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Analysis of Increasing Resilience Related to Flood Disaster Risk Reduction Efforts in Bekasi City

Galih Antariksa Ananda; Ernalem Bangun; Sugeng Triutomo

Disaster Management Study Program, Faculty of National Security, Indonesia Defense University, Indonesia

E-mail: ale.nagant@gmail.com

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Abstract

The impact of hydrometeorological disasters in the form of floods that are often experienced by people in the Bekasi City area, tends to be caused by high rainfall, resulting in rivers in the Bekasi City area not being able to drain river water discharge normally, especially during rainy periods. Flooding that occurs in the Bekasi City area, which almost occurs every year, has caused some residential areas along rivers in the Bekasi area to be submerged in water with a height of more than one meter, causing material and non-material victims. This research aims to analyze the efforts of the government and vulnerable communities in understanding flood disaster risk and how both parties work together in the decision-making process for flood disaster risk reduction. This research also examines efforts to increase resilience that have been carried out by the community, as well as evaluating policies and plans related to flood disaster risk reduction in Bekasi City. This research focuses on a case study of disaster risk reduction in a high flood risk area in Jatiasih Sub-district, Bekasi City.

Keywords: *Hydrometeorological Disasters; Resilience; Disaster Risk Reduction*

Introduction

The occurrence of climate change is likely to lead to increased impacts of hydrometeorological disasters such as floods, landslides, and tornadoes. Flooding is currently a major concern in many parts of Indonesia, which is further exacerbated by global climate change. The high rainfall will also directly affect the expansion of flood inundation areas in the lowlands. The most common natural disaster in Indonesia that often causes losses and even casualties is flooding. The causes of flooding include climatic factors and physical factors of the area.

One of the causes of flooding is continuous rainfall that exceeds the capacity of rivers, lakes, or drainage channels (Suparta, 2004). Meanwhile, according to Law No. 24/2007 on Disaster Management, a flood disaster is an event or situation where an area or land is submerged due to increased water volume.

Based on data from the National Disaster Management Agency (BNPB) which shows that in 2020 the most disasters that occurred in Indonesia were hydrometeorological disasters dominated by floods, landslides, and tornadoes. This can be seen in Table 1 below.

Table1. Data on Disaster Events in Indonesia in 2020

NO	Type Of Disaster	Number
1	Flood	1519
2	Tornado	1486
3	Landslide	1153
4	Abrasion	44
5	Forest and Land Fire	619
6	Earthquake	28
7	Volcano Eruptions	14
8	Drought	26

Source: http://dibi.bnpb.go.id

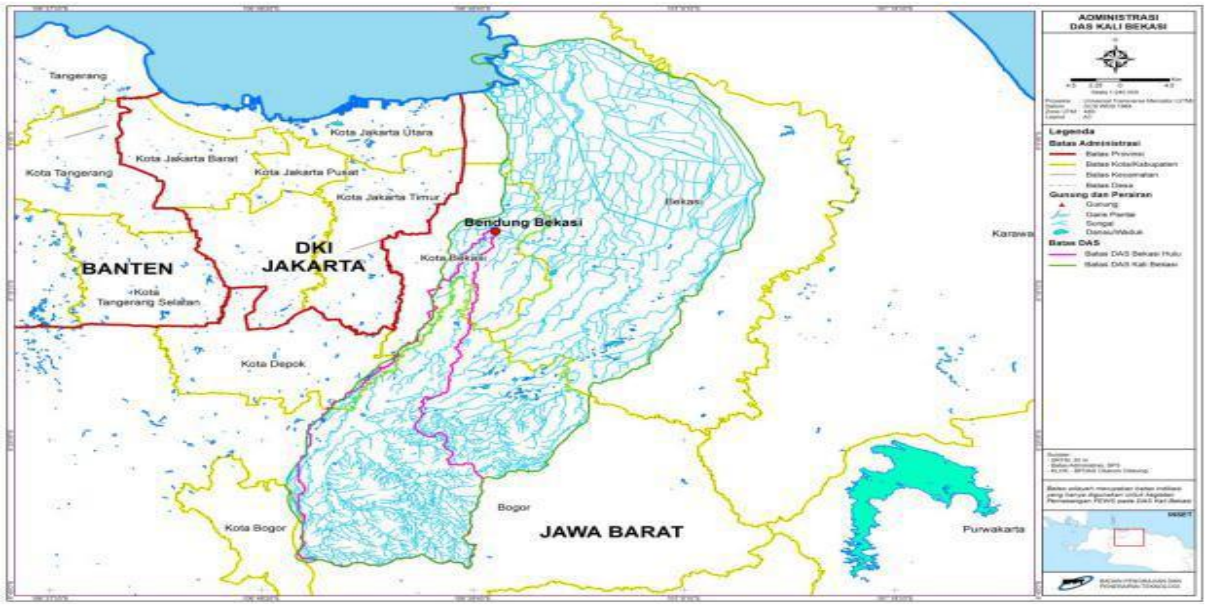
Referring to the 2020 data, flood disasters in Indonesia are the most common disasters, totaling 1519 incidents. The impact caused is 132 people died, 64 people were injured, 781,054 people were displaced and 3,843,714 people suffered (http://dibi.bnpb.go.id). There are three main watersheds that cross Bekasi City, namely the Sunter Watershed, Cakung Watershed, and Bekasi River Watershed. The Bekasi River tends to have a major contribution to the possibility of inundation and flood prone areas in the areas it crosses.

Research Objectives

The purpose of this research is to analyze how the government and vulnerable communities understand flood risk and how they work together in the decision-making process for flood risk reduction. This research focuses on vulnerable communities living in high flood risk areas in Jatiasih area, Bekasi City. This research also examines the efforts to increase resilience that have been made, as well as an evaluation of policies and plans related to flood disaster risk reduction in Bekasi City. In addition, the research was conducted to determine the barriers and obstacles to the involvement of vulnerable communities in decision-making related to flood disaster risk reduction.

Literature Review

Development in Bekasi City is very identical to development which causes less green open land, making Bekasi City prone to flooding. Bekasi City is one of the areas in West Java that is vulnerable to flooding (Khairana, 2013). Bekasi City is in three main watersheds, namely Bekasi Watershed (9,444.886 Ha), Sunter Watershed (3,970.014 Ha) and Cakung Watershed with a total area of 7,042.052 Ha (Nurhayati, 2009). One of the watersheds that often experiences flooding is the Kali Bekasi watershed which consists of the Cileungsi sub-watershed and the Cikeas sub-watershed, which crosses the Jatiasih Sub-district area, Bekasi City. Research conducted by Kadri, et al (2011) stated that the Upper Bekasi River Watershed with a total area of 39,045 ha experienced rapid changes until 2008. The increase in settlement area from the original 4.39% to 23.6% of the watershed area. In addition, Siswoko (2010) stated that the limited flow capacity of the Bekasi River to drain the overflow from the entire watershed, especially with the increase in discharge from upstream, the potential for overflow is even greater.



Picture1. Bekasi River Watershed (Source: BPPT, 2017)

The occurrence of flooding in Jati Asih Sub-district is not only caused by high rainfall, but also by the location of several housing estates on the banks of the Bekasi River, which is the meeting point between the Cikeas River and the Cileungsi River in Bogor Regency (Hikmah, 2016). Flooding in Bekasi City is caused more by land use change in the Upper Bekasi Watershed in the form of an increase in settlement area and a decrease in forest area (Kadri, 2011). The worst flood disaster occurred on April 21, 2016, with flood heights in residential areas reaching 3.5 to 4 meters. This was one of the reasons for the installation of early warning system instruments at that location (Akhirianto, 2018). At the time of the 2020 flood, data obtained until January 1, 2020 at 07.00 LT by the Meteorology, Climatology and Geophysics Agency that rainfall in the Jati Asih District and surrounding areas ranged from 259.6 mm to 335.2 mm (Damarjati, 2020).

In an effort to increase resilience, local governments and communities must contribute in facing the threat of flood hazards with early preparation, as well as sufficient knowledge to deal with flood disasters. Government and community preparedness for floods will help shape and plan several actions that need to be taken during floods. The success of the handling stage and evacuation process during a flood disaster is greatly influenced by the preparedness of the government and the community. Meanwhile, any disruption to aspects of community life is highly dependent on the size of the hazard, which is influenced by the capacity and vulnerability of the existing community (Daryono, 2010).

Research Methodology

The research was conducted from October to December 2022, in Bekasi City, West Java Province. This type of research is descriptive qualitative. Data collection was carried out through semi-structured interviews to find broader and open issues by asking for opinions and information from each source (Esterberg, 2002, in Sugiyono, 2016). The informants chosen were the Prevention and Preparedness Section of BPBD Bekasi City, Representatives of Jatirasa Village, Jatiasih Subdistrict, Bekasi City, and people affected by flooding in the Bekasi City area. As a supporting source, researchers conducted data assessment through literature studies such as books, journal articles, news articles and other documents relevant to this research. The data analysis technique process was carried out using the Miles, Huberman, and Saldana (2014) study which consists of 4 elements, namely data reduction, data

display, conclusion drawing and verification. After the data analysis technique was carried out, the author tested the credibility of the data through triangulation. The concept of triangulation is defined as a data checking technique that can be done by paying attention to the sources, methods and time carried out by the author. In this study, credibility testing was carried out by triangulating sources, where data collection was carried out by describing and categorizing the views of several sources which would later produce an agreement with the data sources that the author obtained while in the field (Sugiyono, 2016).

Results and Discussion

Urban conditions in the East Asia and Pacific region have environmental vulnerabilities that are rapidly changing, and there is uncertainty about the occurrence of disasters that are also related to the impacts of climate change (Jha and Stanton-Geddes, 2013). In addition, Herder et al (2011) argue that uncertainty has increased in recent times, leading to riskier decision-making. Uncertainty is inherent in planning (Constantino, et.al., 2009), with all decision-making involving risk.

Uncertainty also limits the measurability of risks associated with limited data and information, complicating the risk assessment process (Renn and van Asselt, 2011). Thus, integrating risk and uncertainty into urban planning decision-making is an approach to reduce these barriers, recognizing that two factors need to be considered, namely: 1) the decision-making environment in which uncertainty is involved; and 2) constraints on the implementation of decision outcomes for planning (Herder, et.al., 2011).

There are positive international implementations of strong leadership from policy makers in implementing specific strategic decisions to integrate risk and uncertainty issues into flood management in urban environments. The restoration of the Cheonggyecheon river in South Korea is one example of the implementation of policy makers' decisions to reduce risk by improving the river area and promoting it as an important asset of Seoul City while implementing flood risk management (Cho, 2010). In addition, in the Queensland region of Australia, there was also a policy decision implemented in 2011 related to flood risk management in rural environments in the Grantham region, by moving people away from risk and disaster-prone areas, through community involvement and empowerment in decision-making (QRA, 2011).

As for vulnerable communities considering that they can adapt and live with floods through their own coping mechanisms, the Provincial Government sees that flood risk reduction can be successful once at-risk communities are aware of risk management and agree to be relocated (Sunarharum, 2016). For example, the level of knowledge and actions of the community in the Pondok Gede Permai Housing area, Jati Asih Subdistrict related to flooding is quite good, because the community has a lot of experience dealing with flood disasters while living in the location, and the community is enthusiastic about learning from this experience. In addition, the utilization of information regarding flood warnings/early detection by the community by relying on notifications obtained from the community through WhatsApp groups or telegrams is also applied by some people in Jati Asih Subdistrict. The information contains the water level of the Cileungsi River and Cikeas River upstream along with information on weather conditions (Akhirianto, 2017).

In addition, disaster impact reduction can be fulfilled due to the ability of the community to deal with vulnerability and uncertainty (Godschalk, 2003). Building resilience can improve how stakeholder policy programs complement existing forms of governance for disaster risk reduction; can assist in understanding whether stakeholder policies are actively mapped into broader networks of cooperation among other stakeholders; can explain the extent to which stakeholder policies include diverse community members; and show how experiences from past disasters influence the development and operation of stakeholder policy programs (Djalante, 2012).

Picture2. Pondok Gede Permai Housing, Jatiasih, Bekasi City which is observed to be in the vicinity of Bekasi River (Source: Author's Documentation, 2022)

The increase in resilience carried out by vulnerable communities in flood-affected areas in Jati Asih Subdistrict, Bekasi City is generally carried out independently, namely by making their homes into two floors. This is in accordance with research conducted by Akhirianto (2018) that people are not accustomed to evacuating when a flood disaster occurs. So that most people make their own homes on the second floor as an evacuation site rather than having to evacuate to a safe relative's house or to a neighbor's house that has two floors. People are accustomed to staying at home when a flood occurs, and carry out activities outside the home in order to seek information, logistical assistance, or health assistance for family members. (Akhirianto, 2018).

Policies and plans for disaster risk management in Indonesia have emerged in response to major disasters that occurred in Indonesia, such as the 2004 tsunami disaster that occurred in Aceh. Meanwhile, policies and planning for disaster risk management in the Bekasi City area refer to policies and planning at the provincial, national and international levels, serving to translate the new paradigm of disaster management in Indonesia in order to reduce disaster risk. The policies also serve as guidelines for designing and implementing flood risk management in Bekasi City. Policies at the international and national levels provide direction on the principles or concepts related to disaster risk reduction in each policy and plan at the provincial level. These principles are adopted and translated into more specific strategies for disaster risk management at the provincial and district/city levels.

The national disaster management plan was recognized by the central government as insufficient to cope with a major disaster after the 2004 Tsunami disaster that caused 227,896 deaths and cost approximately USD 14 billion (Center for Excellence, 2011). In this regard, there are several policies and plans initiated or combined with the concept of disaster management to reduce disaster risk. These policies consist of principles that can be realized and implemented at the local and community levels. Table 2 below summarizes the policy framework that guides or is related to disaster risk reduction in Bekasi City.

Table2. Disaster Risk Reduction Policy Framework

No.	Level	Policy Document	Year
1	National	Law No. 7/2004 on Water Resources	2004
2		National Medium-Term Development Plan (RPJMN)	2005-2009
3	International	Hyogo Framework for Action (HFA)	2005-2015
4	National	National Long-Term Development Plan (RPJPN)	2005-2025
5		National Action Plan for Disaster Risk Reduction	2006-2009
6		Law of the Republic of Indonesia Number 24 Year 2007 on Disaster Management	2007
7		Law Number 26 Year 2007 on Spatial Planning	2007
8		Presidential Regulation (Perpres) No. 8/2008 on the National Disaster Management Agency	2008
9		Government Regulation (PP) No. 21/2008 concerning the Implementation of Disaster Management	
10		Government Regulation (PP) No. 22/2008 on Disaster Relief Funding and Management	
11		Government Regulation (PP) No. 23/2008 on the Participation of International Institutions and Foreign Non-Governmental Organizations in Disaster Management	
12		National Action Plan for Disaster Risk Reduction	2010-2012
13		National Disaster Management Plan (RENAS PB)	2010-2014
14		National Medium-Term Development Plan (RPJMN)	
15		Government Regulation (PP) No. 38/2011 on Rivers	2011
16	Province	Regional Spatial Plan of West Java Province	2009-2029
17	National	Build Capacity through Disaster Risk Reduction Strategies	2014
18		National Medium-Term Development Plan (RPJMN)	2015-2019
19		National Disaster Management Plan	2015-2019
20	Internasional	Sendai Framework for Disaster Risk Reduction (SFDRR)	2015
21	Province	Increasing the Cultural Capacity of Disaster Resilient Communities in the West Java Province Region	2020

Source: Processed by the Author, 2022

The Government of Indonesia has issued Law No. 27/2007 on Disaster Management as the national policy framework for disaster management. This policy incorporates the main strategies of the HFA 2005-2015 and drives the formulation of three more specific policies, including Government Regulation (PP) No. 21 of 2008 on the Implementation of Disaster Management; Government Regulation (PP) No. 22 of 2008 on Disaster Relief Funding and Management; and Government Regulation (PP) No. 23 of 2008 on the Participation of International Institutions and Foreign Non-Governmental Organizations in Disaster Management.

The regulation of Law No. 27/2007 on Disaster Management has brought a new perspective to disaster management in Indonesia. This perspective is then implemented into policies and plans related to disaster risk reduction. In 2010, the National Disaster Management Agency (BNPB) launched the National Action Plan for Disaster Risk Reduction (RAN-DRR) 2010-2012, which provides a framework to implement the Hyogo Framework for Action (HFA) in order to reduce risks and vulnerabilities to disasters (Tokyo Development Learning Center, 2011). BNPB also published the National Disaster Management Plan 2010-2014, which consists of policies, strategies and priorities for disaster management, and is intended as a guideline for disaster management in Indonesia (UNDP, 2010). A number of programs carried out by the Bekasi City Government in an effort to reduce the risk of flooding are maximizing pump operations, increasing the number of water embankments (polder) and widening the diameter of culverts (crossing) at a number of flood points in the Bekasi City area.

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Regarding flooding issues in Bekasi City, policies and plans related to flood risk management are able to translate concepts and strategies from policies and plans at the national level, which serves as the national policy for disaster risk reduction. As discussed earlier, policies for disaster risk reduction in Indonesia need to involve effective communication strategies and information exchange between the government and relevant stakeholders. Although disaster risk reduction governance mechanisms have been effectively implemented at the national and provincial levels, the implementation of these strategies has not been well implemented at the community level. This can be seen from the existence of vulnerable communities represented by the Cileungsi-Cikeas River Care Community (KP2C), which in 2018, has proposed that the Bekasi City Government normalize the Bekasi River and Cileungsi-Cikeas Sub-River, where the last normalization of the Bekasi River was carried out in 1973 (AntaraNews, 2018).

The lack of involvement of vulnerable communities, in this case not accommodating the proposals of representatives of vulnerable communities through KP2C related to the decision-making process, has the potential to hamper coordination and possibly lead to community distrust. Although policy makers related to flood risk management programs in Bekasi City have the power to encourage the implementation of these programs, the sense of ownership of vulnerable communities in Bekasi City towards various programs in the context of flood risk management tends to be lacking.

Conclusion

Based on the analysis, flood risk management in Bekasi City has been supported by 21 policies and plans with clear objectives, strategies, priorities, and programs to reduce disaster risk. However, there are still shortcomings, especially regarding a clear approach to procedures and mechanisms for cooperation in the decision-making process and plan implementation. In relation to flood risk management in Bekasi City, this study suggests that the establishment of a cooperation forum that covers all levels of authority, and involves not only government agencies but also non-governmental organizations and community leaders, is likely to be helpful in ensuring the continuity of interaction

between the local government and the community. The forum will also foster two-way communication and possibly empower community groups.

Incorporating local government and community cooperation frameworks into decision-making is likely to support increased community resilience. This cooperative form of disaster risk management requires a strong and sustained commitment from the government, including the provision of funding and assistance in order to improve the capacity of stakeholders to engage in decision-making and plan implementation. This is especially important when dealing with marginalized communities in disaster risk reduction planning. This research significantly suggests that flood risk management priorities should focus on strategies to build community resilience and engage communities in governance mechanisms to address multiple vulnerabilities.

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