policy in Samarinda City has shown positive progress but has not yet reached an optimal level. The local government has demonstrated an increased capacity to respond to community needs through the acceleration of infrastructure development and improved public services in flood-prone areas. However, the equitable distribution of these responses remains a significant challenge. Therefore, enhancing policy responsiveness in the future will require strengthening public complaint and feedback mechanisms, integrating technology-based flood information systems, conducting regular policy monitoring and evaluation, and expanding community participation in both planning and oversight processes. Such measures are expected to strengthen governmental capacity to formulate more adaptive, participatory, and citizen-oriented policies, in line with the principles of good flood governance.

Appropriateness

Appropriateness is a policy evaluation dimension that assesses the extent to which a policy appropriately aligns public problems, policy objectives, policy instruments, and the outcomes achieved. According to Dunn (2018), a policy is considered appropriate when it substantively addresses the root causes of public problems rather than merely alleviating their visible symptoms. The findings of this study indicate that the flood mitigation policy implemented in Samarinda City demonstrates a relatively high level of appropriateness. The local government successfully identified flood-prone priority areas and translated these priorities into the Modern Drainage Development Program, drainage channel normalization, drainage rehabilitation, and the expansion of flood control infrastructure capacity. Field observations revealed that areas that had experienced persistent flooding for many years recorded significant reductions in both flood depth and inundation duration following the implementation of these programs. However, interviews with academics, community members, and other stakeholders also revealed that the appropriateness of the policy remains constrained because the current approach focuses primarily on downstream flood mitigation. Fundamental issues—including land-use change, watershed (DAS) degradation, sedimentation of the Karang Mumus River, upstream mining activities, and the continuous loss of water catchment areas—have not yet been addressed through a fully integrated strategy. Consequently, although the

existing policy instruments have been appropriate in mitigating the short-term impacts of flooding, they have not been sufficiently comprehensive to address the principal underlying causes of flooding in Samarinda City.

These findings suggest that policy appropriateness is largely determined by the government's capacity to establish integration across programs and among multiple stakeholders. From the perspective of policy evaluation, Dunn (2018) argues that appropriateness concerns the alignment between community needs, the selection of policy instruments, and the public values that the policy seeks to achieve. This perspective is consistent with the OECD (2019), which emphasizes that effective flood governance should be developed through the integration of spatial planning, water resources management, climate change adaptation, and multi-level governmental coordination, ensuring that policy interventions are not only reactive but also preventive and sustainable. The OECD further highlights that a hybrid flood governance approach—combining grey infrastructure, nature-based solutions, regulatory instruments, and active community participation—is more appropriate for addressing the complex nature of urban flooding than approaches that rely exclusively on physical infrastructure development.

The findings of this study are also consistent with previous research on flood governance. Bappenas (2010) concluded that the limited effectiveness of flood mitigation policies in many regions of Indonesia is primarily attributable to the lack of integration among technical measures, institutional arrangements, spatial planning, and community participation within a unified policy framework. Similarly, Alexander, Priest, and Mees (2016) argue that flood risk management policies are more likely to be appropriate and effective when they are designed according to local geographical characteristics, institutional capacity, and community vulnerability, ensuring that selected policy instruments adequately address local needs. Likewise, Mees et al. (2018) demonstrate that involving communities throughout the planning, implementation, and evaluation stages enhances policy appropriateness because policy decisions are informed by the experiences and actual needs of affected communities. In the context of Samarinda City, the findings indicate that the Modern Drainage Development Program represents an appropriate policy instrument for reducing urban flooding in the city center. However, achieving comprehensive flood mitigation requires its integration with watershed rehabilitation, land-use control, regulation of mining activities, conservation of water catchment areas, and strengthened collaboration among stakeholders. These findings suggest that policy appropriateness depends not only on selecting suitable intervention programs but also on developing an integrated governance system capable of coordinating multiple policy instruments in a sustainable manner.

Based on the overall findings and discussion, it can be concluded that the appropriateness dimension of the flood mitigation policy in Samarinda City has demonstrated substantial progress, although it has not yet reached an optimal level. The Modern Drainage Development Program has been appropriate in addressing flooding problems within priority areas; however, it has not yet comprehensively addressed the structural factors responsible for the recurring

flood events. Therefore, improving policy appropriateness in the future requires strengthening an integrated flood governance approach through the synchronization of flood mitigation policies, spatial planning, watershed management, environmental conservation, regulation of mining activities, and data-driven monitoring and evaluation systems. Such an integrated approach is expected to produce policies that are not only effective in mitigating current flood impacts but also appropriately designed to enhance the long-term flood resilience of Samarinda City in the face of future flood risks.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings and discussion presented in this study, several conclusions can be drawn.

1. The Flood Mitigation Policy of Samarinda City (2021–2024), implemented through the Modern Drainage Development Program, has fulfilled the effectiveness criterion of William N. Dunn's policy evaluation framework. The program has successfully reduced flood depth, inundation duration, and flood frequency in several priority areas. This achievement is further supported by positive public perceptions and the finding that the policy generally satisfies the appropriateness criterion, indicating that the selected policy instruments are suitable for addressing short-term flood problems in targeted locations.
2. Despite these positive outcomes, the policy's effectiveness remains partial and spatially uneven, as its benefits are largely confined to areas included in the program. The policy has not yet comprehensively addressed the broader and more complex drivers of flooding in Samarinda, including watershed degradation, land-use change, declining water catchment capacity, and upstream environmental pressures.
3. According to William N. Dunn's policy evaluation framework, the policy has not yet fulfilled the criteria of efficiency, adequacy, and equity. The findings indicate that public investment has not yet generated proportional benefits across the entire city, the implemented measures remain insufficient to comprehensively resolve flood problems, and the distribution of policy benefits has not been equitable among flood-prone communities. These findings suggest that future flood mitigation policies should move beyond infrastructure-oriented interventions toward an integrated flood governance approach that combines structural and non-structural measures, strengthens cross-sectoral coordination, enhances community participation, and promotes sustainable urban resilience.

ADVANCED RESEARCH

The evaluation of Samarinda City's Flood Mitigation Policy (2021–2024) demonstrates that the Modern Drainage Development Program has achieved measurable progress in reducing flood depth, duration, and frequency within priority intervention areas, thereby fulfilling the effectiveness and, to a considerable extent, the appropriateness criteria of William N. Dunn's policy evaluation framework. Nevertheless, these achievements remain geographically

limited and insufficient to address the systemic and multidimensional nature of urban flooding, which is driven by watershed degradation, uncontrolled land-use change, declining water catchment capacity, and upstream environmental pressures. Furthermore, the policy has yet to satisfy the criteria of efficiency, adequacy, and equity, as the distribution of benefits remains uneven, the overall impacts are not proportional to public investment, and the interventions have not comprehensively resolved flood risks across the city. These findings underscore the necessity for a paradigm shift from predominantly infrastructure-based flood mitigation toward an integrated and adaptive urban flood governance model that synchronizes structural and non-structural strategies, reinforces interinstitutional collaboration, expands community participation, and prioritizes long-term ecological sustainability and urban resilience.

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