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# Policy and public management on earthquakes

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**ABSTRACT**

Disasters are the result of extraordinary events (hazards) occurring in vulnerable communities at a time when the community is unable to cope with the various implications of these extraordinary events. This study aims to determine public policy and management regarding earthquakes. The research method used is a qualitative one. Data collection was carried out using a literature review related to policies and public handling related to the earthquake disaster. The results of this study state that it is necessary to map earthquake-prone areas, which should be carried out by research institutions. Central and regional government policies as well as to increase public awareness of disaster threats. There is a need for rules regarding zoning and building construction, both for office housing and public facilities, with earthquake-resistant construction so as to minimize casualties. These rules must be followed by the following inspections before and during the construction of the building: For people who can't afford it, volunteers are provided to help provide input in building earthquake-resistant buildings. This second approach is often called structural mitigation because it places more emphasis on strengthening the entire physical structure. The third to fifth approaches are usually called non-structural mitigation. So that with the existence of policies and public management, it is hoped that they can provide solutions and countermeasures in handling earthquake disasters.



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## Introduction

Indonesia, which consists of a group of islands, has a very high disaster potential and also varies greatly in terms of the type of disaster. Through laws (government regulations, presidential decrees, provincial regulations, etc.) and collaborative design and approval processes, disaster management policies and regulations are enacted after a disaster so that the organizations or agencies responsible for disaster regulation can carry out their duties. mandated responsibility. UU no. 24 of 2007 defines a disaster as "an event or series of events that threaten and disrupt people's lives and livelihoods caused, both by natural factors and/or non-natural factors as well as human factors, resulting in human casualties, environmental damage, property losses, and psychological impact" (Republik Indonesia, 2007). The definition of disaster as described above contains three basic aspects, namely the occurrence of events or disturbances that threaten and damage (hazard), the event or disturbance threatens the life, livelihood and functioning of the community, and hese threats result in casualties and exceed the community's ability to cope with their resources. Disasters can be interpreted as all events or series of events that threaten and disrupt the lives and livelihoods of the community caused, both by natural factors and / or non-natural factors and human factors resulting in human casualties (Fitriyani et al., 2021).

Disasters can occur, because there are two conditions, namely the existence of events or disturbances that threaten and damage (hazard) and vulnerability (vulnerability) of the community (Awusi et al., 2018). If a hazard occurs, but the community is not vulnerable, it means that the community can handle disturbing events on their own, while if the condition of the community is vulnerable, but there are no threatening events, then there will be no disaster (Susanti et al., 2020). Where disasters cause both moral and material losses in the midst of society, causing mental degradation of the community, psychological disorders and casualties (Sabir & Phil, 2016). These natural disasters include earthquakes, tsunamis, erupting mountains, floods, droughts, and landslides.

Indonesia's position in an area prone to natural disasters has forced Indonesia to lose hundreds of thousands of people in the last decade due to various natural disasters, such as typhoons, floods, tsunamis, earthquakes, volcanic eruptions, landslides and droughts. Although a quick and effective response has been attempted as optimally as possible, the long-term psychological and socio-economic impacts of disasters continue to be experienced by disaster victims in a relatively long period of time. In terms of policies and management, it is necessary to be fast and responsive to resolve disasters that occur. According to (Nugroho, 2017), an earthquake is an event of shaking the earth due to a sudden release of energy in the earth which is characterized by the fracture of rock layers in the earth's crust. Earthquake disasters in Indonesia are indeed a natural occurrence, considering the geophysical, geotectonic and volcanic properties that exist in the territory of Indonesia (Murtianto, 2016). Given the geological conditions faced by Indonesia, various efforts are needed to reduce disaster risk, both through physical development and awareness and improvement of the ability to face disaster threats. People's hopes and dreams are dashed after natural disasters, yet they never stop hoping to return to normal (Karatu, 2022). According to (Fery & Yani, 2019) emphasized that the community fully hopes to restore the economy of people affected by disasters from government and / or non-government policies.

Research conducted by (Faturahman, 2018) states that conceptual disaster mitigation as output, disaster-prone areas empirical conditions as input, implementing and legislative processes as processes in the public policy cycle. In addition, disaster mitigation is included in the policy agenda in the RPJMD of Pacitan, Ponorogo and Trenggalek Districts through disaster prevention and preparedness development programs to improve the ability of local governments to deal with natural disasters. Furthermore, research conducted by (Mayendri, 2022) stated that the implementation of earthquake disaster mitigation policies in Padang City was classified as ineffective, due to obstacles that could be seen from the inadequate infrastructure facilities owned by BPBD, insufficient employee capacity and low public awareness of the risk of disaster impacts. Research conducted by (Novert, 2015) states that first: community capacity building is translated into actions to integrate the disaster preparedness curriculum into the formal education curriculum, disaster socialization, disaster simulation and community empowerment through the establishment of Disaster Preparedness Groups in each village. Second: Provision of community preparedness support facilities, by establishing policies, making operational guidelines in emergencies and building evacuation facilities, as well as early warning facilities. However, the majority of programs made are still incidental and have not been implemented sustainably. So based on the description above, researchers want to conduct research with the aim of knowing public policy and management about earthquakes.

## Method

This paper is prepared using a descriptive method through a qualitative approach. according to (Sugiyono, 2019), qualitative research methods are often called naturalistic research methods because the research is carried out in natural conditions. Data collection is carried out using literature studies through literature reviews related to policies and public handling related to earthquake disasters. Data collection techniques in this study used interview techniques, observation or observation techniques, and documentation techniques. Data analysis used is data reduction, data presentation, and conclusion drawing or verification.

## Results and Discussions

### Conceptual Foundation

### Disaster Management Model

Disasters are the result of the emergence of an extraordinary event (hazard) in a vulnerable community so that the community cannot cope with the various implications of the extraordinary event. Disaster management basically seeks to prevent the community from disasters either by reducing the possibility of hazards arising and overcoming vulnerabilities. There are five models of disaster management, namely:

*Disaster management continuum model.*
This model is probably the most popular model because it consists of clear stages so that it is easier to implement. The stages of disaster management in this model include emergency, relief, rehabilitation, reconstruction, mitigation, preparedness, and early warning.

*Pre-during-post disaster model*
This disaster management model divides the stages of activities around the disaster. There are activities that need to be carried out before a disaster, during a disaster, and after a disaster. This model is often combined with the disaster management continuum model.

*Contract-expand models*
This model assumes that all stages in disaster management (emergency, relief, rehabilitation, reconstruction, mitigation, preparedness, and early warning) should still be carried out in disaster-prone areas. The difference between disaster and non-disaster conditions is that when certain stages of disaster are more developed (emergency and relief) while other stages such as rehabilitation, reconstruction, and mitigation are less emphasized.

*The crunch and release model*
Disaster management emphasizes efforts to reduce vulnerabilities to cope with disasters. If the community is not vulnerable then the disaster will also be less likely to occur even though the hazard still occurs.

*Disaster risk reduction framework*
This model emphasizes disaster management efforts on identifying disaster risks in the form of vulnerabilities and hazards and developing capacities to reduce these risks.

**Natural Disaster Management Policy**
In recent years, disaster management policies have undergone several changes in trends as can be seen in the table. Some trends to note are: 1) The political context that increasingly encourages disaster management policies to become a legal responsibility; 2) Increasing emphasis on increasing community resilience or reducing vulnerability; 3) Disaster management solutions emphasize community organizing and development processes.

In determining a disaster management policy, the process that generally occurs consists of several stages, namely agenda setting, decision making, policy formulation, policy implementation, and policy evaluation. In the case of Indonesia, the Central Government is currently at the stage of policy formulation (the process of drafting several Government Regulations is ongoing) and policy implementation (BNPB has been established and is pushing for the process of establishing BPBDs in the regions). Meanwhile, the Regional Government is in the stage of setting the agenda and making decisions. Some regions that have experienced major disasters have gone further at the stage of policy formulation and policy implementation.

The ideal disaster management policy must not only be developed through the right process, it also needs to clearly define the following: 1) The division of responsibilities between the Central and Regional Governments; 2) Appropriate allocation of resources between Central and Regional Governments, as well as between various related functions; 3) Clear and firm regulatory and institutional changes; 4) Mechanisms of work and arrangements between various portfolios of disaster-related institutions. The disaster management institutional system developed in Indonesia and became one of the focuses of the study is contextual in nature. In the regions there are several institutions and mechanisms that previously existed and were running. Institutional policies designed by the Central Government will interact with existing institutions and mechanisms and specifically with people who have been involved in disaster management activities.

The policy process is dynamic and consists of several steps. Most importantly there is a lab identifying problems, placing them on the political agenda, representing various interests, designing alternative solutions or strategies, setting implementation goals, implementing, evaluating, and revising or resolving stages. The first three steps are relatively simple in a disaster event. The available alternatives vary depending on geophysical considerations. Its implementation is done by making government regulations, giving mandates and providing financial assistance. Evaluation is carried out after the disaster and the results are issued after knowing the number of losses that have not been anticipated before. The development and implementation of public policies can be carried out either by local, national or international governments.

In policy making, the magnitude of the problem is often defined by the magnitude of the loss although it is not the only motivation for the magnitude of concern. The first step in designing policy is the recognition or recognition that a disaster is a public threat. By establishing a disaster as a public threat, policy makers must set a priority scale considering the scarcity of resources. The simple criteria are the magnitude of the disaster and the ease of handling. Important issues must take precedence over those that require major initiative. Setting priorities requires certain considerations, such as universal health and safety standards. For example, public

policy can intervene whether the loss of life and property is not due to individual fault, but due to lack of protection for volunteers whose work is at high risk. In addition to. Public policies cannot be enforced without spatial considerations. Since disasters have been identified from the start at the local level, public responsibility falls on local governments. However, disasters that have a national impact require more national policies on issues related to spatial magnitude, so public policies need to reflect an adequate response. Policies should be based on the magnitude of the problem or potential problems in the future.

**Policy Implementation**

Disaster policies can be classified into various categories based on the elements: level of government, objectives, and timing of events. The three government groups are central, provincial and local. Both central and local governments apply regulations for disaster management, and several provinces take an active role in policy development and implementation. Local governments can cooperate with the central government in drafting a bruni earthquake law (eg national standards for public service facilities). The three levels of government apply different means to achieve goals. Regulations clarify what must be done within the framework of "command and supervision7' which demands completion to certain standards. The same thing happens with mandates, orders or responsibilities that are related or not related to special regulations. Program activities can be viewed as tactics for implementing strategy. Strategy can be mandated.

**Earthquake Disaster Mitigation**

Disaster mitigation is a series of efforts to reduce disaster risk, both through physical development as well as awareness and capacity building in dealing with disaster threats. Mitigation according to William Nick Carter in the aspect of public awareness requires awareness or understanding of the area that is the settlement of the community (Nursyabani et al., 2020). Disaster mitigation is an activity that acts as an action to reduce the impact of a disaster, or efforts are made to reduce victims when a disaster occurs, both loss of life and property. The following are some earthquake disaster mitigation efforts based on the Kochi International Association (2008) and BMKG (nd): Identify the location of the building where you live or work, which is likely to be on an earthquake fault, as well as how strong the potential for an earthquake to occur in the area is based on the mapping of earthquake-prone areas.

Building a house with earthquake-resistant construction in accordance with applicable standards, in Indonesia, SNI 03-1726-2002, Procedures for Planning Earthquake Resistance for Buildings is used. In general, for example, the condition of the soil on which the building will be erected is dry and solid, does not use backfill, the foundation is made of iron-reinforced concrete, the walls are balanced and the construction material is not damaged because it is too old or eaten by termites. Details can be found in the Technical Guidelines for Earthquake Resistant Houses and Buildings compiled by the Ministry of Public Works in 2006. 3. Renovate buildings that are not yet earthquake resistant and whose condition is old or in poor condition. This is important to do, especially for public buildings that are used by many people, such as educational facilities, health facilities, and government buildings. 4. Reduce the risk of shifting and collapsing furniture when an earthquake occurs. Sliding, collapsing, or falling furniture can block egress and fall on and injure people. Things that can be done to reduce the risk are not placing high furniture such as cupboards on the carpet, but on a hard and flat floor, placing heavy items under light items, not placing dangerous items such as scissors in places where height, installing earthquake-resistant pegs, using adhesive rubber on electronic equipment such as computers, and rearranging the layout of furniture.

Renovate buildings that are not earthquake resistant and whose condition is old or bad. This is important to do, especially for public buildings that are used by many people, such as educational facilities, health facilities, and government buildings. Reduce the risk of shifting and collapsing furniture when an earthquake occurs. Sliding, collapsing, or falling furniture can block egress and fall on and injure people. Things that can be done to reduce the risk are not placing high furniture such as cupboards on the carpet, but on a hard and flat floor, placing heavy items under light items, not placing dangerous items such as scissors in places where height, installing earthquake-resistant pegs, using adhesive rubber on electronic equipment such as computers, and rearranging the layout of furniture. Establish community-based independent organizations in earthquake disaster management, to increase public knowledge regarding earthquake disasters, create disaster maps for their respective regions and places of residence so that they can determine the safest place to take shelter when an earthquake occurs, both at home or workplace or outdoors as well as the nearest safe place to evacuate when an earthquake occurs, record important telephone numbers such as fire and ambulance numbers to anticipate the impact of earthquakes, increase alertness in dealing with earthquakes by holding earthquake simulations to practice self-rescue attitudes and actions , attitudes and actions towards the 37 nearest safe shelters during an earthquake, as well as attitudes and actions after the earthquake.

**Public Policy and Management of Earthquake Disasters**

Indonesia is a country that is classified as prone to disasters, both caused by nature and man-made. One of the natural disasters that often occur in Indonesia is earthquakes. This is related to Indonesia's geographical position which is located at the confluence of the Indo-Australian Plate, the Eurasian Plate, and the Pacific Plate (Setyorini, 2020) and is complicated by the presence of micro plates between the main plates. In addition, Indonesia also has 129 active volcanoes that stretch from Aceh to North Sulawesi. These two geographical conditions cause the high intensity of earthquakes in Indonesia. Almost every time, in Indonesia there are earthquakes, both recorded by tools and felt by humans (Rismawati, 2021).

An earthquake is a sudden release of energy that causes particle vibrations that spread in all directions due to the subduction process (Arif, 2022). According to (Widodo, 2017), earthquakes are seismic vibrations caused by the breaking or shifting of rocks somewhere in the earth's crust. These vibrations propagate through the ground in the form of vibration waves so that humans who are on the earth's surface feel the vibrations which are eventually called earthquakes. In general, there are two theories of the process of earthquakes, namely the theory of fault shift and the theory of elastic resilience (Prataopu, 2013). Fault shift theory began 225 years ago where the continents were one landmass called Pangaea. As time goes by, this land separates so that it is fundamental to the formation of the earth's plates which are still moving and trigger earthquakes. Meanwhile, according to the elastic elasticity theory that earthquakes are caused by the release of the elastic stretching energy of rocks in the lithosphere so that vibrations occur on the earth's surface, the greater the energy released, the stronger the vibrations generated (Pristanto, 2010).

Therefore, both the central and local governments implement regulations for disaster management, and several provinces play an active role in the development and implementation of policies. Local governments may cooperate with the central government in the drafting of earthquake laws (e.g. national standards for public service facilities). In policymaking, the magnitude of the problem is often determined by the magnitude of the loss, although that is not the only motivation for the magnitude of concern. The first step in designing policy is the recognition or recognition that a disaster is a public threat. Important issues should take precedence over issues that require major initiative. Setting priorities requires certain considerations, such as universal health and safety standards. Public policy cannot be enforced without spatial considerations. Because disasters have been identified early on at the local level, public responsibility falls on local governments. Policies should be based on the magnitude of the problem or potential future problems. So that central and local government policies and to increase public awareness of disaster threats. The need for rules regarding zoning and building construction, both office housing and public facilities with earthquake-resistant construction so as to minimize casualties. For people who cannot afford it, volunteers are provided to help provide input in building earthquake-resistant buildings. The need to improve the ability to deal with threats by providing knowledge and skills about first aid, preparing medical equipment and basic necessities such as drinking water, dry food, underwear, to securing savings in various corners of Indonesia is still done traditionally.

This is in line with research conducted by (Novert, 2015) stating that first: community capacity building is translated into actions to integrate the disaster preparedness curriculum into the formal education curriculum, disaster socialization, disaster simulation and community empowerment through the establishment of Disaster Preparedness Groups in each village. Second: Provision of community preparedness support facilities, by establishing policies, making operational guidelines in emergencies and building evacuation facilities, as well as early warning facilities. However, the majority of programs made are still incidental and have not been implemented sustainably. So with the existence of public policies and management, it is expected to provide solutions, countermeasures or steps in handling earthquake disasters. In addition, it is very necessary for local government intervention in terms of socialization of disaster management, disaster management and disaster mitigation at the village/kelurahan level. Local governments are also expected to make land use plans at the village level by taking into account disaster factors in the village.

## Conclusions

Several things were immediately carried out, namely, the need for mapping of earthquake-prone areas carried out by research institutions. Central and local government policies as well as to increase public awareness of the threat of disaster. The need for rules regarding zoning and the construction of buildings, both housing offices and public facilities with earthquake-resistant construction so as to minimize casualties. These rules must be followed by the following inspections before and during the construction of the building. For people who can't afford it, volunteers are provided to help provide input on building earthquake-resistant buildings. This second approach is often called structural mitigation because it emphasizes the strengthening of the entire physical building. The need to increase the ability to face threats by providing knowledge and skills about first aid,

preparing medical equipment and basic necessities such as drinking water, dry food, underwear, to securing savings in various rural areas of Indonesia is still carried out in the traditional way, such as saving money under the mattress, in wooden poles, or bamboo. The third to fifth approaches are usually called non-structural mitigation. The existence of public policies and management is expected to provide solutions, countermeasures or steps in handling earthquake disasters.

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