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Article

One river, one planning, and one integrated management policy for flood-free

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ABSTRACT

Greater Jakarta, a densely populated metropolitan area, continues to face persistent and complex flooding challenges. Despite flood control efforts in the environmental sector, these initiatives remain fragmented and lack integration. This research aims to integrate river management policies to reduce flood risks in Greater Jakarta, a critical economic region. By developing a cohesive approach, the study seeks to formulate effective mitigation strategies focused on sustainable river management planning, enhanced coordination among stakeholders, and the development of adaptive flood management solutions. The research proposes an innovative model for integrated flood management under the concept of "One River, One Planning, One Integrated Management," which addresses the fragmentation of river management through a holistic approach. This model incorporates key aspects such as groundwater resources, sanitation, and agricultural irrigation. The study employs an Explanatory Sequential Design methodology, integrating quantitative and qualitative data analysis in two stages. In the first stage, quantitative data were collected through surveys with 350 respondents from seven areas in Greater Jakarta, representing diverse community demographics. In the second stage, qualitative data were gathered through interviews with seven heads of the Environmental Agency (DLH) across these regions, as well as group discussions with 25 representatives from government, academia, and Watershed Forums. The research utilizes multiple indicators to assess the effectiveness of the proposed policy model, including technical infrastructure, stakeholder coordination, and community participation. The findings suggest that integrated flood management strategies can enhance collaboration among stakeholders, improve flood mitigation practices, and strengthen the capacity of the River Authority Agency (BOS) in Greater Jakarta. Statistical results and qualitative insights from the study highlight the potential for policy innovation, particularly in fostering inter-agency collaboration. The research's main outputs include a Sinta 2 Journal article, policy briefs, intellectual property rights (IPR), and proposals to the government for strengthening flood management frameworks. The study demonstrates practical contributions to flood management, providing actionable insights for improving policy implementation and coordination across multiple governance levels.

Keywords:

Environmental administration
Integrated policy
River management
Flood
Jabodetabek

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Introduction

Research Background.

Greater Jakarta, as the economic and government center of Indonesia, faces significant challenges in environmental management, particularly regarding floods. Geographically, this region has topographic characteristics are prone to flooding, exacerbated by high rainfall and climate change (Sharma et al., 2021). Population growth and rapid urbanization have led to substantial land conversion, reducing water absorption capacity and escalating flood risk (Nguyen et al., 2021; Ridwan & Sarjito, 2024). Additionally, sedimentation and the accumulation of river garbage contribute to flood risk (Izzatusholekha, 2023). Floods in Greater Jakarta in addition to causing material losses, also negatively impact public health, economic activities, and social stability (Ratnaningsih et al., 2023).

So far, flood control efforts in Greater Jakarta have often been sectoral and poorly coordinated (Wulandari & Salam, 2022). River management as a flood control effort has not been overshadowed by inadequate, fragmented regulations, inconsistent planning, and inconsistent policy implementation have hampered the effectiveness of flood management. Therefore, a more holistic and integrated approach to environmental administration is needed, involving all stakeholders and integrating various aspects of spatial management including integrated watershed management (Han et al., 2022).

Despite numerous efforts, existing studies largely address flood management from narrow, one-dimensional perspectives, focusing either on technical aspects or social dynamics, but rarely both. These studies often fail to offer integrated solutions that consider the interaction between policy implementation, stakeholder coordination, and community participation. This research seeks to fill these gaps by employing a mixed-methods approach, combining quantitative and qualitative data to evaluate flood risk and management strategies more comprehensively. By doing so, it aims to test the effectiveness of the integrated flood management model proposed in this study.

Figure 1 Factual Floods (Research Team Collection, 2024/2025), it is often seen that vehicles that are desperate to break through floods will break down on the road, if two-wheelers are forced to cross the flood after breaking down.

Based on these problems, this environmental administration research will develop flood control regulations with an integrated management approach of one River, one Planning and one Integrated Management. This is in accordance with the concept of the Sustainable Development Goals (SDG's) improving sanitation with proper clean water management with integrated river management (SDG's

6) and improving the impact of climate change that poses disaster risk (SDG's 13). In the national scope, this is in accordance with the Asta Cita proclaimed by the President of the Republic of Indonesia; "Strengthening the harmonious harmony of life with the environment, nature, and culture, as well as increasing tolerance between religious communities to achieve a just and prosperous society (Asta Cita to eighth). Flood control according to Asta Cita, is a strategic vision of Indonesia's development, focusing on the management of water resources to support food, energy, and environmental security (Mitra et al., 2020). In line with that, the National Research Master Plan (RIRN) also mandates to increase research in the field of disasters, especially in disaster risk reduction mitigation, emergency response, construction and disaster rehabilitation (Chun et al., 2025).

This research offers the idea of integrated environmental administration because it is in accordance with the 2024 Government Work Plan and the 7 National Priorities (PN), especially; PN 6): Building the Environment, Improving Disaster Resilience, and Climate Change (Gan et al., 2021). This research is also important because the Blue, Green, and Circular Economy has great potential and benefits for sustainable global economic development (Patrianti et al., 2020). Its implementation can manage rivers in an integrated and sustainable manner, prevent disasters and create a safe and comfortable environment for the community. In river management, programs that can be favored; Clean River Program, River Normalization, and Slum Relocation (Imawan et al., 2020; Izzatusholekha et al., 2023). Based on this, the research entitled Integrated River Management Policy Through One River, One Planning, One Integrated Management to Realize a Flood-Free Jabodetabek, is important to be carried out.

Problem Formulation.

The formulation of the environmental administration research problem is: (1) How to develop an effective and sustainable integrated flood management policy for Greater Jakarta, based on the concept of "One River, One Planning, One Integrated Management"?; (2) How to integrate community participation in an alternative model of integrated flood management, to improve the effectiveness and sustainability of flood management programs?; (3) How to evaluate the effectiveness of alternative integrated flood management models in reducing flood risk and its impact in Greater Jakarta?; (4) How to realize synergy between the central and regional governments in the implementation of an alternative model of integrated flood management?

Figure 2 Photo of Flood on the Highway, 2025 (Research Team Collection), It can be seen the joy of children playing in the flood overflow water which is certainly unhealthy, while the Trans Jakarta Bus continues to pass through flood areas that are vulnerable to danger, is a fact of the problem that integrated flood management has not been able to be realized in the Greater Jakarta area.

Research Objectives.

This study aims to develop and implement an alternative model of innovative integrated flood management policies, based on the "One River, One Planning, One Integrated Management" concept. It seeks to address the fragmentation in river management through a holistic approach that integrates various aspects of river management as a source of raw water, sanitation and support agricultural land irrigation.

In line with the problem formulation, the objectives of this research are: (1) Quantitative Objective: To measure the impact of integrated flood management policies in reducing flood risks, using indicators such as flood frequency, water quality, and infrastructure efficiency; (2) Qualitative Objective: To explore the perceptions of key stakeholders (government agencies, local communities, and academia) about the feasibility and effectiveness of the proposed integrated flood management model; (3) Integrative Objective: To integrate quantitative data on flood risk reduction with qualitative insights from stakeholder interviews and focus groups, ensuring a comprehensive understanding of the challenges and opportunities in implementing flood management strategies.

Theoretical Framework and Conceptual Hypotheses

To inform the design of research instruments and the analysis, this study adopts the Socio-Ecological Systems (SES) Framework, which connects environmental management practices with socio-economic factors and governance systems. This framework helps link the variables of river management, community participation, and inter-agency coordination. The Policy Implementation Theory (Bolognesi et al., 2021) also provides a foundation for understanding how policy design and organizational dynamics influence the success of flood management programs.

The research hypotheses are as follows: (1) Hypothesis 1 (Quantitative): The integrated flood management model will significantly reduce flood risks, as measured by the frequency and severity of flooding in the Greater Jakarta region; (2) Hypothesis 2 (Qualitative): Effective community participation and inter-agency coordination will enhance the sustainability of flood management policies, as perceived by key stakeholders; (3) Hypothesis 3 (Integrative): The integration of quantitative data with qualitative insights will provide a more comprehensive understanding of the flood management challenges in Greater Jakarta, contributing to more effective policy recommendations.

This study will use an Explanatory Sequential Design approach, where quantitative data collection will be followed by qualitative analysis to further explain and explore the results. This design was selected because it allows for the testing of hypotheses through measurable indicators, while also incorporating in-depth qualitative perspectives on policy implementation and stakeholder engagement.

Literature Review and Conceptual Framework

State-of-the-Art and Novelty

Many studies on river management and efforts to overcome flooding problems have been carried out. Some researchers have studied flooding in various countries using spatial data and remote sensing to calculate potential economic damage, such as in South Korea (Jung et al., 2023), Japan (Tanaka et al., 2022), and Chinese (Han et al., 2022)(Wang et al., 2022). Meanwhile, flood management is associated with spatial management, including rivers, being the focus of European countries such as the United Kingdom (Newson et al., 2022) Netherlands (Verweij et al., 2021)Finland (Tolkkinen et al., 2021). Research in Indonesia itself also highlights the relationship between floods and spatial data (Azzahra, 2022; Kanapi & Kanapi, 2022; Putri et al., 2023)(Harahap et al., 2023; Kurniawati et al., 2021) and the relationship between floods and river management and spatial planning (Ariyani et al., 2022; Namara et al., 2022) (Izzatusholekha, 2023). Meanwhile, other researchers linked community preparedness in dealing with disasters (Oladokun et al., 2023)(Taryana et al., 2022b). The researcher himself attributed the flood problem to weak coordination between stakeholders (Wulandari & Salam, 2022). Most previous studies have focused on flood control with a partial and unintegrated approach.

Meanwhile, flood control needs a holistic approach, starting from integrated regulations in the region, especially in river management to reduce flood risk (Tanaka et al., 2022)(Totin et al., 2021)(Du et al., 2022). This research even presents an idea that is important to be carried out for flood solutions in Indonesia, especially through the management of rivers that are flood subscriptions, and because they are most affected by the community, this research area is directed to the Greater Jakarta area as a priority for this research study.

The novelty of this environmental administration research includes: (1) Development of a comprehensive integrated alternative model, based on the concept of "One River, One Planning, One Integrated Management," which has not yet been implemented in Indonesia; (2) Active and sustainable integration of community participation in every stage of flood management, from planning to implementation and evaluation; (3) Evaluate the effectiveness of alternative models using data-driven measurable performance indicators, ensuring the sustainability of flood mitigation programs.

5-Year Research Road Map

The research track record is compiled in stages through a holistic approach to strengthen the basic arguments of this research. Environmental administration research has started from 2020 using budgeting analysis, in 2021 researchers began to focus on specific environmental problems, namely waste management and flood management coordination in 2022. The arrangement of slums as one of the factors for flooding will be studied in 2023.

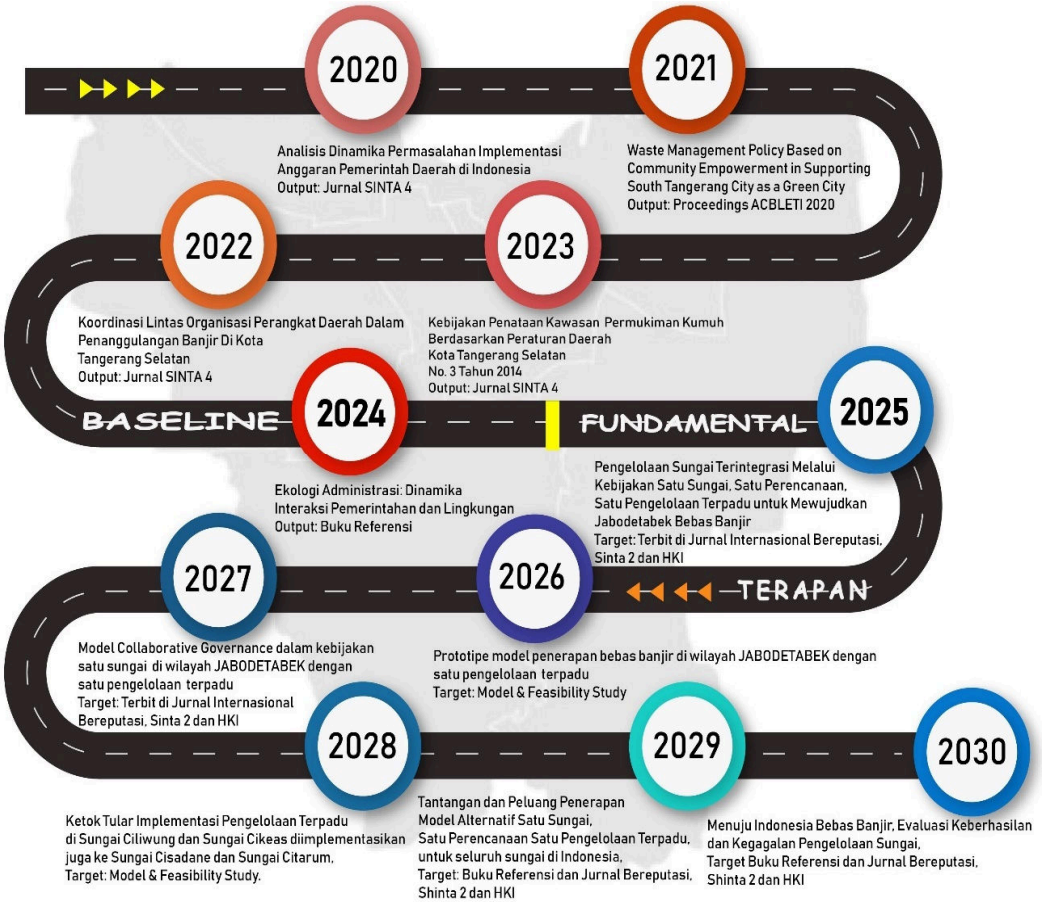

Figure 3 Research Roadmap

A more holistic approach starts in 2024 as **Baseline** in this study by focusing on a well-managed environment (Sánchez et al., 2023). The 2025 research is directed to explore fundamental ideas of river management through policy integration. The results of this research will be developed into an

integrated model that will be implemented in 2026. Meanwhile, in 2027 a model will be developed *Collaborative Governance* river management so that public participation will be seen in real terms. Model development will be carried out on rivers in the West Java region as an implementation of an integrated policy. The policy evaluation will be carried out in 2029 so as to reach the milestone of implementing integrated policies nationally in realizing a flood-free Indonesia in 2030.

Public Policy in River Management.

Government Policies and Regulations.

Law

Law Number 17 of 2019 concerning Water Resources: Although it does not explicitly mention "one river, one authority," this law strengthens the role of the central government in the management of river areas. The strengthening of the authority of the River Region Center (BBWS) as an extension of the Ministry of PUPR at the regional level is a tangible manifestation of this philosophy. BBWS is responsible for managing one or more river areas in an integrated manner, which is in line with the concept that Dr. Basuki advocates.

Scientific Speeches and Orations.

As a minister and technocrat, Dr. Basuki often conveys his strategic thoughts in various forums, both national and international. His scholarly orations or speeches, especially when receiving honorary degrees or on important occasions, became the main source.

Scientific Oration "Chasing the Lag of Water Resources Infrastructure, Increasing the Nation's Competitiveness" (2020): This oration was delivered when he received an Honorary Doctorate from the Bandung Institute of Technology (ITB). In this oration, he explained in detail the strategies and philosophies applied by the Ministry of PUPR in infrastructure development, including the importance of a holistic and integrated approach in river management. You can find a transcript or summary of this oration on the official website of the Ministry of PUPR or ITB.

Academic Studies

Study from Gajah Mada University (UGM): (1) Theoretical and Sociological Focus: UGM, especially through the Center for Water Resources Studies (PSSDA) and the Department of Civil and Environmental Engineering, often examines the institutional and socio-economic aspects of water management; (2) Sample Study: They examine how river management policies interact with indigenous peoples or local wisdom. They also analyzed the effectiveness of BBWS in terms of governance, community participation, and sustainability; (3) Related Experts: Several professors and researchers at UGM have published many journals and books on hydrology, watershed management, and hydrological disaster mitigation in Indonesia.

Study from the Bandung Institute of Technology (ITB): (1) Engineering and Innovation Focus: ITB, through the Water Resources Research Center and the Civil Engineering department, tends to focus on technical and innovative aspects; (2) Study Examples: They develop hydrological models to predict floods, design more efficient irrigation systems, and explore new technologies for water treatment and flood control. Their studies are often oriented towards practical technical solutions, such as the design of sediment control structures or reservoir operational models; (3) Related Experts: Many ITB alumni and professors are experts in the fields of hydrological engineering, environmental engineering, and regional planning. Their contribution is very felt in the design of large infrastructure in Indonesia.

In short, Dr. Basuki Hadimuljono is the figure who encourages the implementation of the River Authority Agency in terms of policy and practice, while academics from UGM and ITB provide the theoretical foundation, critical analysis, and technical innovations that support the successful implementation. The two complement each other in efforts to better manage water resources in Indonesia.

The idea of "One River, One Authority" from Dr. Basuki Hadimuljono is indeed the core of the approach to water resources management in Indonesia. However, it should be understood that this

idea is not a concept found in a single book, but a philosophy and policy that was developed and implemented during his tenure.

Expert Opinion and Global Literature

Globally, the concept and implementation of the River Basin Authority is often discussed in the context of Integrated Water Resources Management (IWRM). Some of the key experts and institutions that have studied this include:

Expert Opinion: (1) Dr. Torkil Jønch-Clausen and Prof. Asit K. Biswas of the Global Water Partnership (GWP) were key figures in popularizing IWRM, which became the philosophical foundation for the establishment of river authority bodies; (2) Researchers at institutions such as the World Bank and the United Nations Educational, Scientific and Cultural Organization (UNESCO) have also discussed river management models around the world.

Literature: (1) Publications from the Global Water Partnership (GWP), especially the guidebook on IWRM. One of their relevant papers is "Integrated Water Resources Management" (2000); (2) Reports and case studies from the World Bank and UNESCO on river basin management in various countries, such as the Autoridad del Lago Titicaca (ALT) in South America or the Mekong River Commission in Southeast Asia; (3) Academic textbooks on hydrology and water resources engineering also often include discussions about the River Authority Agency as one of the institutional solutions.

Some Previous Research

Research on the implementation of public policies has developed extensively in the study of public administration (Taryana et al., 2022a). Furthermore, Septiawan & Sujana mentioned that one of the early approaches that is widely referred to is the implementation model from Zada et al., which emphasizes the importance of clarity of policy objectives, quality of communication, and organizational support in policy implementation (Septiawan & Sujana, 2022; Zada et al., 2023). This model provides an initial framework for understanding how policies can fail or succeed depending on internal and external factors.

Another study by Roczniewska et al. (2024) in Policy Implementation shows that the more complex the policy implementation pathway is, the more likely it is that implementation failure will fail (Roczniewska et al., 2024). They emphasized that each stage of implementation must be supported by effective coordination and communication between the actors involved. This is very relevant in the context of flood management that requires cross-agency cooperation.

In the context of disaster management policies, research by McEntire (2021) highlights that an effective response to disasters depends not only on the availability of resources, but also on the readiness of the bureaucratic system and the capacity of its human resources (McEntire, 2021). This is where the importance of the role of government officials who understand their procedures, risks, and responsibilities lies in the flood disaster crisis situation.

In the past five years, many studies have highlighted the implementation of public policies, particularly in the context of disaster management. For example, research by Wijayanto (2024) examined the effectiveness of the implementation of flood management policies in Semarang City (Wijayanto, 2024). This research emphasizes the importance of the role of inter-agency coordination in increasing policy effectiveness. However, this study has not delved deeper into the aspects of the disposition of the implementers and the bureaucratic structure.

Another research was conducted by Setiawan et al. (2022) which focused on human resource analysis in the implementation of disaster mitigation policies in Bekasi Regency (Setiawan et al., 2022). This study found that the limited number and quality of human resources are the main obstacles in the implementation of the program. They recommend increased technical training and incentives for policy implementers. However, this study does not explain in detail how the bureaucratic structure and the disposition of the implementers also affect implementation.

Furthermore, Nulhaqim et al. (2022) examined the implementation of environmental policies in DKI Jakarta by emphasizing a collaborative approach between the government, the community, and

the private sector (Nulhaqim et al., 2022). This research provides important insights into the importance of public participation and information disclosure. However, this study discusses more aspects of external communication than internal bureaucracy. In fact, the success of policy implementation also depends heavily on the internal dynamics of government institutions.

Research by Riadi et al. (2021) raises the issue of bureaucratic structure in disaster risk management policy in Yogyakarta (Riadi et al., 2021). The study shows that a fragmented and unresponsive bureaucracy is a major bottleneck. Wibowo suggested organizational restructuring and decentralization of authority. However, this research approach has not adequately touched on the dimensions of communication and disposition.

Finally, a study by Shinta & Fidiana (2023) on the implementation of the Regional Regulation on climate change adaptation in Surabaya found that the main obstacle is the weak disposition of implementers (Shinta & Fidiana, 2023). Low disposition is rooted in a lack of understanding and distrust of policy effectiveness. This research makes an important contribution in highlighting the attitude of implementers, but does not relate comprehensively to the available bureaucratic and human resource structures.

Furthermore, Wahyuni (2022) emphasized the importance of competent human resources in the implementation of public policies (Wahyuni, 2022). In many cases in developing countries, failure to implement policies is often not due to weak policy formulation, but due to limited capacity of policy implementers themselves. This strengthens the importance of training and strengthening the competence of regional apparatus. The disposition of policy implementers, or their attitude and motivation towards the policies being implemented, is also an important aspect.

According to Hong et al., implementers who do not believe in the importance of a policy or do not understand its purpose will tend to carry out their tasks in a minimalist manner (Hong et al., 2022). This is a major obstacle in policy implementation that requires active participation and initiative. In the study of policy implementation at the local level, aspects of bureaucratic structure are often of primary concern. Bureaucratic structures that are too hierarchical or inflexible will hinder coordination flows, especially in emergency situations such as floods.

Cho et al. (2023) said that the ideal bureaucracy is one that is able to balance between central control and local initiatives (Cho et al., 2023). Several studies in Indonesia also show obstacles to policy implementation at the regional level. For example, a study by Ibrahim & Olii (2024) shows that bureaucratic reform has not been fully able to drive significant changes in the work culture of regional bureaucracy (Ibrahim & Olii, 2024). There are still bureaucratic practices that are procedural and less responsive to the needs of the community.

In the context of flood management, research by Ibrahim & Olii (2024) shows that local government policies tend to be reactive rather than preventive (Ibrahim & Olii, 2024). This is due to the lack of integration between regional development policies and disaster mitigation policies. Lack of coordination between sectors exacerbates the ineffectiveness of policy implementation.

The study by Pramono & Suranto (2021) also emphasizes the importance of a participatory approach in disaster management policy planning (Pramono & Suranto, 2021). Unfortunately, this approach has not been widely used at the regional level, mainly due to the limitations of human resources who understand participatory and data-driven planning methods.

A review of regulations at the regional level also shows that there are regulations that are quite adequate, but their implementation is not optimal. For example, the South Tangerang City Regional Regulation on disaster management has regulated the duties and responsibilities of each agency. However, in practice, the overlap of authority and weak supervision cause the policy not to run as it should.

The implementation of public policies is also greatly influenced by local contexts, including social, political, and cultural conditions of the community. According to Gofen & Lotta (2021), policy implementers in the field or street-level bureaucrats often interpret policies according to the

conditions they are facing, which may deviate from the original intention of the policy (Gofen & Lotta, 2021).

A study by Chen et al. (2022) on e-governance shows that information technology innovation can increase efficiency in the implementation of public policies, especially in terms of coordination and reporting (Chen et al., 2022). However, the main challenge in the regions is uneven infrastructure and digital literacy.

The literature on disaster management also highlights the importance of collaboration between stakeholders, including communities. The collaborative model as described by Bryson, Crosby, and Stone (2006) emphasizes that handling complex problems such as flooding requires cross-agency and sectoral cooperation, not just government responsibility (Kalutotage et al., 2025). In recent developments, an adaptive approach has emerged in policy implementation that encourages flexibility and continuous learning during the implementation process. This was introduced by Kuhl (2021) who emphasized the importance of continuous evaluation and the ability to respond to dynamics in the field (Kuhl, 2021).

Previous research by Atanga (2020) on flood management in urban areas showed that local leadership factors also play a big role (Atanga, 2020). Leaders who have vision and the ability to mobilize resources tend to be more successful in encouraging the effectiveness of regional policy implementation.

Based on a literature review, there are many factors that cause the difficulty of implementing policies in flood disaster management. The conceptual foundation presented in this analysis will allow future research to investigate the implementation of flood control strategies in Greater Jakarta more carefully. This research aims to improve knowledge and practice of implementing regional policies by utilizing previous ideas and results.

Table 1. Comparison of Previous Research

Research Title	Researcher, Publication Media, and Year	Research Objectives	Conclusion	Suggestions or Weaknesses	Comparison
Implementation of Flood Management Policy in South Tangerang City	Nuraini & Rahman, Public Administration Studies, 2025	Review the implementation of countermeasures policies flood	Lack of synergy between institutions	Need coordination and risk mapping	Local study
Evaluation of Flood Management in Jakarta Jakarta	Astuti, UI Dissertation, 2020	Evaluation of river normalization program	Socially unsustainable	Need for a grounded approach community	Metropolitan scale
Flood Risk Reduction Strategy	Junaedi, Journal of Policy Science, 2021	Analyze the reduction strategy A risk	Minimal community involvement	Increase disaster literacy	Participatory perspective
Flood Risk Management and Urban Planning	Kim et al., Int. J. Disaster Resilience, 2022	Integration of urban planning and mitigation flood	Spatial planning has not responded to risks	Risk-based zoning needs	Global perspective
Community-based Flood Early Warning System	Nguyen et al., Int. J. Environmental Res, 2021	Effectiveness of the warning system early	Success if it is local-based	Technology must be adaptive	Warning system

Research Title	Researcher, Publication Media, and Year	Research Objectives	Conclusion	Suggestions or Weaknesses	Comparison
Spatial Policy in Flood Control	Rahayu, Journal of Urban Planning, 2020	Spatial policy review	Weak implementation in the regions	Need for synchronization between policies	Spatial regulation
Urban Flood Policy Effectiveness	Zhang et al., Cities Journal, 2023	Evaluation of flood policies in China's major cities	Effective if data-driven	Monitoring is still low.	International learning
Mitigating Flooding Based on Vegetation	Sutrisno, Journal of Forestry Indonesia, 2022	The role of vegetation in Flood Control	Effective in the long run	Need cross-sector support	Ecological alternatives
The role of BPBD in Flood Preparedness	Anwar, Journal of State Administratio, 2019	Readiness evaluation Local Agencies	Lack of training and logistics	Improve risk management	Institutional studies
Disaster Risk Reduction and Urban Governance	Sato et al., Urban Affairs Review, 2022	Governance relationship and Reducing the Risk	Adaptive governance is crucial	Need horizontal integration	Governance perspective
Analysis of Community Behavior towards the Threat of Flooding	Raymond, Journal of Social Psychology, 2021.	Risk perception and preparedness	Low risk understanding	Culture-based socialization	Behavioral focus
Flood Disaster Governance in Southeast Asia	Tan et al., Asian Journal of Env. Management, 2020	Flood policy review of countries ASEAN	Many institutional challenges	The need for cross-border cooperation	Regional scale
Public Participation in Flood Policy	Irawati, Journal of Government Science, 2023	Citizen participation rate	Low participation due to Limited info	Public education	Social aspects
Analysis of the Impact of Floods on the Local Economy	Wahyuni, Journal of Economics Development, 2019	The impact of floods on MSMEs	Significant decline in revenue	The need for disaster insurance	Economic perspective
Flood Risk Mapping using GIS	Ali et al., Geospatial Journal, 2023	Mapping of the risk of using can GIS	Effective for mitigation	Limitations of field data	Spatial modeling
Community Adaptation to Change Climate and Flooding	Maharani, Journal of Social Ecology, 2020	Local strategies in dealing with Flood Pi	Communities are not ready for extreme climates	Climate adaptation training	Climate & flooding
Implementation Analysis Integrated Drainage System	Rahmat, UGM Dissertation, 2022	System efficiency Urban drainage	Lots of blockages on the main track	Need periodic drainage audits	Urban infrastructure
An Evaluation of Local Regulations Flood Control	Lubis, Journal of Environmental Law, 2021	Effectiveness of flood control regulations	Weak sanctions, lack of socialization	Revision and strengthening of the law	Regulatory aspects

Research Title	Researcher, Publication Media, and Year	Research Objectives	Conclusion	Suggestions or Weaknesses	Comparison
Green Infrastructure and Flood Resilience	Müller et al., Ecological Engineering, 2022	Effectiveness of green infrastructure	Proven to increase durability	Need budget support	Ecosystem solutions
Collaborative Governance in Flood Control	Prasetyo, Journal of Public Policy, 2023	Cross-agency collaboration	Sectoral ego becomes an obstacle	Collaborative forums needed	Collaborative governance
The Role of NGOs in Flood Disaster Education	Dewi, Journal of Empowerment Communication, 2020	NGOs and disaster awareness	Improving the understanding of the community	Need for program sustainability	Non-government actors
Flood Resilience in Urban Poor Communities	Adams et al., Int. Journal Urban Studies, 2021	Resilience of poor communities city	Structurally and economically vulnerable	Needs-based interventions local	Socio-economic
Implementation of Environment-Based Drainage	Firmansyah, Journal of Civil Engineering, 2021	Effectiveness of drainage systems green	Need integration with planning	Need government support	Green technology
City Government's Adaptation Strategy to Flood	Lestari, Airlangga University Dissertation, 2023	Adaptation strategy of the government h	Adaptation is not even in each OPD	Cross-sector policy integration	Regional strategy

Research gap

Cross-sectoral policy integration Regional strategy Based on the description of previous research, a number of research gaps can be identified that are an important basis for the implementation of this study.

First, most studies highlight only one or two aspects of policy implementation, such as communication or human resources, but have not examined all four aspects holistically. In fact, the success of implementation is highly determined by the simultaneous interaction of these various variables. This vacancy is an important opportunity to conduct a thorough and in-depth study.

Second, existing research is generally descriptive and has not used a case study approach that emphasizes depth of analysis. In fact, the case study approach is very relevant to illustrate the complexity of policy implementation at the local level, especially in the context of multidimensional flood management. South Tangerang City, which is an urban area with a rapid growth rate, has not been the focus of many studies.

Third, there is still a lack of research that specifically examines the implementation of Regional Regulations in the context of handling flood disasters. Most studies only review national policies or sectoral programs without tracing how local regulations are implemented at the operational level. In fact, regional regulations have peculiarities in terms of substance, implementing actors, and the context of the social environment.

Fourth, the relationship between the disposition of the implementer and the bureaucratic structure as a determining factor for implementation is still rarely studied simultaneously. In fact, the attitude of policy implementers is often influenced by the organizational structure in which they

work, including communication patterns and governance of authority. Studies that are able to bridge the relationship between individual and structural factors are a significant scientific need.

Fifth, there has been no previous research that focuses specifically on the City of South Tangerang in the context of the implementation of Regional Regulations related to flood management. The city has unique geographical, demographic, and bureaucratic characteristics.

Thus, this study is expected to be able to fill the literature gap and make relevant empirical contributions to the development of public policy in urban areas.

Data and Information from Central and Regional Officials in Supporting Jabodetabek Watershed Research

The information collected includes aspects of policy, regulation, implementation in the field, funding, and inter-agency collaboration. For the purposes of this research, the following is a list of officials and information obtained from them:

Central Government Officials.

Interviews with central officials provide an overview of the vision, national regulatory framework, and potential support for BOS.

Figure 4 Factual Photo of Repeated Ciliwung River Flood Images 2025, Researcher's photo (processed) June 2025.

The condition of the turab or dam on the banks of the Ciliwung River, which is often the cause of babjir, has become a conflict of authority between the Central and Regional governments, proving the importance of supporting the formation of BOS immediately.

Ministry of Public Works and Public Housing (PUPR), among others: (1) Directorate General of Water Resources (SDA) / Director of Rivers and Beaches: They are the main supporters of river affairs and natural resource infrastructure; (2) Head of the Ciliwung-Cisadane River Area Center (BBWS): The official who best understands the technical conditions, existing infrastructure, and implementation challenges on the ground for these two watersheds.

The information from the Ministry of PUPR to support this environmental administration research includes: (1) The current role of BBWS in the management of the Ciliwung, Cikeas, and Cisadane watersheds (including obstacles and success); (2) Their views on the urgency and model of the River Authority Agency (BOS), including the potential *for overlapping* with the role of the BBWS; (3) The need for flood control infrastructure has not yet been built; (4) Technical data related to water discharge, sedimentation, and the physical condition of the river; (5) A view of how BOS can improve management effectiveness compared to the current model.

Ministry of Environment: (1) Director General of Pollution Control and Environmental Damage (PPKL) / Director of Water Pollution Control: Focus on water quality and pollution issues; (2) Director General of Natural Resources and Ecosystem Conservation (KSDAE): Focus on land conservation upstream of watersheds.

The information from the Ministry of Environment to support this environmental administration research includes: (1) Water quality of Ciliwung, Cikeas, and Cisadane (water quality standard data, polluting sources); (2) The challenge of environmental law enforcement against river pollution; (3) Conservation efforts upstream of the watershed (reforestation, erosion control) and its constraints; (4) Views on the BOS model in integrating aspects of water quality and conservation.

Ministry of National Development Planning/Bappenas.
Deputy for Facilities and Infrastructure / Director of Drinking Water, Sanitation, and Water Resources: They formulate medium- and long-term development planning policies.

The information from the Ministry of National Development Planning/Bappenas to support this environmental administration research includes: (1) The Central Government's vision is related to the management of the Jabodetabek watershed within the framework of the RPJMN; (2) Potential planning and funding support from Bappenas for the formation of BOS; (3) Obstacles to multi-sectoral and multi-regional coordination in water-related development planning; (4) Views on the sustainability of BOS funding.

Ministry of Agrarian and Spatial Planning/National Land Agency (ATR/BPN).
Directorate General of Spatial Planning / Director of Space Utilization Synchronization: They are responsible for national spatial planning policies.

Figure 5 The Spatial Planning of the Riverbank

Figure 5 showed that Spatial Planning of the Riverbank which should be maintained as a green area, is now (July 2025, researcher-processed), has been invaded by irresponsible parties by erecting buildings on the riverbank, and there are even building footprints that have eroded the river body. The information from the Ministry of ATR/BPN to support this environmental administration research includes: (1) Spatial planning issues along watersheds (river boundaries, land conversion upstream); (2) Obstacles in the enforcement of spatial plans that are often violated; (3) How can BOS help enforce more effective spatial planning in watershed areas?

Ministry of Home Affairs (Kemendagri).
Director General of Regional Development (Bangda): They bridge the relationship between the central and regional governments, including the synchronization of development programs.

The information from the Ministry of Interior to support this environmental administration research includes: (1) Coordination and program synchronization mechanism between the central government and the local government; (2) The potential support of the Ministry of Home Affairs in

encouraging local governments to support BOS; (3) Views on legal aspects and regional autonomy related to the formation of BOS.

Coordinating Ministry for Infrastructure.
Deputy for Coordination of Watershed Environmental Management and its infrastructure, as well as their views on the BOS model as a strategic solution.

Regional Government Officials (Pemda): Special Regions of Jakarta, West Java, and Banten.
The information obtained from the Regional Government provides local perspectives, implementation challenges in the field, and their hopes or concerns about the BOS, succeeding or failing to get out of the flood crisis that has been affecting the respective regions.

Figure 6 Factual Floods Hit Settlements: Almost every year there are floods that attack settlements in the Greater Jakarta area, (Kompas Daily, March 2025).

Provincial Government of the Special Region of Jakarta: (1) Head of the Jakarta Special Region Water Resources Agency (SDA): The most affected parties in the Ciliwung flood and manage the downstream drainage system; (2) Head of the Jakarta Special Region Environment Office: Managing waste and pollution issues in the Jakarta area; (3) Head of the Jakarta Special Region Regional Development Planning Agency (Bappeda): Formulating a provincial development plan; (4) Assistant for Economy and Development of the Jakarta Special Region Provincial Secretariat: Managing development and investment and its relation to BOS as a solution to Jakarta floods.

Information from the Five City Regions. The information from the Jakarta Special Regional Government, especially from the five city areas to support this environmental administration research, includes: (1) The impact of the Ciliwung and Cisadane floods in Jakarta, as well as the handling efforts that have been carried out; (2) Obstacles in handling floods that are cross-regional (upstream-downstream); (3) The priority needs of the Jakarta Special Region Provincial Government are related to watershed management; (4) Views and expectations of the BOS, including concerns related to autonomy/authority; (5) Potential collaboration and contribution (if any) from the Jakarta Special Region Provincial Government.

West Java Provincial Government: (1) Head of the West Java Provincial Water Resources Office: Managing watersheds in the West Java region (Ciliwung upstream, Cikeas, Cisadane upstream);

(2) Head of the West Java Provincial Environmental Agency: Managing pollution and conservation issues in the West Java region; (3) Head of Bappeda of West Java Province: Formulating a provincial development plan.

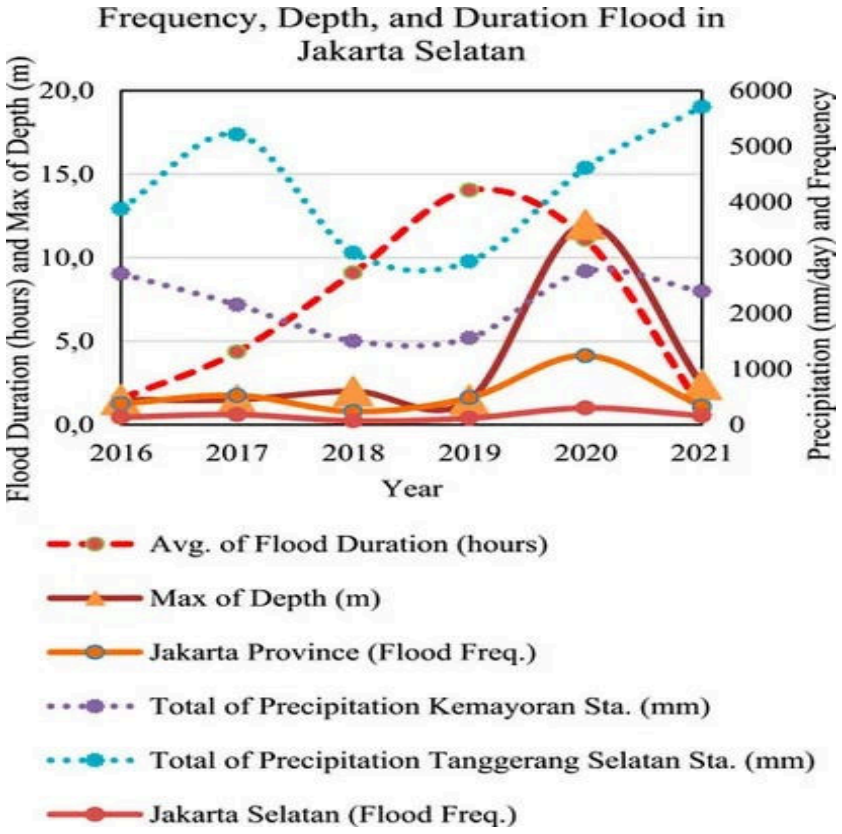

Figure 7 This Illustration in South Jakarta shows the Fluctuations of Flood Disasters between 2016-2021, which Reflect Conditions that are not much Different from Other Greater Jakarta areas.

The information from the West Java Provincial Government, to support this environmental administration research includes: (1) The impact of floods and environmental issues in the upper Ciliwung watershed, Cikeas, and Cisadane in the West Java region; (2) Obstacles in the management of watersheds upstream (land conversion, illegal settlements, waste); (3) Priority needs from the West Java Provincial Government related to watershed management; (4) Views and expectations of the BOS, including concerns related to autonomy/authority; (5) Potential collaboration and contribution (if any) from the West Java Provincial Government.

Banten Provincial Government: (1) Head of the Banten Provincial Water Resources and Settlements Office: Managing the Cisadane watershed in the Banten area (especially downstream); (2) Head of the Banten Provincial Environment and Forestry Service: Managing environmental issues in the Banten area; (3) Head of Banten Provincial Bappeda: Formulating a provincial development plan.

The information from the West Java Provincial Government, to support this environmental administration research includes: (1) The impact of floods and environmental issues in the downstream Cisadane watershed in the Banten area; (2) Obstacles in watershed management in the Banten area; (3) The priority needs of the Banten Provincial Government are related to watershed management; (4) Views and expectations of the BOS, including concerns related to autonomy/authority; (5) Potential collaboration and contribution (if any) from the Banten Provincial Government.

Regency/City governments are directly affected. Officials who can provide direct information are: (1) Mayor/Regent (or Deputy): The highest representative who has political will; (2) Head of the PUPR/SDA/Environment/Bappeda Office in 7 (seven) regions, namely: (a) Bogor City and Bogor Regency: It is very crucial for Ciliwung and Cikeas upstream; (b) Depok City: For Ciliwung and Cikeas; (c) Tangerang City and South Tangerang City: For downstream Cisadane; (d) Tangerang Regency: For Cisadane and Ciliwung; (e) Bekasi City: A slice with a drainage system related to the Cikeas watershed.

The information was obtained through various agendas, especially related to the institutional implementation of BOS as a solution to floods in their respective regions. (similar to Provincial Government, but more specific at the local level where flooding occurs), such as: (1) Flood problems and specific environments in their area (local data, flood-prone maps); (2) Handling efforts that have been carried out at the city/district level and their obstacles (3) Their interaction with BBWS or the Provincial Government in handling floods; (4) The perception of the local community towards the river problem and its handling; (5) The deepest hopes and concerns are related to the formation of BOS; (6) How can BOS help them overcome limited resources or authority?

Figure 8 Flood Shipments, Factual Photos of Flood Shipments 2024/2025, collection of the Research Team

Densely populated residential areas, not raining but flooded, are always in the news in the Greater Jakarta Area, the problem of evacuation places and their facilities when floods occur, and cleaning and rehabilitation when after floods, conditions that are bitter for the flood of shipments waiting for the birth of BOS to overcome it.

Conceptual Framework of Research.

The conceptual framework of this research begins with an approach to solving environmental administration research problems, which is as follows: (1) The policy approach includes analysis of regulations and policies related to flood management, as well as evaluation of the effectiveness of policy implementation; (2) The social approach involves community participation through surveys, interviews, focus groups to understand people's perceptions, needs, and aspirations related to flood management; (3) The technical approach evaluates the effectiveness of integrated flood management alternative models, including spatial analysis for flood risk mapping, hydrological modeling for river flow simulation, and evaluation of flood control infrastructure; (4) A collaborative approach to realize synergy between the central government and local governments in the implementation of an alternative model of integrated flood management.

All of these approaches are conceptual frameworks that are used as a benchmark for research, about the research area whether it has applied a policy approach related to flood management, then about the social approach, related to community participation in flood management.

Methods

This study adopts Mixed Methods with an Explanatory Sequential Design approach. According to Creswell and Plano Clark, an explanatory sequential design involves collecting and analyzing quantitative data first, followed by qualitative data to help explain or elaborate on the quantitative results (Creswell & Creswell, 2017; Plano Clark, 2017). This approach was chosen because the complexity of flood management in Greater Jakarta requires both statistical analysis to quantify the flood risks and qualitative insights to understand the contextual and institutional factors influencing flood management. The integration of both data types allows for a comprehensive understanding that cannot be achieved by either approach alone, adding value through the depth of qualitative insights combined with the breadth of quantitative evidence.

Approach and Design.

Quantitative Approach (First Stage): (1) Focus on spatial data analysis and evaluation of the effectiveness of policies that have been implemented related to watershed management; (2) Data collection was carried out through a survey of 350 community respondents spread across 7 areas in Greater Jakarta directly affected by the Ciliwung, Cikeas, and Cisadane watersheds. This survey aims to assess the perception, impact, and effectiveness of existing flood management policies from the community's perspective; (3) Quantitative data analysis will be conducted using SPSS, performing statistical tests such as correlations and trend analyses to identify patterns, relationships, and factors that influence the effectiveness of the flood management strategies.

Qualitative Approach (Second Stage): (1) Focus on policy analysis, policy implementation evaluation, and in-depth perspective excavation to explain quantitative findings; (2) Data collection is carried out through: (a) In-depth interviews with 7 Heads of the Environment Agency (DLH) or their representatives in the relevant Greater Jakarta area, to understand policy perspectives, implementation challenges, and inter-agency dynamics; (b) Field observations to verify actual conditions in watersheds and surrounding environments, as well as observe policy implementation at the operational level; (c) Focus Group Discussion (FGD) with 25 participants consisting of government representatives (central and regional), academics, and Watershed Forum (Watershed) in the Greater Jakarta area. The FGD aims to explore complex issues, identify root causes, and gather collective views on possible solutions. (3) Qualitative data analysis uses NVIVO to organize, codify, and analyze textual data from interviews and FGDs, so as to uncover important themes, narratives, and an in-depth understanding of environmental administration dynamics.

Integration of Quantitative and Qualitative Data

To ensure the methodological synergy between quantitative and qualitative data, the findings from the surveys will inform the interview protocols and FGD discussion guides. Qualitative insights will then be used to interpret the quantitative patterns and explain underlying causes or contextual factors that cannot be captured through numerical data alone. The integration of both data sources will provide a holistic understanding of the flood management challenges in Greater Jakarta, allowing for more informed policy recommendations.

Formulation of Strategic Policy Recommendations.

The results of quantitative and qualitative analysis are integrated to provide a holistic understanding. Furthermore, this study recommends the formulation of strategic policies that can be implemented, especially related to the establishment of the River Authority Agency (BOS). The formulation of these policy recommendations is supported by: (1) Analytical Hierarchy Process (AHP): This method will assist in determining priorities and weighing criteria in decision-making, particularly in managing multi-criteria and multi-stakeholder complexities; (2) Multi-Criteria Analysis (MCA): This method will evaluate and compare various policy alternatives or governance models (including the BOS

model), based on a predefined set of criteria, to identify the most optimal and feasible solutions for flood management."

With the combination of these methods, this research aims to produce solutions that are not only academically strong but also practical and can be applied well for handling environmental problems in the Jabodetabek watershed.

Research Flow Diagram

Stages of research and division of research tasks

Figure 9 Research Flow Diagram

Research Procedure

Phase One: Analysis of Existing Conditions using Quantitative Data: (1) Literature deepening based on research problems; (2) Secondary data collection: Rainfall data, topographic data, land use data, flood control infrastructure data, related policy data. Data collection of public perception data and the effectiveness of flood control policies through a questionnaire with a sampling of 350 respondents in

the Greater Jakarta area; (3).Spatial data analysis: Flood risk mapping in the Greater Jakarta area; (4) Policy analysis: Evaluation of the effectiveness of regulations and policies related to flood management that have already been implemented; (5) Expected results: A comprehensive overview of the existing conditions of flood management in Greater Jakarta; (6) Achievement indicators: An analysis report of existing conditions; (7) Person in charge: Spatial data analysis team and survey to the community

Second Stage: Deepening using qualitative data: (1) Literature review: A literature review on integrated flood management models and community participation; (2) Development of data collection instruments, interviews, and focus group discussions; (3) Interview data was collected by 7 Heads of the Environment Agency in the Greater Jakarta area; (4) Expected outcomes: analysis and evaluation of policy implementation; (5) Achievement indicators: Policy implementation analysis report document; (6) Person in charge: Interview and documents team.

Third Stage: Focus Group Discussion: (1) The FGD involved 25 stakeholders, academics and the Watershed Forum to produce a conceptual framework for an alternative model of "One River, One Planning, One Integrated Management."; (2) Initial evaluation: Analyze field data and evaluate research results to formulate policy alternatives with AHP and MCA; (3) Expected results: Initial evaluation of policy alternatives; (4) Achievement indicators: Initial evaluation report; (5) Person in charge: Implementation team and evaluation team.

Fourth Stage: Preparation of Policy Recommendations and Scientific Publications: (1) Synergy analysis of central and regional governments: Analyzing the synergy between the central and regional governments in flood management; (2) Preparation of policy brief materials using AHP and MCA so that appropriate policy alternatives can be formulated; (3) Preparation of scientific publication articles; (4) Expected results: Integrated alternative policy recommendations that are refined and advocated to the Greater Jakarta regional leadership; (5) Achievement indicators: Synergy analysis report, policy brief and the preparation of journal articles; (6) Person in charge: Socialization team and policy analysis team; (7) Person in charge: Evaluation team and publication team.

Results and Discussion

Policy Analysis and Implementation

The "One River, One Planning, One Integrated Management" policy is a holistic approach adopted by the government to address the complex flood problem in Greater Jakarta. This policy seeks to bring together various programs and projects that previously ran separately. Its implementation in Greater Jakarta is mainly carried out by the Ciliwung-Cisadane River Area Center (BBWS) under the Ministry of PUPR.

Although the intention is to integrate all programs perfectly, challenges remain in the field, resulting in fragmented implementation. Below are examples of key programs that have been initiated, demonstrating efforts toward integrated management:

River Normalization and Restoration.

It is one of the most visible major programs. The goal is to restore the function of the river as an optimal waterway: (1) Project: Normalization of the Ciliwung River. This project involves the widening and dredging of the river, the construction of embankments, and the arrangement of the riverbank; (2) Linkage with Integrated Policy: This project covers areas from upstream to downstream, involving three provinces (West Java, Banten, and DKI Jakarta). This is a real example of how a single physical project is designed to address problems that cross administrative boundaries. However, its implementation is still fragmented due to land acquisition constraints under the authority of local governments and funding issues.

Development of Flood Control Infrastructure

The project aims to reduce the discharge of water into major rivers, especially during high rainfall: (1) Project: Construction of the Ciliwung River Sodetan to the East Flood Canal (KBT) and Ciawi and

Sukamahi Reservoirs. The Ciliwung Sodetan functions to divert part of the Ciliwung water flow to KBT to reduce the river load downstream, while the Ciawi and Sukamahi Reservoirs function to hold the water rate from upstream; (2) Linkage to Integrated Policy: These projects demonstrate an integrated approach that involves physical development upstream (reservoir) and in the middle (sodetan) to protect downstream areas (Jakarta). However, sometimes the operation and maintenance of reservoirs and sodetans are not always aligned with the surrounding spatial policies, which indicates the fragmentation of inter-institutional policies.

Conservation and Reforestation in the Upstream

This effort aims to maintain the carrying capacity of the environment in upstream areas to reduce erosion and sedimentation: (1) Project: National Movement for Water Rescue Partnerships (GN-KPA). It involves reforestation programs, infiltration well construction, and socialization to the community; (2) Linkage to Integrated Policy: This program is an important part of the integrated strategy because it focuses on the source of the problem, not just the downstream impact. However, these programs are often fragmented because their implementation is spread across various non-governmental organizations and local governments, without a single strong coordination.

Waste Management and Pollution Control

This aspect is also crucial because garbage and waste exacerbate flooding problems and pollute the environment: (1) Project: Normalization of rivers which includes garbage cleaning and wastewater treatment plant (WWTP) projects; (2) Linkages to Integrated Policies: Despite being part of river management, waste and waste management is often the responsibility of local governments and private companies, making coordination a major challenge. This often causes inconsistency between the physical programs run by BBWS and the cleaning programs run by the local government.

From the above description, it can be seen that despite real efforts to implement integrated policies, fragmentation is still a problem. The challenge is to harmonize the various physical, non-physical, and policy programs of various entities (central government, local governments, and communities) into a cohesive unit.

Case Study of Important Rivers in Greater Jakarta (Ciliwung River, Cikeas River and Cisadane River)

Analysis of policy implementation in the three rivers and identification of their successes and failures, in an effort towards "One River, One Planning, One Integrated Management", in three important rivers in Greater Jakarta: Ciliwung, Cikeas, and Cisadane. These three rivers have different characteristics and challenges, thus providing a rich picture of policy successes and failures.

Ciliwung River

Ciliwung is an icon as well as a symbol of Jakarta's flood problem. As a river that crosses three provinces (West Java, Banten, and DKI Jakarta), Ciliwung is the most complex case study.

Policy Implementation: Integrated policies in Ciliwung are realized through: (1) Normalization Project: Widening and deepening of river channels in Jakarta; (2) Reservoir Construction: Construction of Ciawi Reservoir and Sukamahi Reservoir upstream to hold water discharge; (3) Ciliwung Sodetan: A tunnel project that diverts part of the Ciliwung water flow to the East Flood Canal (KBT); (3) Conservation Program: Reforestation and infiltration wells in upstream areas.

Success: (1) Local Flood Reduction: The development of physical infrastructure such as sodetans and reservoirs has been proven to reduce inundation in several vulnerable points in Jakarta; (2) Increased Flow Capacity: Normalization of rivers increases water capacity, although not comprehensive.

Failure: (1) Coordination Problems: Coordination between local governments (DKI Jakarta, West Java, Banten) is still a major challenge, especially in land acquisition for normalization; (2) Urbanization Threats: Upstream development continues, reducing catchment areas and increasing water rates, thereby undermining conservation efforts; (3) Low Public Participation: Public

awareness of the importance of keeping rivers clean is still lacking, which causes garbage and pollution problems to persist.

Cikeas River

The Cikeas River is a tributary of the Bekasi River that flows from the upstream in Bogor Regency to meet the Bekasi River. The problem is often related to the flood of shipments and rapid urbanization in the upstream area.

Policy Implementation: Management efforts in Cikeas focus more on: (1) Construction of Embankments: The construction of embankments to protect settlements along rivers; (2) Sediment Dredging: Periodic dredging projects to maintain river depth.

Success: Local Flood Mitigation: The construction of embankments has proven to be effective in preventing water overflow in densely populated settlements such as in Jatiasih and its surroundings.

Failure: (1) Focus on Downstream: Handling focuses more on downstream (flooding) rather than addressing the root of the problem upstream (urbanization, land degradation); (2) Lack of Cooperation Between Regions: The lack of synergy between local governments in the upstream (Bogor) and downstream (Bekasi) areas makes the handling of Cikeas partial.

Cisadane River

The Cisadane River flows from Mount Pangrango and empties into the Java Sea, passing through Bogor City, Tangerang Regency, and Tangerang City. This river plays an important role as a source of raw water.

Policy Implementation: Integrated policies in Cisadane include: (1) Dam and Irrigation Construction: The construction of the Jatiluhur Dam which doubles as a flood control and irrigation water provider; (2) Raw Water Project: Construction of water treatment plants to meet the drinking water needs of the community.

Success: (1) Raw Water Management: Cisadane is successfully managed as a vital source of raw water, showing success in terms of utilization; (2) Local Flood Prevention: Dams upstream are effective in controlling the flow of water downstream, although they do not completely eliminate flooding.

Failure: (1) Severe Pollution: The level of pollution in Cisadane is very high due to industrial and household waste. The environmental aspect of integrated policies is still very weak; (2) Conflict of Interest: There is a conflict of interest between irrigation needs (farmers) and raw water needs (drinking water companies), which indicates a lack of synchronization in planning.

Facts from the Case Study

Overall, the section or part of the implementation of the "One River, One Planning, One Integrated Management" policy shows significant progress in the limited section/section of the development of physical infrastructure (normalization, dams, sodetan) that has succeeded in reducing the impact of flooding in some areas.

However, the main failure lies in the non-physical aspects/parts, namely: (1) Policy Fragmentation: Lack of strong coordination between local governments and related agencies; (2) Weak Law Enforcement: Especially related to spatial planning and waste disposal; (3) Lack of Community Participation: Participatory programs have not been a top priority.

Therefore, even though the foundation of an integrated policy already exists, the journey to a flood-free Greater Jakarta still requires a stronger, more holistic synergy at various levels, from upstream to downstream comprehensively.

Analysis of Policy Implementation Challenges.

The issue of inter-institutional coordination.

This is the biggest and most complex challenge. River management in Greater Jakarta involves many parties with different authorities, which are often not in line. (1) Central Government vs. Regional

Government: The Ministry of PUPR (through BBWS) is responsible for river infrastructure, while local governments (DKI Jakarta, West Java, Banten) have authority over spatial planning, licensing, and waste handling. Often, the BBWS program is hampered due to land acquisition constraints that are the business of local governments. For example, the Ciliwung normalization project was stopped due to the slow land acquisition by the Jakarta Provincial Government and the Bogor Regency Government; (2) Overlapping Authority: There is an overlap between the duties of BBWS in maintaining the cleanliness of the river and the duties of the cleaning service in the local government. As a result, waste management in the river is not well coordinated.

Funding Issues

Realizing a flood-free Jabodetabek requires very large funds. However, funding is often an obstacle, both in terms of amount and allocation: (1) State Budget Limitations: Central and local government budgets for water infrastructure are limited. Major projects such as reservoir construction and river normalization require trillions of rupiah that cannot be fulfilled in one budget year; (2) Allocation Ambiguity: There is often a misalignment between the needs in the field and the budget allocation given. The focus of the budget may be more on new physical projects than maintenance or non-physical programs such as socialization and conservation; (3) Reliance on Loans: Many large projects are financed through overseas loans, which can be time-consuming and often require certain things, slowing down the implementation process.

Low Community Participation

The success of river management is highly dependent on community awareness and active participation, but this is still a weakness: (1) Garbage Disposal Behavior: The habit of throwing garbage into rivers is still very common in society, which directly exacerbates the problem of flooding and pollution; (2) Development on the Riverbanks: Many communities build illegal settlements on the banks of riverbanks, hindering normalization efforts and endangering themselves during flooding; (3) Lack of Conservation Awareness: In upstream areas, communities have not fully understood the importance of maintaining water catchment areas. Land conversion for settlements and agriculture continues to occur, which increases the rate of water downstream.

Spatial Issues

Spatial planning is the root of the problem that is difficult to overcome, as it deals with long-term planning and the interests of various parties. Spatial Deviations: Many areas of Greater Jakarta, especially in the upstream areas and along rivers, experience spatial deviations. Water catchment areas that were supposed to be green areas turned into housing or business centers.

Inconsistencies in Spatial Plans: Regional Spatial Plans (RTRWs) from districts/cities in Greater Jakarta are often not aligned with the Water Resources Management Master Plan. As a result, the flood mitigation policy made by BBWS is contrary to the development permits issued by the local government.

Urbanization Impact: Massive and uncontrolled population growth causes green open land to continue to decrease, making the soil unable to absorb rainwater, and ultimately increasing the volume of water flowing into the river.

Overall, these challenges are intertwined and form a vicious cycle. Effective solutions should focus not only on physical development, but also on strengthening institutional coordination, wise allocation of funding, improvement.

Analysis of Policy Implementation Opportunities.

After outlining the challenges, let's move on to the more optimistic side: opportunities that can be used to implement integrated river management policies in Greater Jakarta. These opportunities are essential capital to overcome existing barriers.

Political Support and Government Commitment.

There is a strong political momentum to solve the flood problem in Greater Jakarta. This support comes from many levels and is crucial: (1) Presidential Commitment: The President and his ministers

(especially the Minister of Public Works and Housing) have consistently shown commitment to addressing the flooding problem in Greater Jakarta through national strategic projects, such as the Ciawi-Sukamahi Reservoir and river normalization. This ensures budget availability and policy priorities; (2) Local Government Synergy: Although coordination between local governments is often a challenge, several regional heads in Greater Jakarta (such as the Governors of DKI Jakarta and West Java) have shown a willingness to collaborate on river management issues. The existence of a regional coordination forum is a space to equalize vision and mission.

Technological advancements.

The development of modern technology offers innovative solutions to overcome river management problems that were previously difficult to solve: (1) Early Warning System: The installation of real-time water discharge sensors and measuring stations along the river allows monitoring of water conditions from upstream to downstream. This data is invaluable for predicting potential flooding and providing early warning to the community; (2) Geospatial Technology (GIS): The use of Geographic Information Systems (GIS) and satellite imagery allows for accurate mapping of spatial planning, land conditions, and land cover changes in upstream areas. This helps decision-makers to formulate more targeted policies; (3) Digital Applications and Social Media: Governments and communities can use apps and social media to disseminate information, educate, and mobilize public participation in river cleanup programs or conservation campaigns.

Raising Public Awareness.

The development of mass media and access to information has made people more aware of the adverse effects of behavior that damages the environment: (1) The emergence of Environmentally Caring Communities: Many local communities have volunteered to carry out river cleanups, tree planting, and socialization. This movement is a strategic partner for the government in river management efforts; (2) The Active Role of Academics and NGOs: Non-governmental organizations (NGOs) and academics often conduct research, advocacy, and constructive criticism of government policies. Their role can encourage accountability and transparency in river management; (3) Improved Quality of Life: As awareness increases, people are beginning to realize that a clean environment and healthy rivers will improve their quality of life. This is an internal motivation for the community to actively participate in government programs.

Overall, the challenges are complex, but by leveraging strong political support, technological innovation, and increasing community participation, the opportunity to realize a flood-free Jabodetabek becomes more realistic.

Management Institution for "One River, One Planning, One Integrated Management".

Key Principles That Management Institutions Must Have.

Before discussing the form of the organization, there are several basic principles that must be attached to this Management Institution: (1) Cross-Sectoral and Cross-Administrative Authority: Rivers often cross several administrative areas (districts/cities, even provinces) and involve various sectors (agriculture, industry, housing, environment, energy). This institution must have the authority to coordinate all these parties; (2) Independence and Legal Force: Institutions must have a strong legal basis (laws, government regulations) and be relatively independent of short-term political intervention, while remaining accountable to the public and the government; (3) Scientific and Data Base: Decisions should be based on scientific data, research, and a deep understanding of river ecosystems, hydrology, and socio-economic communities in watersheds; (4) Multi-stakeholder Participation: Engage a wide range of stakeholders, including local governments, indigenous/local peoples, water-user communities, the private sector, academics, and non-governmental organizations (NGOs); (5) Sustainable Funding: Having a clear and sustainable funding mechanism, not only depending on the State Budget/Regional Budget, but also the potential for user levies, conservation funds, or environmental incentive schemes; (6) Flexibility and Adaptability: Able to adapt to climate change, technological developments, and socio-economic dynamics.

Option to Form a Management Institution.

Looking at complex needs, there are several models of Management Institutions that can be considered, each with its advantages and disadvantages:

The first option: the River Basin Authority.

It is the most comprehensive and often recommended model for integrated watershed management: (1) Form: The Authority Body is independent or semi-independent which is formed on a legal basis at the level of a Law or Presidential/Government Regulation; (2) Duties and Authorities: (a) Integrated Planning: Prepare a Watershed Management Master Plan (RIP-DAS) which includes aspects of water quantity and quality, conservation, disaster mitigation, and socio-economy; (b) Regulation and Enforcement: Establishes derivative rules from central policies and has the authority to enforce regulations related to the use and protection of rivers; (c) Cross-Sectoral/Regional Coordination: Be the sole coordinator for all interested parties in the watershed, from upstream to downstream; (d) Infrastructure Management: Plan, build, operate, and maintain water resource infrastructure (dams, irrigation canals, flood controls); (e) Decision Making: Have decision-making authority related to water allocation, licensing, and conflict management; (f) Research and Monitoring: Conducting ongoing research and monitoring watershed conditions (water quality, discharge, ecosystem); (g) Funding Mobilization: Finding and managing funding sources from various parties.

Excess: (1) Has the highest authority and strong legitimacy to coordinate the various parties; (2) Able to make holistic and integrated decisions; (3) Potential efficiency because it's all under one roof; (4) Full focus on watershed management without being divided with other sectoral tasks.

Deficiency: (1) It requires a very high political commitment to its formation; (2) Potential conflicts with existing ministries/institutions that may feel their authority is being taken; (3) Requires highly competent human resources and a large number; (4) The bureaucracy can be complex if not well designed; (5) The risk of becoming a "little king" if there is no strong oversight mechanism.

Second option: Inter-sectoral/agency coordinating committee.

It is a softer model, usually not having direct execution power, but rather as a coordination forum: (1) Form: A forum involving representatives from various relevant ministries/institutions (PUPR, Environment, Agriculture, Health, Local Government) and possibly also non-government; (2) Duties and Authorities: (a) Formulation of Joint Policy: Agree on river management policies and strategies; (2) Program Coordination: Aligning programs and activities from each ministry/institution; (3) Conflict Resolution: Mediating and finding solutions to conflicts of interest between parties; (4) Information Exchange: To be a platform for sharing data and information.

Excess: (1) It is easier to form because it does not require a major restructuring; (2) Utilize expertise and resources from existing institutions; (3) Encourage dialogue and collaboration between parties.

Deficiency: (1) It does not have direct execution power, only limited to coordination; (2) Decisions often depend on consensus, which can be slow or difficult to achieve; (3) The potential for sectoral egos that hinder the implementation of decisions; (4) Funding and priorities are often still divided among each parent institution.

Third Option: Modification of the Existing River Area Center (BBWS).

Indonesia already has a River Region Center (BBWS) under the Ministry of Public Works and Housing. This model proposes strengthening and expanding the role of BBWS: (1) Form: BBWS which is strengthened in mandate by expanding authority and resources; (2) Duties and Authorities: (a) Expanded Mandate: In addition to focusing on infrastructure, the BBWS is also given a stronger mandate in comprehensive planning (including water quality, conservation, socio-economic), cross-sector coordination, and law enforcement; (b) Multistakeholder Engagement: Establish a steering board or advisory committee that involves all stakeholders at the watershed level; (c) Capacity Building: Significant increase in human resources and budget.

Excess: (1) Utilizing existing structures, so that they are implemented fastes; (2) BBWS already has technical experience and a deep understanding of rivers; (3) It may be more politically acceptable than forming a completely new institution.

Deficiency: (1) Historically, BBWS have tended to focus more on physical infrastructure (water quantity) than holistic management of ecosystems and water quality. This paradigm shift takes time and commitment; (2) The potential for limited authority outside the Ministry of Public Works and Housing, so coordination with other ministries (environment, agriculture) is still a challenge; (3) Legitimacy in the eyes of the public may need to be rebuilt if the initial perception is only as a "project implementer".

Conclusion

This study shows that the One River, One Planning, One Integrated Management policy is the most relevant and effective approach to overcome complex flood problems in Greater Jakarta. Through the establishment of the River Authority Agency represented by the Ciliwung-Cisadane River Area Center (BBWS), the government has laid a strong institutional foundation for integrated water management from upstream to downstream. The findings from both quantitative and qualitative analyses confirm that a holistic, integrated approach is essential for addressing the multi-dimensional challenges of flood management in this region. The main findings of this study are:

The quantitative analysis confirms that large-scale physical infrastructure projects like the Normalization of the Ciliwung River, the construction of the Ciawi and Sukamahi Reservoirs, and the Ciliwung Sodetan have proven effective in reducing flooding in several vulnerable points. SPSS analysis revealed a significant decrease in flood frequency and severity in these areas, confirming that technical approaches are key components in flood mitigation.

Despite the physical successes, qualitative interviews and FGD insights highlight that the implementation of this policy still faces major challenges in non-physical aspects. Inter-agency coordination issues (between central and local governments), limited funding, lack of community participation, and spatial deviations were consistently identified as barriers to full integration of flood management efforts. These insights provide the contextual depth needed to understand the fragmentation of policy implementation.

The integration of quantitative findings with qualitative insights reinforces that while the foundation of an integrated policy through the River Authority Agency is key, the success of a flood-free Jabodetabek depends heavily on addressing these non-physical challenges. The AHP analysis and qualitative themes both emphasize the need for a stronger, more holistic synergy, particularly in harmonizing regulations, adequate funding allocation, and public behavior changes.

The study shows that while physical infrastructure is important, collaboration, political commitment, and sustainable public participation are equally crucial in achieving long-term success. The qualitative findings from the interviews with local authorities and FGD participants stress that policies cannot succeed without strong stakeholder engagement and active public involvement. Community participation and political support emerged as recurring themes in both the qualitative and quantitative data, emphasizing the necessity of comprehensive solutions.

To overcome the challenges in the implementation of the "One River, One Planning, One Integrated Management" policy, strategic steps are needed that include legal, institutional, social, and funding aspects.

Strengthening the Legal Umbrella: (1) Revision and Harmonization of Regulations: It is necessary to revise regional regulations (perda) in each Greater Jakarta area (DKI Jakarta, West Java, and Banten) to be in line with the Water Resources Law. This is important to eliminate overlapping authority, especially related to land acquisition and spatial planning; (2) Consistent Law Enforcement: The government needs to increase law enforcement against spatial planning violations and river

pollution. Strict sanctions must be given to those who dispose of waste or build on the banks of rivers without permits.

Establishment of the River Authority Agency and Inter-Institutional Collaboration: (1) The establishment of the River Authority Agency is urgently needed, perhaps through increasing the authority of the BBWS; The government needs to strengthen the authority of the Ciliwung-Cisadane River Area Center (BBWS) as the first step in the establishment of the River Authority Agency. This authority is not only limited to physical development, but also includes full coordination of spatial planning, licensing, and law enforcement in the river area comprehensively; (2) Permanent Regional Coordination Forum: A permanent coordination forum involving regional heads (Governors, Regents, and Mayors) in Greater Jakarta. The forum serves as a platform for shared decision-making, dispute resolution, and program synchronization across the river region.

Active Community Involvement: (1) Continuous Education and Socialization: The government and communities need to work together in a massive and sustainable education program on the importance of keeping rivers and the environment clean. This program can be in the form of campaigns at schools, social media, and direct activities in the community; (2) Local Community Empowerment: Involve local communities in river management programs, such as the "Ciliwung Bersih" or "Waste Bank" programs. Give incentives or rewards to communities that manage their environment well, so that they feel they own the river and are responsible for it.

Development of Innovative Funding Models: (1) Public-Private Partnerships (PPPs): Involve the private sector in the funding and management of river infrastructure. The PPP model can be applied to large projects, such as the construction of wastewater treatment facilities or conservation projects; (2) River Area Conservation Fund: A special form of fund for conservation that is sourced from various parties, including the government, the private sector, and public donations. These funds can be used for upstream land rehabilitation programs, infiltration well construction, and research. (3) By implementing these recommendations, it is hoped that river management in Greater Jakarta can move from a partial approach to a truly integrated and holistic approach.

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