



Analysis of Government Policy Implementation in Natural Disaster Management Through National Search And Rescue (Sar) In Indonesia

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ABSTRACT

Indonesia is highly vulnerable to natural disasters due to its geographical location at the convergence of three major tectonic plates. This study aims to analyze how the government implements policies to address disasters, particularly in the context of national-level Search and Rescue (SAR) operations. Using a qualitative descriptive method and a literature review approach, this research evaluates data from national policy documents, academic references, and Warfield's (2008) disaster management theory. The findings reveal that although legal and institutional frameworks are in place through Law No. 24 of 2007 and the existence of BNPB and BASARNAS there are still major challenges in implementation. The main issues include weak inter-sectoral coordination, disparities in regional capacities, limited Search and Rescue (SAR) technology, and low levels of community preparedness. The integration of the six stages of disaster management proposed by Warfield (mitigation, preparedness, emergency response, recovery, capacity building, and adaptation) into Search and Rescue (SAR) policy has not been effectively implemented. There is a need to strengthen policies that are risk-based, sustainable, collaborative, and responsive to social and environmental changes. This study recommends improving inter-agency coordination, investing in Search and Rescue (SAR) technology, and empowering local communities as a strategic approach to disaster management in Indonesia. These findings highlight the need to strengthen inter-agency coordination and implement collaborative governance that can directly support the effectiveness of SAR policies at the practical level.

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Key word: government policy, natural disasters, national search and rescue, disaster management, Warfield theory.

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1. INTRODUCTION

Indonesia is a country with a high risk of natural disasters. Geographically, it consists of thousands of islands and is located at the convergence of four tectonic plates: the Australian Plate, the Eurasian Plate, the Pacific Ocean Plate, and the Indian Ocean Plate. In the eastern and southern regions, there is a volcanic belt stretching from Sumatra, Java, Nusa Tenggara, to Sulawesi. This belt consists of old volcanic mountain ranges and lowlands, most of which are wetlands. With these characteristics, Indonesia carries both potential and vulnerability to disasters such as earthquakes, tsunamis, volcanic eruptions, floods, and landslides (Basarnas, 2023).

Preparedness includes actions taken before, during, and after disasters occur. This means that individual readiness in facing disasters can be developed through understanding early signs, potential risks, and other influencing factors. Disasters can be caused by natural factors as well as human error. Examples of natural disasters include landslides, earthquakes, storms, tsunamis, volcanic eruptions, droughts, floods, and tidal waves. Meanwhile, acts of terrorism, conflicts, industrial accidents, transportation accidents, and forest fires are examples of disasters caused by human negligence. Both natural and human-induced disasters result in environmental and economic losses (Basarnas, 2023).

The National Agency for Disaster Management (BNPB) classifies disaster-related losses into several categories, including fatalities, missing persons, displaced populations, injured victims, affected populations, damage to housing, damage to health and educational facilities, road infrastructure damage, and land degradation. These losses are further grouped into four categories: the number of occurrences in a region, the frequency of events per population, the proportion of events to the total population, and damage related to GDP. Indonesia's position at the convergence of three active tectonic plates the Indo-Australian Plate in the south, the Eurasian Plate in the north, and the Pacific Plate in the east makes it highly prone to disasters. These plates collide and move, with the Indo-Australian Plate shifting northward and the Eurasian Plate moving southward. This movement creates seismic zones, chains of active volcanoes, and fault lines, making Indonesia one of the most disaster-prone regions where earthquakes and volcanic eruptions can occur at any time (Basarnas, 2023).

According to BNPB data, 10,021 disasters were recorded in Indonesia between 1990 and 2010 across 33 provinces. These disasters were classified into 17 categories, including acts of terrorism, floods, a combination of floods and landslides, tidal waves, tsunamis, earthquakes, combined earthquakes and tsunamis, extraordinary events (KLB), landslides, industrial accidents, transportation accidents, forest fires, pest infestations, conflicts, droughts, storms, and volcanic eruptions. The five most frequent disasters in Indonesia are floods, droughts, tornadoes, landslides, and earthquakes. The year with the highest number of disasters was 2008, with a total of 1,849 events (Arsyad, 2017). More recently, BNPB reported that in 2023, more than 3,000 disasters occurred, dominated by floods, landslides, and tornadoes. The losses incurred include casualties, infrastructure damage, loss of productive land, and even macroeconomic impacts on the national Gross Domestic Product (GDP).

Indonesia is located in a disaster-prone region due to its geographical position surrounded by three major tectonic plates (Indo-Australian, Eurasian, and Pacific). According to BNPB data, more than 3,000 disasters occur annually, with floods and landslides being the most dominant events. The government, through national policies, established the National Disaster Management Agency (BNPB) under Law No. 24 of 2007 on Disaster Management, and strengthened the role of

the National Search and Rescue Agency (BASARNAS) in rescue operations based on Law No. 29 of 2014 on Search and Rescue and Presidential Regulation No. 83 of 2016 concerning BASARNAS. These policies emphasize the importance of Search and Rescue (SAR) operations within the disaster management cycle. However, challenges frequently arise in the field, such as weak inter-agency coordination, lack of community training, and logistical limitations in Search and Rescue operations. Therefore, it is essential to analyze the implementation of disaster management policies and the execution of Search and Rescue operations in Indonesia (Kusworo & Yubsir, 2024).

This study focuses on analyzing the implementation of government policies related to national SAR operations in Indonesia, with particular emphasis on Law No. 29 of 2014 and Presidential Regulation No. 83 of 2016. The analysis is conducted using Warfield's (2008) disaster management cycle theory, which encompasses the phases of mitigation, preparedness, emergency response, and recovery (Warfield, 2008). The research questions posed are: (1) How effective is the implementation of SAR policies at the practical level? (2) To what extent do inter-agency coordination and collaborative governance support the success of SAR operations in Indonesia?

2. METHOD

This study employs a descriptive qualitative method with a literature review approach. The sources of literature include national policy documents such as Law No. 24 of 2007, books on disaster challenges and Search and Rescue (SAR) operations in Indonesia, as well as relevant scientific articles and journals. The research data are derived from secondary literature, including: national policy documents, Law No. 24 of 2007 on Disaster Management, Law No. 29 of 2014 on Search and Rescue, and Presidential Regulation No. 83 of 2016 on BASARNAS; academic books on disaster challenges and Search and Rescue (SAR) operations in Indonesia; scholarly journal articles and research reports related to the implementation of disaster and SAR policies; as well as official government reports from BNPB, BASARNAS, and other relevant ministries/agencies.

The literature selection was carried out based on the following criteria: (1) type of document, including regulations, academic books, journal articles, and research reports; (2) publication range between 2007–2024 to align with the context of policy implementation following the enactment of the Disaster Management Law; and (3) sources obtained from reliable databases such as Google Scholar, Sinta, and official government portals. The scope of analysis is limited to the implementation of national SAR policies, particularly Law No. 29 of 2014 and Presidential Regulation No. 83 of 2016, with a focus on inter-agency coordination, collaborative governance, and the effectiveness of SAR operations. The analysis does not cover international policies or local policies that are not directly related to the implementation of national SAR. The analytical technique applied is content analysis to identify key themes related to the challenges and effectiveness of SAR policy implementation. The stages of analysis include: (1) reviewing and selecting literature according to the criteria; (2) categorizing key issues such as institutional coordination, resource readiness, and implementation barriers; (3) interpreting the meaning and patterns emerging from the literature findings; and (4) framing the results within Warfield's (2008) disaster management cycle, which consists of mitigation, preparedness, emergency response, and recovery.

3. FINDINGS AND DISCUSSION

Indonesia is a country with a high level of vulnerability to natural disasters due to its geographical position within the Ring of Fire, where three major tectonic plates converge: the Indo-Australian, Eurasian, and Pacific Plates. The combination of geological conditions,

topography, and a tropical climate makes the region highly susceptible to various disasters such as earthquakes, tsunamis, volcanic eruptions, floods, landslides, as well as forest and land fires. According to data from the National Disaster Management Agency (BNPB), more than 3,000 disaster incidents occur annually, with floods, extreme weather, and landslides accounting for the highest figures.

The high frequency and impact of disasters have driven the government to formulate and implement various policies for disaster management. One of the key policies is the enactment of Law No. 24 of 2007 on Disaster Management, which serves as the foundation for establishing a coordinated national disaster management system. Through this law, the National Disaster Management Agency (BNPB) was established at the central level, along with Regional Disaster Management Agencies (BPBD) at the provincial and district/municipal levels. The presence of the National Search and Rescue Agency (BASARNAS), which is tasked with carrying out search and rescue operations, represents a crucial component in the implementation of these policies (Kusworo & Yubsir, 2024).

Although the regulatory framework and organizational structures are already in place, the implementation of policies in the field still faces numerous complex challenges. Coordination among institutions, both vertically (between central and regional levels) and horizontally (across sectors), often does not function effectively. When disasters strike, overlapping responsibilities and delays in the distribution of logistics frequently occur due to the absence of an effective unified command system. One of the indicators of weak policy implementation can be seen in the uneven capacity of local governments in developing disaster preparedness systems.

Many Regional Disaster Management Agencies (BPBD) face budget constraints, a lack of personnel training, and insufficient early warning systems. These conditions hinder the effective implementation of nationally formulated policies, which are often designed through a top-down approach, at the local level. In the context of Search and Rescue (SAR) operations, although BASARNAS has established SAR standby units in various areas, the shortage of essential SAR equipment such as helicopters, speedboats, drones, sonar, and modern evacuation tools remains a major challenge (Nakoe & Lalu, 2022). A study by Pratama and Wahyuni (2023) further reveals that weaknesses in local government preparedness often stem from institutional gaps and suboptimal coordination with central agencies such as BNPB and BASARNAS.

Local community participation in Search and Rescue (SAR) operations remains limited due to a lack of disaster response education and training. Yet, the critical window for victim evacuation particularly within the first six hours after a disaster (the golden time) is crucial in determining the number of lives that can be saved. In the Indonesian context, communication among institutions tends to be restricted to specific sectors and is often carried out manually, while resources such as SAR equipment and trained personnel are unevenly distributed. Although implementers generally demonstrate strong motivation, their efforts are not adequately supported by regular training. Moreover, the highly hierarchical and rigid organizational structure hinders the speed of decision-making during crises.

The bureaucratic culture, which prioritizes administrative and reactive measures over preventive approaches, poses a significant challenge. Modern disaster management emphasizes disaster risk reduction (DRR) through community education programs, the implementation of evacuation drills, the development of disaster-resilient infrastructure, and the advancement of information systems supported by digital technology (Kusworo & Yubsir, 2024). The effectiveness of operations is largely determined by the government system's ability to make rapid

collaborative decisions, supported by integrated information technology (Kapucu, N., & Garayev, 2019). The implementation of disaster management policies and national Search and Rescue (SAR) operations in Indonesia needs to be strengthened through several strategic measures:

1. More effective operational decentralization, accompanied by the strengthening of BPBD's institutional capacity.
2. The development of an integrated information system that connects BNPB, BPBD, BASARNAS, and other relevant agencies in real time.
3. Increased investment in Search and Rescue (SAR) technology and community volunteer training, particularly in disaster-prone areas.
4. Strengthened cross-sectoral coordination, including the involvement of the military (TNI), police (Polri), NGOs, and higher education institutions within a collaborative framework.

From a public policy perspective, the implementation of disaster management policies does not only focus on technical execution but also encompasses cross-sectoral coordination, community participation, and continuous evaluation. This decentralization is in line with the principle of decentralized governance, while the integration of information systems supports evidence-based policy making. The enhancement of technological capacity and community volunteer training reflects a policy orientation toward capacity building and the strengthening of community resilience. Furthermore, multi-actor coordination involving government, security forces, NGOs, and academia illustrates a collaborative governance model that ensures policy objectives can be achieved effectively and sustainably (Danar *et al.*, 2021).

According to the disaster report from BNPB, during the year 2021, from January 1 to December 28, a total of 3,058 natural disaster events were recorded in Indonesia. Floods were the most common type of disaster, affecting almost every region of Indonesia, with a total of 1,288 incidents or approximately 42.1%. Extreme weather ranked second with 791 incidents, followed by landslides with 623 cases. During the same period, forest and land fires were recorded at 265 events. Other types of disasters included tidal waves and coastal abrasion with 44 incidents, earthquakes with 31 incidents, drought with 15 incidents, and a single volcanic eruption (BNPB, 2021).

As an illustration, the United States through FEMA (Federal Emergency Management Agency) has developed various mitigation initiatives, including land-use regulation. As highlighted by Alexander (2021), effective disaster risk management requires cross-sectoral and multi-level governance approaches that are strategically coordinated, particularly in densely populated and high-risk urban areas (Abdulhalim *et al.*, 2021). These initiatives are part of a comprehensive mitigation plan, which includes measures for flood hazards, coastal areas, and geological risks. Mitigation models can be used to simplify the implementation of land-use regulations in different regions, including Indonesia. The development of such models can be carried out by utilizing Geographic Information System (GIS)-based applications. The resulting models are expected to be applied in various regions of Indonesia to effectively support disaster risk reduction.

Disasters occur when an extraordinary incident (hazard) strikes a vulnerable community, rendering people unable to cope with the various effects of the incident. The primary goal of disaster management is to protect communities from disasters, either by reducing the likelihood of hazards or by addressing the level of vulnerability. There are five models of disaster management (Kusworo & Yubsir, 2024), namely:

1. Disaster Management Continuum Model: This model is one of the most popular because it provides clear stages, making it easy to implement. The stages in this model include emergency, relief, rehabilitation, reconstruction, mitigation, preparedness, and early warning.
2. Pre-During-Post Disaster Model: This model categorizes disaster management stages based on the timing of events, namely before, during, and after a disaster. Each stage involves specific activities aimed at reducing the impacts of disasters. This model is often combined with the Disaster Management Continuum Model.
3. Contract-Expand Model: This model assumes that all stages in disaster management (emergency, relief, rehabilitation, reconstruction, mitigation, preparedness, and early warning) must continue to be implemented in disaster-prone areas. The difference lies in priority: during a disaster, stages such as emergency and relief are expanded, while other stages like rehabilitation, reconstruction, and mitigation receive less emphasis.
4. The Crunch and Release Model: This model focuses on reducing vulnerability to manage disasters. If communities are not vulnerable, the likelihood of disaster impacts will be minimal, even when hazards occur.
5. Disaster Risk Reduction Framework: This model emphasizes the identification of disaster risks, both those originating from vulnerabilities and hazards, as well as the development of capacities to reduce these risks.

Correlation with the Implementation of Government Policy in Managing National SAR Disaster Response in Indonesia. This study emphasizes the implementation of government policies, particularly in Search and Rescue (SAR) operations. When linked to Warfield's theory, the primary focus is on the Response phase; however, it must also be understood in relation to the other phases to ensure that SAR policies can be carried out effectively and sustainably. Tierney (2022) indicates that disaster policy adaptation that is responsive to social, economic, and climate dynamics is an essential requirement for national disaster management systems to remain relevant and effective in the long term (Tierney, 2012). Warfield (2008) explains that disaster management consists of a dynamic cycle encompassing six main phases: Mitigation, Preparedness, Response, Recovery, Development, and Adaptation to Risks (Warfield, 2008).

Effectiveness of the Implementation of National Search and Rescue (Sar) Policy: an Analysis Through Warfield's Theoretical Perspective

Disaster management is a well-structured public policy process that involves various stages, ranging from prevention to post-disaster recovery. Warfield (2008) proposed the Disaster Management Cycle, which consists of six interrelated phases: mitigation, preparedness, response, recovery, capacity development, and adaptation to risks. Each phase in this cycle complements one another and forms a strategic foundation for the formulation and implementation of disaster policies by the government. In the context of Indonesia, the implementation of government policies in disaster management, particularly through Search and Rescue (SAR) operations, is primarily emphasized during the response phase. The success of emergency response largely depends on the quality of planning in the preceding stages, as well as the ability to manage post-disaster recovery and development. This implies that the effectiveness of SAR operations is not only determined by the speed of response when a disaster occurs but also by the integration of policies across all phases that strengthen national disaster resilience. This model highlights the

importance of formulating holistic and sustainable policies, incorporating capacity building and adaptation as integral components of the disaster management cycle (Trisnawati *et al.*, 2020).

The Government of Indonesia, through the National Search and Rescue Agency (BASARNAS), is mandated to conduct Search and Rescue (SAR) operations during emergencies, both in relation to natural and non-natural disasters. The implementation of SAR policies cannot operate in isolation. It requires support from effective risk mitigation systems, such as disaster-prone area mapping and the development of disaster-resilient infrastructure, as well as well-planned preparedness programs, including training for SAR personnel, integrated simulations, and strengthening of local capacities. Coordination among various institutions including BNPB, the Indonesian National Armed Forces (TNI), the National Police (POLRI), technical ministries, and civil society organizations also plays a crucial role in integrating this disaster management cycle (Presidential Regulation No. 83, 2020). In the recovery and capacity-building phases, government policies are essential to ensure that SAR activities contribute to a sustainable and equitable reconstruction process. The adaptation phase further highlights the need for SAR policies that are flexible and responsive to emerging risks such as the impacts of climate change, pandemics, and constantly evolving socio-economic dynamics (LIPI, 2021).

Table 1. Integration of Warfield's Disaster Management Cycle (2008) with the Implementation of National Search and Rescue (SAR) Policy in Indonesia

Phases of Warfield's Cycle (2008)		Conceptual Description	Implementation in the National SAR Policy
Mitigation		Efforts to reduce disaster risks and impacts before they occur.	The government develops policies on disaster-prone zoning, the establishment of evacuation facilities, and disaster education, yet the direct coordination with Basarnas is still limited.
Preparedness		Planning and training to prepare for the possibility of disasters.	Integrated Search and Rescue (SAR) training, disaster simulation exercises, the enhancement of early warning systems, and the formulation of cross-sectoral operational SOPs are conducted. Nevertheless, significant disparities in capacity among regions remain.
Emergency (Response)	Response	Rapid actions to save lives and protect property.	Basarnas leads Search and Rescue (SAR) operations, with support from the TNI, POLRI, BNPB, and local communities. Effective inter-agency coordination is crucial for ensuring operational success.
Recovery		The process of restoring social conditions and infrastructure after a disaster.	Search and Rescue (SAR) operations contribute to the initial phase of recovery. However, government policies have not been fully integrated with long-term reconstruction efforts.
Capacity Building		Enhancing long-term capabilities to cope with disasters.	This includes strengthening SAR institutions, improving human resources, modernizing SAR equipment, and integrating spatial data. Ongoing policy oversight and evaluation remain essential.
Adaptation		Adaptation to emerging risks or changes in the environment.	SAR policies must address emerging dynamics, including climate change, urbanization, and technological advancements. At present, adaptation measures are largely reactive rather than proactive.

Through the perspective of Warfield's theory (2008), the author understands that the implementation of government policies in handling natural disasters through search and rescue activities should be viewed as part of a comprehensive system. The success of search and rescue operations is not determined solely during the disaster event, but largely depends on the effectiveness of previously established mitigation, preparedness, and adaptive capacities. It is recommended that search and rescue policies in Indonesia move toward a more comprehensive, risk-based, and community-oriented approach by referring to the disaster management cycle as a whole.

Inter-Agency Coordination and Collaborative Governance in the Implementation of National Sar Policies in Indonesia

1. Mitigation

Warfield emphasizes mitigation as a systematic effort to reduce risks before disasters occur through regulations, spatial planning, and public education. Ideally, mitigation should be directly integrated with the SAR system so that risks can be minimized during emergencies. In Indonesia, disaster-prone zoning policies and the construction of evacuation facilities have been implemented. However, BASARNAS's integration at this stage remains weak (Lestari, 2021). This is due to BASARNAS's institutional focus being more dominant on response activities. Consequently, operational risks in the emergency response phase are higher, such as delays in evacuations in areas prone to flash floods.

2. Preparedness

According to Warfield, preparedness serves as a strategic bridge between mitigation and response, including training, simulations, cross-sectoral SOPs, and early warning systems. BASARNAS has conducted integrated training, SAR simulations, and strengthened early warning systems. However, disparities are evident in regional capacities; facilities and trained personnel are concentrated in major cities, while remote island regions lag behind (Kapucu, N., & Garayev, 2019). This results in uneven SAR responses and increases the risk of delayed operations in remote areas.

3. Response

Warfield highlights response as the core phase for saving lives and assets. In Indonesia, BASARNAS is the primary actor collaborating with the TNI, POLRI, BNPB, and local communities. Challenges include slow coordination, overlapping authorities, and logistical problems (Shokr et al., 2022). These issues stem from weak initial policy design and unclear role allocation among agencies (Kapucu, N., & Garayev, 2019). As a result, SAR operations risk inefficiency, and victims may not receive timely assistance.

4. Recovery

According to Warfield, recovery encompasses physical, social, and psychological reconstruction. SAR should support the early recovery phase through victim identification and retrieval of essential items. In practice in Indonesia, SAR's role stops at evacuation. There is no strong integration with post-disaster reconstruction policies (BNPB, 2022). The limitation arises because SAR's mandate is restricted to the emergency phase, leaving recovery to other institutions without continuity. Consequently, SAR's contribution to long-term resilience building is not maximized.

5. Capacity Development

Warfield emphasizes the importance of strengthening human resources, technology, and data to address future disasters. Indonesia has modernized SAR equipment and digitized information systems. However, monitoring and evaluation remain inconsistent, resulting in partial capacity development. Without continuous oversight, the capacities built may not fully meet field needs, making SAR effectiveness fluctuate.

6. Adaptation

Warfield places adaptation as a phase for adjusting to new risk dynamics. In reality, Indonesia faces shifting disaster patterns due to climate change and urbanization (BMKG, 2023). SAR policies remain largely reactive. The cause is the suboptimal integration of

predictive data and disaster research (Lassa, 2020). As a result, SAR operations are not sufficiently adaptive to new disasters, such as extreme flash floods or earthquakes in previously low-risk areas.

4. CONCLUSION

Based on Warfield's (2008) theoretical approach, this study concludes that the success of Search and Rescue (SAR) operations is not determined solely during the emergency response phase but is also highly influenced by the extent to which mitigation policies, preparedness measures, and adaptive capacities have been designed and implemented beforehand. Therefore, the recommended policies include: Mitigation phase; The government needs to integrate disaster risk maps into the planning of SAR logistics bases to ensure more precise resource allocation. Preparedness phase; Regular joint training exercises (joint simulations) involving BASARNAS, TNI, POLRI, and BPBD should be mandated to ensure solid cross-agency coordination. Emergency response phase; It is important to establish unified command protocols with clearly defined lines of authority to prevent overlaps in field operations. Recovery phase; Data-driven post-disaster evaluation mechanisms are necessary to strengthen future SAR policy improvements and capacity development. These findings emphasize the importance of enhancing inter-agency coordination and implementing collaborative governance to ensure the practical effectiveness of SAR policies. Furthermore, future research is needed to test the effectiveness of the proposed collaborative governance model and to conduct comparative studies with other countries to enrich lessons learned for strengthening SAR policies in Indonesia.

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