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Communication management in the sister village program: Mount Merapi disaster mitigation efforts with a participatory approach

[1]Yani Tri Wijayanti, S Bekti Istiyanto[2], Tri Susanto[3], Handini Handini[4], Irwanto Irwanto[5]

[1]Master's Program in Communication and Media, Universitas Islam Negeri Sunan Kalijaga Yogyakarta, Indonesia
[2]Master's Program in Communication Science, Universitas Jenderal Soedirman Purwokerto, Indonesia
[3]Master's Peogram in Communication Science, Univesitas Singaperbangsa Karawang, Indonesia
[4, 5]Communication Science, Universitas Islam Negeri Sunan Kalijaga Yogyakarta, Indonesia
Corresponding Author, yani.wijayanti@uin-suka.ac.id

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Abstract

The 2010 eruption of Mount Merapi led the Disaster Management Agency (BPBD) of Magelang Regency to implement the Sister Village Program as a participatory disaster mitigation strategy. This study aims to examine how communication was managed to support this initiative, focusing on audience identification, goal setting, message planning, and channel selection. Using a qualitative case study approach, data were collected through participatory observation and in-depth interviews with BPBD officials, village leaders, and residents from both disaster-prone and buffer villages. Findings show that the integration of local knowledge, structured dialog through the three plano papers, and inclusive stakeholder engagement played a critical role in enhancing preparedness and response. The study highlights that communication strategies rooted in community-driven practices foster trust, coordination, and timely evacuation. These results suggest that participatory communication management is essential for effective disaster mitigation and should be adapted to other disaster-prone areas in Indonesia.

Introduction

The complex relationship between geological, geographical, and weather conditions that influence the frequency and intensity of disasters in this country has led Indonesia to be known as a country that is prone to disasters, as it is often hit by disasters such as earthquakes, floods, typhoons, landslides, tsunamis, tornadoes, and volcanic eruptions. Volcanic eruptions are one of the disasters that can strike without warning, as volcanic activity can occur without prior notice or with only minimal signs beforehand, making mitigation efforts increasingly challenging. To put it succinctly, volcanic eruptions represent a constant risk of catastrophe. Among the nation's most notorious volcanoes is

Mount Merapi, located in the Magelang Regency of Central Java, which has a long history of eruptions that threaten surrounding communities.

Despite numerous disaster risk reduction (DRR) initiatives, gaps remain in the implementation of community-based communication strategies, particularly in high-risk volcanic zones. This study focuses on the Sister Village Program as an innovative participatory model for disaster mitigation, specifically examining how communication management supports preparedness and response efforts. By analyzing local practices and stakeholder engagement in Mount Merapi's disaster-prone areas, this research addresses the gap in understanding effective, inclusive communication systems in grassroots disaster management. Among the nation's most notorious volcanoes is Mount Merapi, which is located in the Magelang Regency of Central Java and has a history of frequent destructive eruptions. The area is particularly vulnerable to associated risks, such as lahar floods, landslides, and earthquakes triggered by volcanic activity. The catastrophic eruption of Mount Merapi from October 26 to November 11, 2010, resulted in the tragic loss of 347 lives, displaced over 360,000 individuals, and led to numerous hospitalizations across Central Java (Ismail et al., 2016). These substantial figures underscore the urgent need for effective disaster preparedness and management strategies. Notably, there is a cultural saying among local residents: "Merapi never breaks its promise," which encapsulates the expectation of periodic volcanic activity, although the timing of such events remains unpredictable (Gadeng et al., 2022)Indonesia led to several injuries, deaths, unfound bodies, and high property losses on 26 December 2004. This hazardous period has reportedly become a valuable case for Syiah Kuala University, where various solutions are being considered for eradicating subsequent occurrences. Therefore, this study aims to determine the implementation patterns of the disaster curriculum developed and applied at Syiah Kuala University, to achieve a DPC (Disaster Preparedness Campus.

Considering these ongoing threats, comprehensive disaster response programs in the region are imperative. These programs aim to address immediate needs and mitigate fatalities during and after volcanic eruptions. Previous efforts have included economic and social recovery initiatives implemented by both governmental bodies and private organizations, focusing on the provision of shelter, financial assistance, and livelihood training (Ismail et al., 2016). Effective disaster response requires robust community involvement along with governmental action (Ifkarina & Rinakit, 2021). Engaging local communities in disaster management practices is crucial for achieving successful outcomes (Husna et al. 2021). Research conducted by Nuryanti et al. emphasized the significance of constructing a participatory framework that actively engages local communities in disaster management practices (Hindriyastuti et al., 2019).

Recent disaster management efforts in Magelang have focused on reducing casualties from future volcanic events. The Sister Village program strategically pairs disaster-prone villages with safer counterparts, facilitating timely evacuation and immediate assistance post-disaster (Ismail et al., 2016). This framework not only provides immediate assistance but also supports social cohesion and economic stability, thereby enhancing resilience against future eruptions (Ifkarina & Rinakit, 2021). Participatory communication models are increasingly recognized as vital for fostering a sense of community ownership over disaster management strategies, influencing the efficacy of recovery efforts (Husna et al., 2022).

Experts assert that successful post-disaster initiatives are deeply rooted in active community participation. Istiyanto highlights that community involvement is a cornerstone of effective recovery, which aligns with participatory principles advocated by many scholars in the disaster management literature (Rahmawati & Prajayanti, 2023). The ongoing analysis of the Sister Village program delves into community engagement and the impact of governmental communication on disaster recovery.

Effective communication during and after disasters plays a critical role in ensuring the accurate and timely dissemination of information. This includes the communicator, message, medium, and receiver. Dance's communication theory stresses the necessity of reducing uncertainty through clear information exchanges, particularly during emergencies (Lukman et al., 2021).

Disaster communication comprises a series of actions designed to share valuable information with affected communities and stakeholders before, during, and after a disaster. This function connects authoritative bodies, aid organizations, and communities, ultimately minimizing losses and fostering efficient recovery efforts. Research suggests that disaster communication is pivotal in risk-mitigation endeavors (Emaliyawati et al., 2021). Government initiatives must prioritize effective communication systems within disaster-prone areas to enhance overall preparedness and responsiveness (Dewi et al., 2024).

Moreover, effective government communication structures can significantly influence community resilience, ensuring that citizens are adequately informed and prepared during disasters. Agencies such as the Regional Disaster Management Agency (BPBD) play a critical role in establishing communication channels to bolster community preparedness and facilitate rapid recovery actions. Given the recurrent nature of disasters in Indonesia, particularly at volcano sites such as Mount Merapi, adopting systematic communication management strategies is essential.

This research aims to analyze the communication management framework within the Sister Village program and evaluate its application as a disaster mitigation strategy in the Mount Merapi region. The Sister Village model stands out due to its emphasis on localized, community-based collaboration between disaster-prone and buffer villages. The scope of implementation spans a wide geographical area, including 11 subdistricts and 41 villages in Magelang Regency, such as Ketep, Ngargomulyo, and Mangunsuko; 1 subdistrict in Boyolali (Selo, with Klakah and Tlogolele Villages); 6 subdistricts in Temanggung, including Bulu and Wonotirto; 3 subdistricts in Magelang City; and 7 subdistricts in Wonosobo, such as Wonosobo, Garung, and Kertek. This extensive coverage underscores the need for effective, decentralized communication systems. Unlike top-down approaches, the program builds communication flows from the ground up, ensuring contextual relevance and cultural sensitivity. Engaging local perspectives helps tailor strategies to community needs and capacities, enhancing disaster preparedness (Emaliyawati et al., 2022; Husna et al., 2022). While prior studies acknowledge the role of knowledge and attitude. few have examined how participatory frameworks like Sister Village sustain communication across pre-, during-, and post-disaster phases. This study addresses that gap.

Indonesia's unique geographical characteristics significantly influence its susceptibility to natural disasters, emphasizing the need for robust disaster management and preparedness strategies. The Sister Village program, coupled with effective communication management frameworks, provides a fresh perspective towards reducing casualties from volcanic activity and enhancing overall community resilience. The incorporation of participatory approaches in disaster response is imperative for successful recovery. Future research in this domain should continue to explore and refine these approaches, leveraging data and insights to foster ongoing improvements in disaster management practices.

Method

This study employs a qualitative research approach, which is crucial for understanding the complex social phenomena involved in disaster management strategies. The method used is a case study to address several issues or objects related to a phenomenon, especially

in the social sciences.Yin (2011) outlined several vital steps in designing a case study, which encompass the formulation of research questions, selection of research design and instruments, determination of data collection techniques, execution of data collection activities, data analysis, and assembly of the final research report (Asteria et al., 2023). In alignment with the problem formulation presented in the Introduction, this research focuses primarily on the communication management of the Sister Village Program as a disaster mitigation strategy in the volcanically active Mount Merapi area.

Central to qualitative research objectives is the identification of key informants or particular social situations rich in information pertinent to the research focus (Nurmansyah & Grandisa, 2022). Informant selection in this study was conducted through purposive sampling, a non-probability sampling method where participants are deliberately chosen based on specific characteristics, knowledge, or roles relevant to the research objectives. This approach allows researchers to gather rich, contextual insights that quantitative data may overlook. Informants were selected based on their involvement in disaster communication and their knowledge of the Sister Village Program. These included government officials, village heads, and community members from both disaster-prone and buffer villages. The informants selected for this study were the Regional Disaster Management Agency (BPBD) of Magelang Regency, which is involved in disaster management, and Mr. Joko Sudibyo, MT, was selected due to his central role in initiating and implementing the Sister Village Program (Kumalawati et al., 2023). His strategic position and long-term engagement provided critical insights into the institutional and practical dimensions of the program (Kumalawati et al., 2023)so disaster communication is urgently needed. Disaster communication is a very important parameter in disaster mitigation so it needs to be improved and requires collaboration and coordination of various stakeholders, such as government, companies, media, scientists, advocacy groups, and the community. There has not been much research on communication with the theme of fire, so more in-depth research is needed. The purpose of this research is to find out how to Optimize Disaster Communication for Future Fires Mitigation\". Research on disaster communication was carried out in the location of the new state capital, East Kalimantan. The research used the descriptive-analytic method to identify the research area and collect secondary data. Disaster communication is an activity carried out by several parties, in this case, the authorities in preventing and overcoming the negative impacts that may arise due to fires. The results showed that the disaster management agency in East Kalimantan was the Regional Disaster Management Agency (BPBD .

The study also deployed data triangulation utilizing source triangulation to incorporate perspectives from policymakers and community members within the villages involved in the Sister Village Program (Nurmansyah & Grandisa, 2022). This triangulated approach is significant as it reinforces the credibility and richness of the data collected throughout the research process.

The data collection techniques employed in this study encompassed in-depth interviews, focus group discussions, observations, and document analysis (Waluyo et al., 2024). Each method contributes unique insights and dimensions to the study's findings. Data analysis adheres to the structured procedures developed by Strauss and Corbin (1990), which involve three stages of coding designed to systematically unravel the complexities of the gathered data.

a. Open Coding: This phase entails meticulously uncovering, detailing, examining, comparing, conceptualizing, and categorizing data. The culmination of this stage is the labeling of concepts and categorization of data, leading to the development of relevant categories based on properties and dimensions that link back to the research problem (Ekawati et al., 2022).

b. Axial Coding: In stage, categories derived from open coding are reorganized according to their labels within the established grounded theory paradigm. This model comprises critical elements such as causal conditions, phenomena, context, intervening conditions, interaction or strategic actions, and the resultant consequences (Denisya & Hertati, 2023). The axial coding stage helps re-establish connections between categories, facilitating a deeper understanding of their interrelations.

c. Selective Coding: The final analytic stage involves scrutinizing core categories and their relations to other categories. This process identifies core categories through comparative analyses using a paradigm model, ultimately producing an overarching design that reflects the theoretical underpinnings of the findings. This stage is akin to developing hypotheses but engages at a higher level of abstract analysis (Wolkin et al., 2015).

Through this structured research methodology, the study aims to provide a comprehensive understanding of communication management within the Sister Village Program as a strategy for disaster mitigation within the Mount Merapi area. It hopes to formulate insights and frameworks that can be applied in similar disaster-prone contexts to enhance community resilience and preparedness (Yusran et al., 2021).

This qualitative research approach not only illuminates the significance of communication in disaster management but also emphasizes the importance of participatory frameworks that actively engage communities in their resilience efforts (Anshori et al., 2022). Given that disaster risks often disproportionately affect vulnerable populations, enhancing participatory disaster discourse is fundamental. As noted in previous literature, effective communication systems are critical in connecting stakeholders, ensuring timely dissemination of information, and facilitating community engagement during disaster events (Surwandono & Muhammad, 2023).

In conclusion, this research's methodological approach, characterized by its qualitative foundation and robust case study structure, is designed to yield rich, contextually grounded insights that bear critical implications for both academic discourse in disaster management and practical applications in engaging community-based strategies for future disaster resilience. This research endeavors to inform and inspire new initiatives that can bridge the gap between theoretical disaster management frameworks and real-world practices that cultivate resilience among vulnerable communities.

Results and Discussion

The Sister Village Program represents a shift in the paradigm of disaster management in the Mount Merapi area of the Magelang Regency. Initially, the approach was emergency response (crisis management), but it evolved to be more preventative, emphasizing disaster risk reduction (Mei et al., 2018). The program changed the paradigm in the community, which once viewed volcanic eruptions as mere fate, where people could only surrender, to a perspective where individuals are now involved in disaster management and able to take real action in case of disaster by performing emergency responses.

With the community's growing awareness of technological developments, its perspective on disasters has begun to shift. Prevention and preparedness can be implemented by recognizing the characteristics and warning signs of potential disasters. This approach is known as Disaster Risk Reduction (DRR), which is a more scientific and systematic way of dealing with disaster threats. This paradigm views disasters as part of normal life, and formulates that disaster risk is a function of the threat multiplied by vulnerability, divided by capacity (Mei et al., 2019).

In response to the designation of Mount Merapi as a permanent disaster threat to surrounding communities, three options have been offered. Joko Sudibyo (2022) stated that these options are: a) Removing the disaster threat of Merapi from the community, b) Removing the community from the disaster threat of Merapi (permanently), c) Living in Harmony with Merapi.

According to Joko Sudibyo (2022), these three options are offered to the community, asking them to choose the best alternative. Most people choose to live harmoniously with the threat of Mount Merapi, which could erupt at any time, endangering their lives and property. The community expressed that they felt comfortable living in the disaster-prone area, as relocating elsewhere, such as to another island in Indonesia, would require starting a "new life." They preferred to stay in disaster-prone areas and be ready to evacuate when Merapi erupted, as they did in 2010.

The 2010 eruption, which caused hundreds of casualties, destroyed homes and other properties and forced the population to evacuate, became a valuable lesson for the community. This experience sparked the idea of a Sister Village Program. Joko Sudibyo mentioned that in 2010, the management of evacuees was not optimal, resulting in panic and disorder during the evacuation process, unclear evacuation destinations, many people losing family members (due to being evacuated to different locations), unequal distribution of basic needs such as logistics, discomfort in evacuation centers, and subsequent health risks such as diseases in the shelters.

To reduce the risk of volcanic eruptions from Mount Merapi, the BPBD of Magelang Regency developed a better disaster management concept known as the Sister Village Program. According to Joko Sudibyo (2022), "This program combines technical engineering activities with social engineering." The program maps disaster-prone villages and "safe" villages located away from Merapi's eruption threat. The Sister Village Program, also known as Desa Bersaudara or Paseduluran Ndeso, addresses evacuees and facilitates villages in disaster-prone areas, particularly in Disaster Prone Zone III (KRB III). It prepares "buffer villages," which are considered safe for evacuation. Thus, villages in KRB III are paired with a "brother or partner" village for evacuation. The placement of evacuees in the buffer villages varies depending on the conditions of each village, including village halls, public facilities, and residents' homes. The Sister Village Program unites two or more villages in an institutionalized relationship.

The concept of Paseduluran Ndeso (village solidarity) in managing evacuees has positive values within the community, such as fostering a sense of cooperation and brotherhood; promoting national unity; building integrity; and strengthening community commitment and cooperation. According to data from the BPBD of Magelang Regency, the program was completed in 2017. The program started in 2011 and was developed in four stages: 1) Formation of Sister Villages; 2) Resource Mapping; 3) Capacity Building; and 4) Infrastructure Preparation.

The Sister Village Program is a manifestation of the concept of "living in harmony with disaster" The formation of this program involves the community as both subjects and implementers. The BPBD of the Magelang Regency invited the community, especially KRB III, to brainstorm about disaster management, evacuation management, and solving issues based on the lessons learned from the 2010 Merapi eruption. The program formation process used a strategy called the "three plano papers." On the first plano, the community was asked to write down the problems faced during the eruption. On the second plano, they wrote down their ideal conditions or expectations. On the third plano, they proposed alternative solutions to address the problems and achieve the desired conditions. The initial idea of the Sister Village Program was initiated with the community and BPBD filling out these plano papers.

According to Joko Sudibyo, during the first plano filling, the community wrote down all complaints they encountered. They mentioned that during the evacuation, people were separated, leading to protests against the village head for not properly managing the evacuation; family members were scattered, causing trauma (mental health issues); and aid distribution was unequal, as refugee data kept changing. The discussion between the community and BPBD led to a question: "Did the government fulfill all the needs during the 2010 evacuation?" The community's answer was unanimous: there were also contributions from relatives, volunteers, schools, the military, police, companies, and others. Based on this experience, the second plano led to better coordination and community expectations. In the third plan, the community wrote down the steps that needed to be taken to achieve the desired conditions, such as the government providing early, fast, and accurate warnings, preparing adequate evacuation infrastructure, supplying sufficient and fair logistics, setting up health posts at evacuation centers, and providing all necessary supplies for evacuees.

In 2014, the BPBD raised this program to become a transformation project within the BPBD of Magelang Regency, aiming to gain support from various stakeholders, accelerate the Sister Village Program, and document the program in written form, with the hope that it could be read and utilized by all parties. Based on the discussions in the three plano papers, it can be concluded that the Sister Village Program was a solution to the problems faced during the Merapi eruption and an approach to managing evacuees. This program adopted local wisdom from the community in the Magelang Regency, as explained by Joko Sudibyo, who was inspired by stories from his grandparents. In the past, when Merapi erupted, his family provided shelter to Merapi evacuees, treating them as families in their homes.

Once the concept was finalized by the BPBD, the next step was to socialize the program with the community. The BPBD carried out communication and guidance processes with the communities to ensure that disaster-prone villages were matched with appropriate buffer villages. The BPBD allowed each disaster-prone village to choose their "partner" buffer village, considering the number of evacuees and the accommodation capacity of the buffer village. This could lead to "polygamy," where one disaster-prone village could have multiple buffer villages. The BPBD facilitated meetings, negotiations, and agreements between the two sides, which were followed by preparing cooperation documents or MoUs to be signed by both parties.

Through Focus Group Discussions (FGDs), it was found that the reason buffer villages were willing to accept evacuees from KRB III villages was based on humanitarian concerns, fostering brotherhood, mutual aid, having facilities for evacuees, and past experiences of accepting evacuees. The BPBD's Sister Village Program gained support from various stakeholders, including the United Nations Development Programme (UNDP), the Magelang Regent, BPPTKG, BPBD of Central Java, BNPB, NGOs, local organizations, and the media. Many stakeholders are involved in the formation of this concept. When community involvement is low, there is a lack of awareness to engage in disaster risk management, and infrastructure is far from ideal, an effective communication strategy is needed among stakeholders.

The communication strategy implemented was as follows: a) For groups or individuals who support the program, communication strategies focus on maintaining and enhancing existing good relations by regularly updating progress, involving them in the implementation process, and organizing Training of Facilitators (ToF) for BPBD staff and village disaster risk management organizations (OPRB) as change agents, b) For groups hindering the program, such as some village heads and local government officials who still held old paradigms in dealing with Merapi's threat, the BPBD used special approaches like coordination meetings, workshops, and personal visits to engage them

and explain the benefits of the Sister Village Program, c) The community in KRB III and buffer villages required an effective communication strategy, involving village heads and the OPRB as change agents or facilitators, intensive socialization through various media, village meetings, and simulations based on the program's SOPs.

Community empowerment communication is marked by the initiation and participation of the community in development to improve the quality of life. In community empowerment communication, technology is seen as part of the learning process and not the key determinant of change (Setyowati, 2019). In the Sister Village Program socialization process, the BPBD applied the operational steps of Suprapto's (2009) communication methods, which included identifying the audience, determining the communication objectives, planning messages, and selecting appropriate communication channels.

The transformation in disaster management practices around Mount Merapi, particularly through the implementation of the Sister Village Program, exemplifies the significant alignment this initiative has with the principles of Community-Based Disaster Risk Reduction (CBDRR). The foundational theories underpinning CBDRR highlight the importance of community ownership, integration of local knowledge, and encouragement of horizontal collaborations among community members in the face of disaster risks. In practice, the Sister Village Program facilitates inter-village partnerships and creates a communication framework rooted in local identity, values, and historical experiences. This approach effectively counters the limitations of top-down disaster management models by reinforcing social networks, trust, and community-led decision-making processes, which are pivotal during critical operations such as disaster preparedness and evacuation planning (Dias et al., 2024; Kitagawa & Samaddar, 2022; Moises et al., 2024)linking science and local communities to reduce their vulnerability and to enhance strategies for forest fire risk reduction. Applied in Monchique, a forest-fire-prone municipality in Portugal, the InnoLab creates a space for dialogue and knowledge sharing between multiple actors that, directly or indirectly, manage forest territories. BRIDGE attempts to facilitate social learning about forest fire risks, strengthen collaborative networks and enhance adaptive capacities (socially and institutionally.

The transition observed in Merapi's disaster response framework resonates with the Pressure and Release (PAR) model articulated by Wisner et al., which conceptualizes disaster as a consequence arising from unsafe conditions created by dynamic pressures and societal vulnerabilities such as marginalization and institutional weaknesses. The Sister Village Program addresses these structural vulnerabilities by developing coordinated evacuation plans, fundamentally enhancing community resilience. The model draws on culturally significant practices, such as the concept of "paseduluran," which translates to village brotherhood and serves as an operational principle for cohesive disaster response actions. This culturally informed risk reduction strategy not only mitigates exposure to dangers but also reinforces community adaptability and prepares villagers for future impacts through established social bonds and shared experiences (Dias et al., 2024; Sinthumule & Mudau, 2019; Trejo-Rangel et al., 2022)there has been a paradigm shift in research from 'top-down' directives to 'bottom-up' planning. Thus, there has been a change from imposing strategies to a participatory approach by indigenous people. This study uses the participatory approach to flood disaster management in Thohoyandou and its environs. The aim of this study is twofold: first, to understand the perception of communities towards floods hazards; and second, to probe how communities respond to flood hazards and how this knowledge can be used in the planning and management of future disasters. In order to achieve these objectives, participatory rural appraisal (PRA

Globally, community-centric disaster management models illustrate the effectiveness of participatory approaches. For instance, Japan's "Bosai" culture integrates disaster preparedness drills, educational initiatives, and neighborhood collaboration networks

into daily life, significantly enhancing community resilience through routine engagement. In the Philippines, the Barangay Disaster Risk Reduction and Management Committees (BDRRMCs) operate at the village level, leading local evacuation plans, early warnings, and resource mobilization. Such initiatives are deeply rooted in participatory governance, reflective of the widely accepted notion that grassroots engagement significantly improves disaster risk reduction efforts. The distinctive strength of the Merapi initiative lies in its nuanced blend of social engineering and cultural narratives. The paseduluran principle extends beyond mere symbolism; it is vital in forging collaborative frameworks for disaster management, effectively pivoting traditional kinship structures into organized partnerships for risk reduction (Baudoin et al., 2016; Mahardhika & Pamungkas, 2024; Tian et al., 2023).

The Merapi approach diverges from models that rely excessively on rigid administrative frameworks or solely on technological early warning systems. Instead, it fosters a synthesis of the technical and emotional dimensions of disaster preparedness by affirming community memory, intergenerational knowledge through participation, and embedding communication strategies within culturally trusted venues such as village assemblies and religious congregations. Thus, this participatory model contributes not only to the theoretical discourse on collective risk reduction but also showcases a locally adapted resilience framework capable of inspiring similar interventions in culturally rich and hazard-prone regions of the world. Investigations have shown that inclusive community engagement bolsters disaster response by mobilizing local understanding, thus directly supporting efforts to reduce vulnerabilities and improve outcomes in disaster-prone contexts (Balderacchi, 2017; Bustamante Duarte et al., 2018; Kelman & Harris, 2021).

The necessity of promoting local knowledge and fostering community agency is crucial when addressing disaster risks. Participatory methodologies, such as the one exemplified by the Sister Village Program, leverage local insights and historical context, leading to more relevant and effective disaster management strategies. This approach promotes ownership among community members and strengthens their capacity to respond dynamically to future hazards. Thus, the Merapi case stands as a pertinent reference point for practitioners seeking to enhance disaster resilience through culturally attuned and participatory approaches (Liu et al., 2018; Sou, 2019)within Cochabamba, a city in the centre of Bolivia, South America, ‘at-risk’ citizens engage minimally with disaster risk issues in participatory spaces, despite high levels of civic participation. This is because ‘at-risk’ populations view disasters as a private/household problem that is symptomatic of household error, rather than seeing them as a broader public problem due to wider structural inequalities. Consequently, they redistribute responsibility for disaster risk reduction towards households, which (re.

An integrated review of participatory risk approaches highlights that their successful application is contingent on recognizing the interplay of formal and informal networks. Community-driven disaster management processes like those facilitated by the Sister Village Program effectively respond to local needs by prioritizing collective action and shared decision-making. This grassroots methodology empowers communities to develop tailored evacuation plans and risk reduction strategies informed by local realities, ensuring disaster management practices are responsive, inclusive, and ultimately effective (Baudoin et al., 2016; Moises et al., 2024; Tian et al., 2023).

Emphasizing the role of culture and identity in disaster response practices, participatory models such as the one implemented in Merapi can significantly reshape the landscape of disaster management. This fusion of social facilitation and cultural narrative resonates with the community’s intrinsic values and experiences, leading to robust and adaptive strategies in disaster preparedness. For instance, the integration of local customs

and collaborative frameworks fosters an environment where community members feel valued and motivated to actively participate in risk reduction efforts, becoming active agents of change in their own safety and resilience (Raška & Brázdil, 2015).

In implementing the Sister Village program, there are several issues that must be evaluated in the future. These problems include: a) a lack of basic amenities like clean water and toilets, b) a lack of supplies like food and clothing, c) social jealousy between refugees and locals, which can interfere with coordination and weaken connections of fraternity and solidarity between the two groups.

In conclusion, the Sister Village Program represents a salient embodiment of community-oriented disaster management that addresses the challenges posed by conventional top-down approaches. By leveraging local attributes and nurturing inter-community relationships, the program builds resilience against hazards while cultivating a strong and cohesive social fabric. The experiences from Mount Merapi can serve as a beacon for other regions facing similar threats, demonstrating that participatory approaches that recognize and integrate local nuances can yield significant advancements in disaster risk reduction, ultimately leading to safer and more resilient communities (Mahardhika & Pamungkas, 2024)

Conclusion

The Sister Village Program, developed by BPBD Magelang in response to the 2010 Mount Merapi eruption, is a participatory disaster mitigation initiative rooted in local values of paseduluran (brotherhood). It formalizes collaboration between disaster-prone and buffer villages, transforming traditional kinship ties into structured evacuation and preparedness mechanisms. Supported by communication strategies such as audience identification, goal setting, message planning, and multi-channel dissemination, the program ensures local ownership and institutional integration.

This study underscores the importance of structured community dialogue particularly through the three plano papers method as a culturally relevant model for disaster communication. The Sister Village framework demonstrates that effective disaster preparedness can be achieved through participatory communication and shared memory. Given its success, this model is recommended for replication in other volcano-prone regions in Indonesia. Future research should explore its adaptation in diverse geographic and cultural settings, assess long-term outcomes, and further develop institutional frameworks to strengthen community resilience nationwide.

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