Sumatra Journal of Disaster, Geography and Geography Education: December 2025. Vol.9. No.2. pp. 67-70
Disaster, Geography, Geography Education http://sjdgge.ppj.unp.ac.id/index.php/Sjdgge
ISSN: 2580 - 4030 (Print) 2580 - 1775 (Online), Indonesia

# EMPIRICAL ANALYSIS AND REALISM-BASED FLOOD MITIGATION STRATEGY IN BEKASI (CASE STUDY OF ERALY MARCH 2025 FLOOD)

*Anang Suherman, Dede Sugandi, Enok Maryani

Doctoral Study Program, Faculty of Social Sciences Education, UPI-Bandung
Email: anangsuherman@upi.edu

*Corresponding Author, Received: August 08, 2025. Revised: October 25, 2025. Accepted: November 28, 2025



**ABSTRACT**: Flood is a recurring hydrometeorological disaster in urban areas of Indonesia, including Bekasi City and Regency. This study employs a realism-based geographic approach to analyze the causes, impacts, and formulate mitigation strategies for floods occurring in Bekasi in early March 2025. Using qualitative methods with a case study design, data were collected through observations, interviews, and document studies. The results reveal that floods are caused by a combination of high rainfall intensity, rapid urbanization reducing water catchment areas, poor drainage infrastructure, and topographical vulnerabilities. Beyond physical and economic damages, the disaster severely disrupted educational activities, affecting hundreds of schools and thousands of students. The realism approach highlights the importance of empirical data in understanding flood patterns and designing comprehensive mitigation strategies. Recommended solutions include improving drainage capacity, enforcing land-use regulations, river normalization, and integrating disaster risk reduction (DRR) education into school curricula to build community resilience. This research contributes to evidence-based disaster mitigation efforts in urban planning and education sectors.

*Keywords: Flood Mitigation, Realism, Urban Planning, Disaster Education, Bekasi*

## 1. INTRODUCTION

Flooding has increasingly become a pressing issue in many Indonesian urban centers, particularly in Bekasi City and Regency [1]. In the past five years, the area has experienced frequent flood events, causing significant socio-economic and environmental impacts [2]. Floods in urban areas are not merely caused by extreme rainfall events but are often the result of complex interactions between natural and anthropogenic factors [1], [3]. These include rapid urbanization, land-use changes, inadequate drainage systems, and poor environmental management [3], [4]. Understanding the multifactorial nature of flooding is crucial to designing effective mitigation strategies that are sustainable and adaptive to future climatic and demographic changes [2], [5].

From a geographic realism perspective, natural phenomena such as floods are not random occurrences but are patterns that can be observed, measured, and scientifically analyzed [6]. Realism emphasizes that flood events have causal relationships rooted in environmental and human dynamics, making empirical evidence fundamental in addressing the problem [7]. By applying this approach, spatial patterns, temporal trends, and socio-environmental interactions contributing to floods can be identified [8]. Consequently, a realism-based analysis does not only diagnose the immediate physical triggers of flooding but also interrogates broader urban planning failures and policy gaps that exacerbate disaster risks [9].

This study seeks to investigate the causative factors of the March 2025 flood event in Bekasi through a realism-based geographic approach. It aims to integrate empirical data from field observations, stakeholder interviews, and secondary sources to formulate evidence-based mitigation strategies [10]. This research intends to contribute actionable insights for policymakers, urban planners, and disaster management practitioners by grounding the analysis in objective realities rather than subjective interpretations [11]. In doing so, it aspires to foster resilient urban environments capable of withstanding hydrometeorological hazards in the era of rapid climate and societal changes [12].

## 2. METHODS

This study employed a qualitative research

approach using a case study design to explore the multifaceted causes and impacts of the flood disaster in Bekasi, as well as to formulate evidence-based mitigation strategies. The case study method was chosen because it allows for an in-depth investigation of contemporary phenomena within real-life contexts, especially when the boundaries between the phenomenon and context are not clearly evident. By focusing on the March 2025 flood event in Bekasi, this study aimed to capture the complex interactions between environmental and anthropogenic factors through empirical data collection.

Primary data were obtained through direct field observations conducted in several flood-affected areas within Bekasi City and Regency [13]. Observations focused on the extent of flood damage, the conditions of drainage systems, the state of riverbanks, and the physical infrastructure [13]. Additionally, semi-structured interviews were conducted with multiple stakeholders, including affected residents, representatives from the Regional Disaster Management Agency (BPBD Bekasi), officials from the Meteorological, Climatological, and Geophysical Agency (BMKG), and urban planning academics [14]. These interviews provided rich insights into the perceived causes, impacts, and responses to the flood disaster [14].

Secondary data sources were utilized to complement and triangulate the primary data [15]. These included official reports from government agencies such as BMKG, BNPB, and BPBD, as well as credible news articles and relevant academic studies on flood risk, urban development, and disaster management [14], [16], [17]. The integration of various data sources ensured a comprehensive understanding of the flood event from multiple perspectives [15].

Data analysis was carried out using descriptive qualitative methods [18]. The process involved data reduction, where raw data were selected and organized according to thematic relevance, followed by data presentation through narrative descriptions and visualizations [18]. Finally, conclusions were drawn by interpreting patterns and relationships between environmental, social, and infrastructural factors [19]. Triangulation techniques were employed to ensure data validity and reliability, by cross-verifying findings from field observations, interviews, and secondary data [15], [19].

To situate the findings in the local context and broader theory, we also referenced recent empirical and methodological studies: the use of IoT-based water-level and weather monitoring in the Bekasi watershed [13], governance gaps in flood disaster management in Bekasi City [14], spatial flood-vulnerability mapping in the Bekasi River Basin [15], [16], nature-based flood mitigation strategies in metropolitan Indonesia [17], micro-scale flood risk assessment using flood potential indices [18], qualitative flood-risk reduction strategies in Jakarta [22], and remote sensing/deep learning methods for flood mapping [21], [22]. different sources and methods**.**

## 3. RESULTS AND DISCUSSION

The flood disaster that struck Bekasi City and Regency in early March 2025 caused not only severe physical and economic damages but also substantial disruptions to the education sector [23]. According to official reports from the local Education Office, more than 391 educational institutions, including elementary, junior high, and senior high schools (SMA), were submerged during the peak of the flood [24]. The areas most severely affected included Kecamatan Bekasi Selatan, Bantar Gebang, Cibitung, and parts of Cikarang, where floodwaters reached up to three meters, forcing mass school closures [25]. It was reported that a total of 114 school buildings in Bekasi were damaged by the flooding [26], spanning PAUD, SD, SMP, SMA, SMK, and SLB levels [27].

The closure of schools disrupted academic activities for tens of thousands of students. Many schools were physically damaged, with water destroying learning materials, laboratory equipment, and administrative records. Even after the floodwaters receded, many educational institutions were unable to resume operations immediately due to extensive cleaning, repair, and health risk mitigation efforts. This prolonged disruption significantly affected students' right to education, leading to learning delays and psychosocial impacts such as stress, anxiety, and loss of motivation among students and teachers alike.

Beyond the immediate impact, the flood event highlighted critical gaps in disaster preparedness within the education sector. Few schools had established emergency plans or alternative learning mechanisms such as online or blended learning systems. The lack of educational resilience in disaster-prone areas underscored the urgent need to mainstream disaster risk reduction (DRR) education into school curricula, particularly for high school (SMA) students who are cognitively mature enough to grasp complex environmental and social interrelations.

Incorporating the March 2025 flood event as a case study into classroom discussions offers a valuable opportunity to enrich students' geographic literacy and disaster awareness. Teachers can use this real-world event to teach about the hydrological cycle, urbanization impacts, climate change, sustainable city planning, and community resilience. Classroom activities could include analyzing rainfall data trends, mapping flood-prone areas, simulating disaster response plans, and discussing policy solutions for urban resilience.

Moreover, through problem-based learning (PBL) models, students can be challenged to propose community-based solutions to mitigate flood risks, fostering critical thinking, collaboration, and civic engagement. By contextualizing the curriculum with recent, local events such as the Bekasi flood, educators not only enhance student engagement but also cultivate a generation of citizens who are better prepared to respond to environmental challenges.

Thus, the March 2025 flood disaster in Bekasi can serve not only as a stark reminder of urban vulnerabilities but also as a powerful, pedagogical tool in developing proactive disaster resilience education at the senior high school level.planning.

## 4. CONCLUSION

The application of a realism-based geographic perspective in analyzing the flood disaster that occurred in Bekasi in early March 2025 reveals that flood risks in urban areas are the result of a complex interplay between natural phenomena and human activities. Factors such as extreme rainfall intensity, rapid urbanization leading to land-use changes, inadequate drainage infrastructure, and topographical vulnerabilities were found to be the primary causes of the flood. Moreover, the flood's devastating impact extended beyond economic and environmental damages, severely disrupting educational activities and exposing the lack of disaster preparedness within schools. These findings emphasize that effective disaster mitigation requires a multi-sectoral approach grounded in empirical evidence, integrating environmental management, urban planning, infrastructure resilience, and educational system readiness.

Based on the realism approach, this study highlights the urgent need to not only improve physical infrastructures but also strengthen human capital through disaster education programs, especially at the senior high school (SMA) level. Incorporating local disaster events into educational curricula can foster critical awareness and community resilience among students. A comprehensive, evidence-based mitigation strategy—encompassing technological, environmental, and educational dimensions—is essential to reduce future flood risks and ensure sustainable urban development. Thus, addressing flood disasters must go hand-in-hand with fostering an informed, adaptive society capable of responding to the increasing threats of hydrometeorological hazards.

## 5. ACKNOWLEDGEMENTS

The authors express gratitude to the Faculty of Social Science Education, Universitas Pendidikan Indonesia, for supporting this research, and to all respondents who provided valuable insights during data collection.

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