From Competition to Configuration: The Convergence of Scientific and Local Knowledge in the Design of Mount Merapi Disaster Mitigation Policy in Yogyakarta

Ghea Anissah Trinanda[1]

Abstract

This article examines the transformation of two types of knowledge—government/official knowledge, which represents "scientific" and "expertise"; and local knowledge, represented by the "Jalin Merapi" community, considered as "non-scientific" and layman's understanding. Both types of knowledge are linked by a common "boundary object" (Gieryn, 1983) of Mount Merapi, but they are often in a competition to influence public discourse. The main argument of this article is that integrating government/scientific and local/non-scientific knowledge can result in more effective disaster mitigation strategies. However, in Indonesia, there is a significant gap between these two types of knowledge systems, and competition often overshadows collaboration. Using a qualitative case study approach, the research highlights a shift in knowledge dynamics, from competition to collaboration, facilitated by the "Jalin Merapi" community. Despite this progress, the inclusion of local knowledge in policy making in Indonesia remains limited. This finding emphasises the importance of more inclusive policies that combine scientific knowledge with local insights to improve disaster management system in Indonesia.

Keywords: *Local Knowledge, Scientific Knowledge, Competition, Boundary Object, Disaster Management.*

1   Department of Politics and Government, Gadjah Mada University. Email: gheaanissah@mail.ugm.ac.id

Introduction

The unpredictability of when disasters might occur represents one of the most significant challenges in risk mitigation efforts. Addressing this uncertainty requires disaster mitigation planning that relies on the collaboration between local and scientific knowledge. Local knowledge provides insights into the characteristics of specific regions, often passed from generation to generation (Simanjuntak & Chintia, 2022). In contrast, scientific knowledge offers systematic data, supported by technical tools for evidence-based decision-making (Carby, 2015). Halffman (2003) emphasises that collaboration is a crucial preventive measure.

Indonesia, located within the Pacific Ring of Fire, is a region characterised by high seismic activity. As a result, tectonic and volcanic earthquakes frequently occur in this area

(Hinga, 2015). Aligned with postmodern thought, Seidman (1998) argues that knowledge is dynamic and constantly in a state of contestation. This diversity of perspectives within cultures positions local and scientific knowledge as subjects of debate, often entangled in complex discussions. Wisner (1995) highlights the importance of harmonising these two forms of knowledge, as both are shaped by power dynamics that influence their application in disaster mitigation.

This article examines the challenges and opportunities in integrating local and scientific knowledge for disaster mitigation with a focus on Mount Merapi. Situated across four districts—Sleman, Magelang, Boyolali, and Klaten in Central Java—Mount Merapi's location complicates coordination efforts in disaster management (Hayati et al., 2019). The 2010 Emergency

Response Report by the Sleman Regional Disaster Management Agency (BPBD) highlights Mount Merapi's significant volcanic hazards, primarily from pyroclastic flows and lava streams. Despite the high risk of disasters, the fertile volcanic soil continues to attract communities for settlement and agriculture (Crosweller & Wilmshurst, 2013). The 2010 eruption, with a Volcanic Explosivity Index (VEI) of 4, was one of the most significant in Merapi's history. It released 140 million cubic meters of volcanic material and resulted in 346 fatalities, marking the highest death toll since the 1930 eruption (Hartmann, 1934; Surono et al., 2012).

In the context of disaster mitigation, a contestation exists between "scientific" knowledge (produced by the government), and "local" (produced and understood by ordinary citizens) in responding to disasters. This is evident in the interaction between "Jalin Merapi", a local-based community, and BPBD (the Regional Disaster Management Agency), a government institution which claimed to employ a scientific approach. The scientific approach to disaster management refers to applied sciences aimed at enhancing the effectiveness of prevention, mitigation, preparedness, emergency response, and recovery through systematic observation and disaster analysis (Carter, 2008). The competition between these two knowledge also reflects power dynamics. Dahl (1957) emphasises that power is evident when one party, such as the government, can direct and dominate another, even if it goes against their interests. Maarif et al. (2012) highlight this dynamic, but the competition between local and scientific knowledge has not been thoroughly explored

in the literature. This article examines this competition, particularly regarding the production and types of knowledge.

Research on the 2010 eruption emphasises that trust between the community and authorities was crucial for effective mitigation (Mei et al., 2013). Lavigne et al. (2008) found that local communities outside the official danger zones had low risk perception, stemming from misunderstandings of volcanic processes, over-reliance on prevention measures, and cultural beliefs. This knowledge gap, due to limited hazard information, often conflicts with scientific approaches, hindering disaster response. Novia (2012) highlights the need for collaboration between formal institutions, such as BPBD, and community organisations, such as Jalin Merapi, to address these knowledge conflicts and enhance disaster management.

This article applies several concepts, starting with "boundary work", first introduced by Gieryn (1983) and further developed by Langley et al. (2019), to explain the discursive strategies used by scientists to distinguish science from non-science. Boundary work serves to establish, modify, or clarify the boundaries between different entities, whether they are groups, professions, or organisations (Lamont & Molnar, 2002; Phillips & Lawrence, 2012). These boundaries play a crucial role in understanding the dynamics of contestation in the field, including situations involving the separation of scientific and local knowledge.

The second concept is Bourdieu's (1977, 1984) theory of "practice", which is relevant for analysing competitive boundary

relations within two different contexts. This theory introduces the concept of "fields of practice" encompassing the social, historical, and material aspects that influence specific practices. Status differences within a field arise from individuals' access to various forms of capital—economic, cultural, social, and symbolic—which are essential for success in the field.

In relation to the first concept, Langley et al. (2019) expand on boundary work by emphasising how individuals or groups influence social, symbolic, and material boundaries. Competitive boundary work involves efforts to maintain, challenge, or create boundaries that separate one group from another to gain a particular advantage. This process often creates paradoxes, tensions, or conflicts when individuals or groups try to distinguish themselves from others (Bucher et al., 2016).

This study aims to identify the application of boundary work in the context of boundary setting, using an approach that incorporates concepts like demarcation (Bourdieu, 1977, 1984). Certain boundaries are created and maintained to achieve advantages in the field of practice. Additionally, this research also considers the concept of "boundary infrastructure", introduced by Garud et al. (2014), which describes how materials, technologies, and physical spaces can serve as boundary infrastructure to facilitate interaction and coordination between groups.

Figure 1. Analytical Framwork
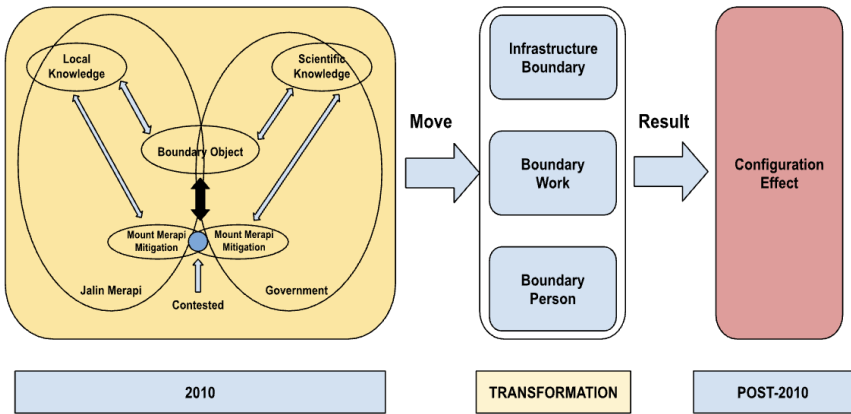
Source : Author's Analysis

This article refers to Chikodzi et al. (2014) who explore the alignment between scientific and non-scientific local knowledge, outlining their differences based on specific criteria that serve as the foundation and key focus of this study.

Table 1. Differences between Local Knowledge and Scientific Knowledge

Character-istic	Scientific	Local
Tools	Instruments that are designed are limited, focused, and recorded. Rain gauges, water level recorders.	The instruments are undefined and undocumented Observations are unfocused. Passed orally from generation to generation.

Accuracy	More precise, and errors can be corrected. Measurement tools can be repeated.	Contextual, individual, and errors are difficult to evaluate. Each individual has a different perception, and potentially with bias.
Communi-cation	Easy to translate and com-municate. Standardised terms, such as "porosity." Porosity is a measure of the amount of empty space in a material that allows liquids or gases to flow or be stored.	In local language and re-quires interpretation.

Source : Chikodzi et al (2014)

This research uses a qualitative approach with a case study design to explore the dynamics of disaster mitigation at Mount Merapi and the roles of "scientific" (produced by the government) and local knowledge (non-scientific and produced by the layman). Data analysis is carried out through triangulation of multiple data sources to ensure validity and reliability. The data collection methods include in-depth interviews with key informants from BNPB (Badan Nasional Penanggulangan Bencana Nasional), BPBD (Badan Penanggulangan Bencana Daerah) Sleman, BPPTKG (Balai Penyelidikan dan Pengembangan Teknologi Kebencanaan Geologi) Yogyakarta, and local communities. The study was conducted at the Jalin Merapi office in Klaten, Central Java, which acts as a central information hub for the local

community. In addition to interviews and direct field observations, this research also includes a literature review to gather relevant disaster mitigation planning documents.

ANALYSIS

Science-Based Knowledge in Mount Merapi Disaster Management

Government Authority in Science-Based Policy for Mount Merapi Disaster Management

The government plays a crucial role in ensuring public safety during disasters through preparedness coordination approaches and mechanisms among its apparatus. The government holds the authority to manage this responsibility. It regulates the roles, tasks, and functions of agencies to collaborate in disaster mitigation, including assessing social, economic, and cultural vulnerabilities. In the context of Mount Merapi disaster mitigation, the government establishes units, agencies, and actors involved based on the increasing disaster status, with actions adjusted accordingly. The validation of field data and information is essential to ensure that disaster management is effective and targeted.

Figure 2. Mount Merapi Status Flow
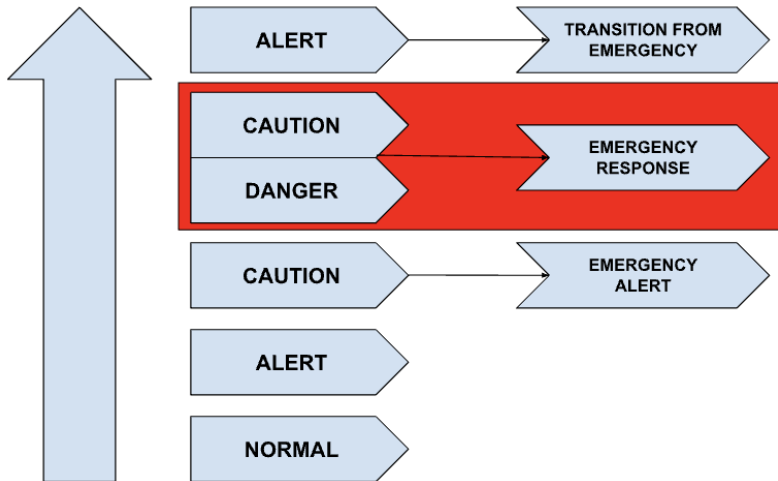
Source : Contingency Plan Document for Mount Merapi Eruption 2020

The status flow includes several notes when the level changes, adjusted according to the institutions responsible for evacuating the public. These notes serve as a reference in the concept of Mount Merapi's status.

1. When Mount Merapi's status increases from "Waspada" (Alert) to "Siaga" (Caution) as determined by BPPTKG, the Sleman District Government establishes a "Siaga Darurat" (Emergency Alert) status.

2. If Mount Merapi's activity level increases from "Siaga" (Caution) to "Awas" (Danger), an "Emergency Response" status is declared.

3. When the Merapi status is downgraded to "Waspada" (Alert), the Sleman District Government implements a "Transition from Emergency to Recovery" status.

The status categories mentioned above are based on scientific knowledge, serving as a reference for the government in volcanic disaster management policies. These categories are used throughout Indonesia and follow the international standard of Volcanic Alert Levels (VALs), with some have been adapted to the local context with some adjustments. In addressing the potential risk of eruptions, the government adopts science-based policies supported by the latest technology to provide accurate data for decision-making and policy formulation.

"...The eruption events of volcanoes are usually recorded, and one of the best observations of volcanoes is in Indonesia. There is PVMBG (Center for Volcanology and Geological Disaster Mitigation), which has offices at every volcano that is at risk of eruption, and this is something unique to Indonesia; no other country has such a system," (Interview with Mr. Berton, Director of Disaster Mitigation at BNPB Jakarta, January 10, 2024).

In volcanic crisis management, PVMBG is structured at every district/city level and is based on recommendations provided by the Center for Volcanology and Geological Disaster Mitigation (PVMBG). PVMBG is the agency responsible for assessing and monitoring volcanic activity across Indonesia, while BPPTKG is the operational unit focused on the Mount Merapi region, with more specific technical and operational tasks (Mei et

al., 2013). This hierarchy allows a swift and relevant crisis response at the local level. However, despite the potential for the application of science and technology in disaster identification and diagnosis, bureaucratic regulations and authority limitations often restrict the efficiency of mitigation and emergency response. These limitations define the extent to which agencies can act during a disaster.

> *"BPPTKG provides hazard characteristics, which are not yet linked to the population after modeling is conducted and scenarios of events and risk impacts are created. Of course, there are authorities held by the district and provincial governments," (Interview with Mr. Agung, Disaster Mitigation Analyst at BPBD DIY Yogyakarta, January 22, 2024).*

Collaboration between institutions, stakeholders, and local governments is key to implementing disaster management mechanisms. The approach that demonstrates "integration" between science and policy (Bocher, 2016) emphasises that scientific information must be optimised in the policymaking process. In this context, Mount Merapi is managed through the Sleman District Disaster Emergency Response Command System, which integrates scientific knowledge with right policies to reduce the risks and impacts of disasters.

Command Line of Science-Based Knowledge in Mount Merapi

The information and data on Mount Merapi's activity are provided by technical institutions such as BPPTKG,

which plays a crucial role in monitoring and providing follow-up recommendations. Data is a key factor in decision-making. BPPTKG, as the primary source of scientific information, processes monitoring data to quickly identify potential risks. However, further decisions lie with BPBD, which works closely with the local government. The collaboration between BPPTKG, BPBD, and the local government is essential to ensure a quick and effective response to the threats posed by Mount Merapi's activity. However, all of this operates within the scope of each level of government's authority.

"The authority only extends to providing recommendations; the execution is handled by BPBD and the local government. We cannot intervene in decisions or what can be done for execution, as well as disaster prevention, management, and post-disaster actions, alongside providing support in the form of data," (Interview with Mr. Alam, Head of the Geological Disaster Information Dissemination Task Force, Yogyakarta, January 18, 2024).

The division of tasks (based on authority) in Mount Merapi disaster mitigation creates clear boundaries (boundary work), by defining responsibilities according to the capabilities, knowledge, and authority of each party. BPPTKG plays a central role in the production of scientific knowledge by processing data from studies and technologies related to Merapi's activity. BPPTKG also serves as an information link for the public, presenting study results in a popular format that is easy to understand. This process shows how BPPTKG not only generates scientific data, but

also bridges the gap between scientific knowledge and public understanding. Therefore, this division of labor ensures that the knowledge produced can be effectively applied and understood, forming the basis for the legitimacy needed to encourage the public to follow government instructions during emergencies.

The message production process at BPPTKG Yogyakarta is focused through the Media Centre (Syafuddin & Purworini, 2021). In addition, BPPTKG has adopted application technologies to send real-time data, enabling the communication of Merapi's current condition and accelerating recommendations and decision-making when certain signs occur. The use of this technology improves efficiency in responding to and preparing for potential disasters.

The disaster management of Mount Merapi is based on policies that integrate scientific knowledge, the latest technologies, and government authority. BPPTKG plays a key role in monitoring volcanic activity, while policy execution is carried out by BPBD and local governments. Clear collaboration between institutions and stakeholders ensures a swift and effective response, supported by real-time technology and communication that is easily understood by the public, thus enhancing preparedness and risk mitigation efforts.

Local Knowledge-Based in Mount Merapi Disaster Management

The Knowledge Construction of the Jalin Merapi Community

The Jalin Merapi community emerged as an initiative to provide more balanced information tailored to the local conditions and to meet the need for accurate communication during disasters. Previously, slow information flow from the government to the public resulted in significant losses, including loss of life, as seen in the eruptions of 1994 and 2006. Jalin Merapi was initiated by civil society groups such as the COMBINE Resource Institution, WALHI, and the Community Radio Network. The community's goal is to reduce information uncertainty by delivering accurate, fast, and up-to-date information. Since its establishment, Jalin Merapi has grown into a key communication channel in disaster mitigation, strengthening community response and preparedness around Mount Merapi.

> *"BPPTKG intensively collaborated with Jalin Merapi in 2010. In 2010, it felt like we were disconnected from the information from BPBD,"* (Interview with Mr. Sarjino, Livestock Coordinator of Jalin Merapi, Deles, February 23, 2024).

According to Novia (2012), Jalin Merapi utilises accessible communication tools as a tangible effort to facilitate the acquisition of factual and up-to-date information about the conditions of Mount Merapi. Its main goal is to enable quick and accurate decision-making or actions in response to potential disasters. To achieve

this, Jalin Merapi developed an approach where information is sourced directly from the field and obtained through the active involvement of local communities and volunteers engaged in this initiative.

Platform X, used in 2010 to disseminate real-time updates on Mount Merapi's conditions, shared information across other platforms. This aimed to offer balanced information to the public. The Jalin Merapi positions the community as the subject, rather than the object, of disaster response. Therefore, information about affected communities is regarded in high importance. Through various information flow mechanisms established by Jalin Merapi, transparency ensures that balanced news reaches both the public and the government.

Figure 3. Platform X Jalin Merapi

Source : https://twitter.com/jalinmerapi *Accessed on January 31, 2024*

According to Mahaswari (2012), Jalin Merapi uses various multi-platform media. The distribution of this information helps support the data that is shared across the agreed-upon platforms. The effectiveness of information distribution is measured by the level of public trust in Jalin Merapi, which is reflected in the increase in donations received through Jalin Merapi during the disaster.

Local Knowledge of The "Juru Kunci" (Key person) and the Convergence of Knowledge

In traditional Javanese belief (Kejawen), there are two key cultural leaders: the Sultan of Yogyakarta and the "Juru Kunci" (a culturally resourceful person usually living in the hotspot of disaster area). The Juru Kunci holds the symbolic key to the volcano and acts as an intermediary between humans and the spirits that protect the mountain (according to local belief). Despite modernisation and advancements in various fields, the local community around Mount Merapi continues to revere a local mystic, Mbah Marijan, who serves as the Juru Kunci (Lavigne et al., 2008). The community's belief in the Juru Kunci and their ability to access supernatural sources of knowledge remains strong and continues to develop. However, this knowledge is not considered "scientific", while the local people considered Mbah Marijan, who lived in Kinahrejo, Cangkringan, as a figure who provided safety.

The local knowledge held by the Juru Kunci is a blend of natural knowledge, gained from previous events, and supernatural knowledge (*ilmu titen,* lit: observe). As a result, the justification for scientific knowledge does not always align with the local and non-scientific

knowledge in monitoring the signs of a potential eruption of Mount Merapi. The community places full trust in the figure who bridges this knowledge and carries it forward. The local knowledge approach, by understanding the situation of the Juru Kunci, provides valuable experience for BPBD Sleman staff in dealing with situations related to Mount Merapi. It requires them to gain a deep understanding of the patterns and needs of the community. Through the socio-cultural approach implemented by BPBD Sleman, they are able to build closer relationships with the community, provide effective means of socialisation, and create a positive impact for the community in facing the threat of disaster.

"...Mbah Asih, the Juru Kunci, still asks for scientific opinions and sometimes visits the office (BPPTKG)..." (Interview with Mr. Alam, Head of the Geological Disaster Information Dissemination Task Force, Yogyakarta, January 18, 2024).

"If Mbah Asih sees something, we still listen to him (all decisions and warnings), even though we don't use it 100%, but it's part of the recommendations." (Interview with Mr. Sukiman, Coordinator of Jalin Merapi, Deles, February 23, 2024).

Mbah Asih's visit as the Juru Kunci of Mount Merapi to the BPPTKG office to inquire about the condition of the volcano is a concrete example of the interaction between local and scientific knowledge. This offers a new perspective on how local knowledge can create space for scientific knowledge, and vice versa. So far, the understanding of the Juru Kunci who plays an

important role as representative of the local knowledge. While their approaches may vary, their presence in the collaboration concept emphasises the importance of respecting and preserving local knowledge in disaster mitigation efforts. This reflects recognition of the value of traditional and local knowledge in facing disaster challenges and demonstrates a commitment to incorporating local perspectives into decision-making and mitigation planning.

Boundary Person: The Sultan as an Intersection of Local and Scientific Knowledge

The Sultan of Yogyakarta, Sultan Hamengkubuwono X, who symbolises the intersection of traditional and modern values, plays a significant role in this dynamic. The Sultan was actively involved in the success of the 2006 evacuation efforts,

emphasising the importance of evacuating residents, despite it conflicting with the advice of the Juru Kunci. Sanggrahan, the Sultan's residence in Kaliurang, is believed to have played a key role in diverting the pyroclastic flow from Mount Merapi in 1994, preventing it from reaching the village of Turgo. The local community also believes that the tomb of Sheikh Maulana Kubro at the top of the Turgo Hill provides spiritual protection (Lavigne et al., 2008).

The Sultan of Yogyakarta not only serves as a figure who bridges tradition and modernity but also acts as a spiritual guardian and protector for his people in the face of serious natural threats. In 2010, during the eruption of Mount Merapi, one of the key figures representing local knowledge of the volcano, Mbah Maridjan, became a victim (Maarif et al., 2012). This occurred because

Mbah Maridjan refused to evacuate from Kinahrejo Village, despite being urged by Sultan Hamengkubuwono X to do so. He rejected the request and chose to remain in the village. This illustrates how the government has been insufficient in addressing the risks and habits of the people living around Mount Merapi, particularly in relation to the majority of their occupations. It is crucial for the government to pay closer attention to and understand the dynamics and diverse needs of the community, especially concerning disaster mitigation and emergency response for Mount Merapi.

In confirming the activities of Mount Merapi, the Sultan as the leader of the region and in his capacity as the Governor of Yogyakarta, ensures the monitoring of the volcano through the scientific knowledge provided by BPPTKG, the institution responsible for monitoring. Sultan Hamengkubuwono X serves as a mediator and bridge between modernity and tradition within the community, playing a key role in both areas.

"Ngarso Dalem (Sultan HB X) has visited here several times, and in his role as the Governor of DIY, on New Year's Eve, December 30, he contacted the local government and requested that monitoring be increased on the afternoon of December 31, saying he had a bad feeling. It turned out that there were two pyroclastic flows," (Interview with Mr. Alam, Head of the Geological Disaster Information Dissemination Task Force, Yogyakarta, January 18, 2024).

The Sultan of Yogyakarta, in his role as a symbol, reflects the dynamics involving the

relationship between traditional values and elements of modernity (Maarif et al., 2012). This process demonstrates that the Sultan plays a crucial role as a central actor in bridging two types of knowledge, positioned within the middle corridor. In his role as a boundary figure, the Sultan not only acts as a link between the two distinct bodies of knowledge but also as a mediator, facilitating interaction between these two domains.

## The Process and Dynamics of Knowledge Construction

The Construction of Local and Scientific Knowledge

The construction of local and scientific knowledge can be viewed through the roles of institutions that represent these types of knowledge. From the explanation above, it can be concluded that patterns emerge in the segmentation of knowledge, aimed at preserving knowledge within society. Within the authority of institutions and organisations, there is the development of knowledge internalisation, which forms a process of strengthening knowledge, supported by stakeholders and key actors who play a vital role in this process.

The process of knowledge construction is carried out through the internalisation of the knowledge being shared. This not only creates a solid foundation for deeper understanding but also builds a strong support network among stakeholders. Thus, the various actors involved in this process not only act as knowledge keepers but also as agents who aim to secure and develop knowledge sustainably. Knowledge construction becomes not just a passive process but an active effort to shape, support, and protect knowledge from various challenges and the dynamics of the social environment.

Figure 4. Construction Area of Knowledge
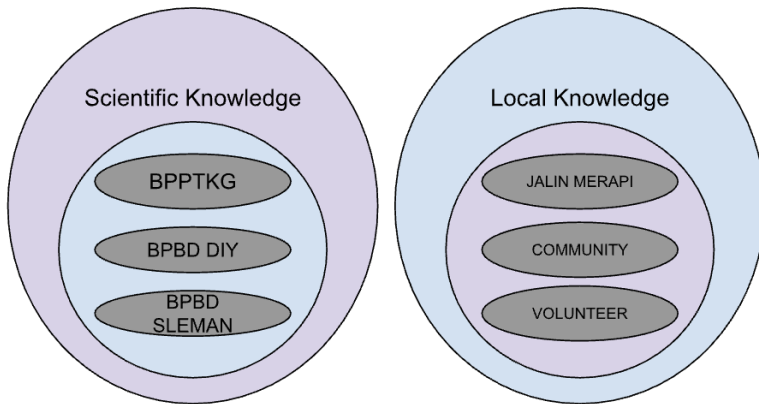
Source : Author's Analysis

Government and Jalin Merapi: The 2010 Mount Merapi Eruption Experience

The competition between scientific knowledge and local knowledge arises due to the differences between the knowledge developed by the community. Jalin Merapi, in managing information for disaster mitigation, accommodated the two types of knowledge, and exercised an adaptation of knowledge. Government institutions, such as BPPTKG, are responsible for generating scientific knowledge related to disaster mitigation, which forms the basis of policies.

The analysis of the 2010 Mount Merapi eruption provides insight into the management of disaster situations by both the community and the government. This eruption had distinct characteristics compared to previous ones, seen in the type of

eruption, the safe zone radius, the direction of the pyroclastic flow, and Mount Merapi's activity. The 2012 Mount Merapi Contingency Report by the Sleman District Government shows that the impact of the 2010 eruption was widespread, affecting nearly the entire Sleman Regency and the Special Region of Yogyakarta. The consequences of this disaster included fluctuating evacuations due to repeated changes in the safe zone, such as 10 km, 15 km, and 20 km, along with several major eruptions during that period.

As mentioned before, communities living on the slopes of Mount Merapi have a strong belief in the informal figure of the Juru Kunci, Mbah Marijan, who is believed to have a strong sense on the condition of Mount Merapi. Local knowledge was spread through digital media, providing a space for community actors like Jalin Merapi to

deliver up-to-date information. The contestation between local and scientific knowledge created interactions between key actors in disseminating information related to the 2010 Mount Merapi disaster. Two main groups emerged: one based on local knowledge and the other on modern knowledge. This contestation led to the emergence of key actors responsible for providing information to the public.

As these actors mapped out their interests, they operated within the concept of "boundary work", combining relevant discourses and narratives within the context of Mount Merapi. The 2010 event highlighted the struggle of the Juru Kunci, where Mbah Marijan chose to stay despite his house being only five kilometers from the volcano's peak. He stated, "I still feel comfortable and at home

Advocacy Strategies of Labour Unions

here. If I leave, who will take care of this place?"—reflecting a local perspective of resilience (Maarif et al., 2012).

Post-Eruption Knowledge Construction after the 2010 Mount Merapi Eruption

Jalin Merapi opened space for community participation in providing information about Mount Merapi in 2010. The role of the government in building and spreading knowledge and information remains insufficient to increase public trust in the government. According to Novia (2012), the public's trust in information from Jalin Merapi was higher because it was considered more accurate compared to government information, which was seen as less responsive.

This process offers insight into the existence of a pathway used to contest power dynamics within the community. This attitude and principle serve as guidelines for each type of knowledge to create space for constructing knowledge. Typically, boundary work tends to benefit those already in power, and boundary relationships, in general, are likely to be maintained over time to serve the interests of the dominant group (Allen, 2000; Bucher et al., 2016; Sanders & Harrison, 2008; Langley et al., 2019).

RESULTS

Contesting the Knowledge

According to Foucault (1980), power is not only a physical or legal tool but is also influenced by processes of knowledge. In complex power structures, knowledge functions as a crucial

instrument in the formation and maintenance of power. Those in power, whether government institutions or dominant groups, actively produce and distribute knowledge that supports their agendas, meaning that knowledge not only reflects but also shapes social reality.

However, this dynamic is not without challenges. Competition between different discourses of knowledge creates complexity in the politics of knowledge, where both powerful and marginalised groups strive to maintain or challenge their respective dominance. By reducing the dominance of one group, marginalised knowledge has the opportunity to be recognised and accepted in public discourse, creating a diversity of information beneficial to society. This dynamic shows that the relationship between power and knowledge is not merely hierarchical, but also a complex process of negotiation and contestation in the production and reproduction of knowledge.

Figure 5. Contested Area of Existence of Knowledge

Source : Author's Analysis
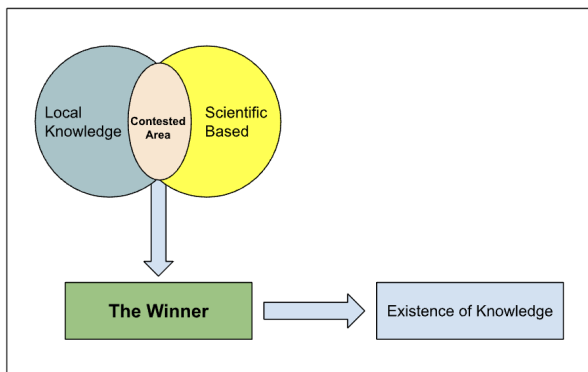
**Advocacy Strategies of Labour Unions**

Breaking the Boundaries of Knowledge Construction

Jalin Merapi in 2010 intensified the practice of competitive boundary work with the government, taking on a role previously held by BPBD. However, this shift occurred when Jalin Merapi began to integrate itself with the government as an integral part, transforming the competitive concept into a configurational one. This represents a specific form of configurational boundary work that maintains a paradoxical balance between competitive and collaborative forces, supporting boundaries through the creation of boundary organisations.

Figure 6. Boundary Work Pasca Letusan 2010
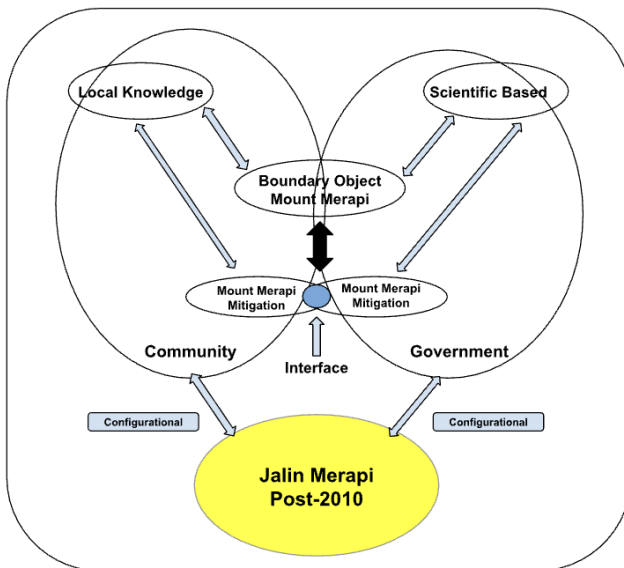
Source : Author's Analysis

This configurational boundary work attempts to establish boundaries that facilitate collaboration among organisations from incompatible social worlds or actors with competing interests. It does so by creating a special space to mediate these relationships, a practice known as "buffering boundaries" (Langley et al, 2019). The concept of "buffering boundaries" is highly relevant in understanding the new role of Jalin Merapi. Buffering boundaries refer to the creation of boundaries designed to facilitate collaboration between organisations or actors with incompatible or even conflicting interests.

In 2010, Jalin Merapi exhibited a strong contestation pattern against the government, reflecting tensions and differing views in disaster management. However, over time, following the 2010 Merapi eruption, this shift marked the emergence of Jalin Merapi as a third actor, taking a more active role in configuring the relationship between the community and the government. Boundary work, emphasising configuration, presents its own challenges for its members, who must manage the tensions between cooperation and competition, while maintaining trust from both parties involved (O'Mahony & Bechky, 2008; Perkmann & Schildt, 2015; Langley et al, 2019).

Through the application of this concept, Jalin Merapi successfully created interactive spaces that allowed for constructive dialogue and cooperation between the affected community and the government. In the context of Jalin Merapi, the application of buffering boundaries created a special space that mediated the relationship between the

community and the government post-2010 eruption. This space functioned as a neutral zone where both sides could collaborate without domination or confrontation.

## Implications in Boundary Contestation

The shifting boundaries between scientific and local knowledge at Mount Merapi play a critical role in disaster mitigation, with Jalin Merapi acting as a third party that facilitates collaboration and integration between the two types of knowledge. While the boundaries of each knowledge system remain distinct, the space for interaction and information exchange allows for the development of more holistic solutions. The evolving agreements between the government and other stakeholders over time require adjustments, which affect the dynamics and structure of boundary work. As a configuration actor, Jalin Merapi plays a key role in maintaining balance and facilitating interaction between scientific and local knowledge, while also adapting mitigation strategies to the continuously changing political and social conditions.

Figure 7. Configurational of Boundary Work Local
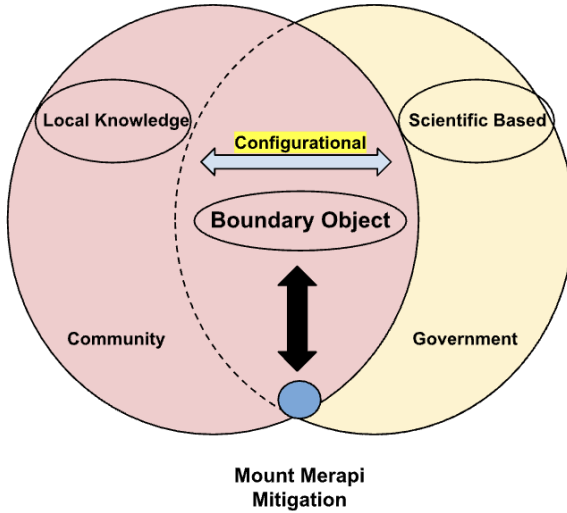
Source : Author's Analysis

The phenomenon of configurational boundary work around Mount Merapi emerges when there is a need for information validation from the local community. Jalin Merapi plays a key role in this shift, integrating local knowledge with scientific knowledge. This change creates a new space within scientific knowledge that was previously unaccommodated, becoming an integral part of the local knowledge dynamics.

The boundary object becomes a central focus in this work, allowing for more integrative interaction between different types of knowledge. Jalin Merapi facilitates the

Advocacy Strategies of Labour Unions

integration of rooted local knowledge with evidence-based scientific knowledge, creating opportunities for both to unite and complement each other. This effort strengthens disaster risk mitigation at Mount Merapi, enhancing understanding and responses to the complex challenges faced by the community.

Figure 8. Configurational of Boundary Work Scientific
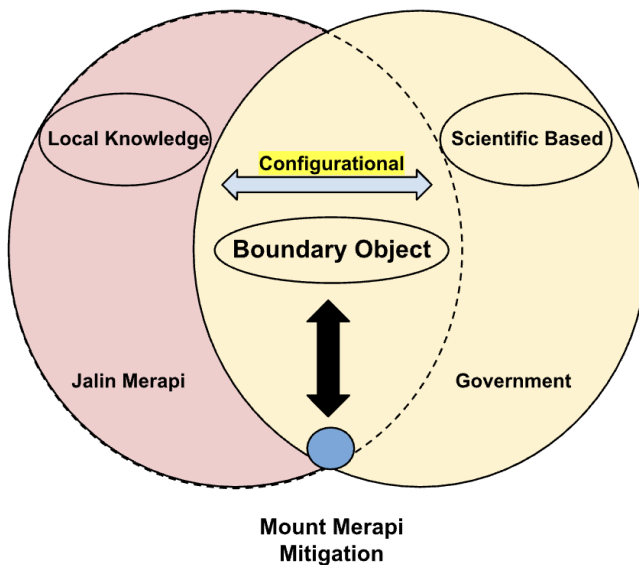
Source : Author's Analysis

Scientific knowledge requires interaction with the public, not only through the formation of formal knowledge. Scientists as stated by Garud et al. (2014), must build communication bridges with the public using stories rather than complex scientific terms. A reluctance to engage in this interaction can limit the understanding of science. Configurational boundary work, which emerges from the interaction between local and scientific knowledge, creates new boundaries that facilitate the flow of information. This pattern allows knowledge to move as a boundary object that remains relevant across various contexts, supporting collaboration and understanding.

Conclusion

The eruptions of Mount Merapi in 2006 and 2010 marked significant reflection points in efforts to enhance disaster preparedness and mitigation in the region, particularly concerning the types of knowledge—scientific knowledge (reproduced by the government) and local knowledge (reproduced by the community). The communities living around Mount Merapi have developed a collective awareness that natural disasters are an inseparable part of the natural reality of life.

First, there are two types of knowledge: scientific knowledge produced by BPPTKG, and local knowledge produced by the citizens and bridged by Jalin Merapi. This local knowledge is based on the community's understanding, which emphasises local beliefs and the concept of self-reliance in efforts to mitigate Mount Merapi's disasters. Over time, there has often been friction between these two types of

Advocacy Strategies of Labour Unions

knowledge due to differences in approach and perspective in influencing the public regarding Mount Merapi disaster mitigation.

Second, despite the friction and contestation between scientific and local knowledge, a convergence point exists where both types of knowledge can be used together to influence the public. This process begins with the formation of an initial construct, which is often influenced by sectoral egoistic interests, where each party strives to dominate the knowledge they possess. However, over time, there have been adjustments in the use of this knowledge on the ground. This involves careful consideration of the available information and data, as well as reactions to the dynamics occurring in the surrounding environment, leading to a more configured response.

Third, from the discussion above, it can be seen that a shift has occurred in the boundary work process, where contestation has evolved into configuration based on mutual understanding. The boundary work process during the contestation between these two types of knowledge is not merely an effort to build a bridge, but more about a paradigm shift. Configuration becomes the core of this process, enabling the acquisition and adjustment of information from both knowledge systems according to the specific needs on the ground.

With this configuration, there is an exchange of information, understanding, and best practices between the two sides. This ultimately enhances the effectiveness of disaster mitigation efforts for Mount Merapi and provides a more adaptive response to evolving

situations on the ground. Jalin Merapi became a configuration actor, particularly after the 2010 eruption, bringing together the community and government, thus providing perspectives from both sides. This configuration process involves a deep understanding of existing knowledge boundaries and the ability to adapt to changes on the ground. Expanding the understanding of boundary work allows us to view it as a bridge in the infrastructure of knowledge. Furthermore, it involves a dynamic, flexible, and adaptive process to accommodate changes in context and the needs of the local community. Here, expanding the understanding of boundary work will not only improve the quality of disaster mitigation policies but also help build a stronger foundation for the protection of the community and environment in the Mount Merapi region. It emphasises the importance of an integrative and adaptive approach in addressing the complexities of disaster mitigation, combining both scientific and local knowledge for more comprehensive and sustainable solutions.

References

Allen, D. (2000). Doing Occupational Demarcation: The "Boundary-Work" of Nurse Managers in a District General Hospital. *Journal of Contemporary Ethnography*, *29*(3), 326–356. https://doi.org/10.1177/089124100129023936

BNPB. (2020). *Disaster Management Plan Preparation Document BNPB 2020*. BNPB

Bocher, M. (2016). How does science-based policy advice matter in policy making? The RIU model as a framework for analyzing and explaining processes of scientific knowledge transfer. *Forest Policy and Economics, 68*, 65–72. https://doi.org/10.1016/j.forpol.2016.04.001

Bourdieu, Pierre. (1977). *Outline of a Theory of Practice*. Vol. 16. Cambridge: Cambridge University Press.

Bourdieu, Pierre. (1984). *Distinction: A Social Critique of the Judgement of Taste*. London: Routledge.

BPBD Sleman. (2020). *Mount Merapi Eruption Contingency Plan Document BPBD Sleman 2020*. BPBD Sleman

BPBD Sleman. (2010) *The 2010 Emergency Response Report by the Sleman Regional Disaster Management Agency (BPBD)*

Bucher, S. V., Chreim, S., Langley, A., & Reay, T. (2016). Contestation about Collaboration: Discursive Boundary Work among Professions. *Organization Studies*, *37*(4), 497–522. https://doi.org/10.1177/0170840615622067

Carby, B. (2015). Beyond the community: Integrating local and scientific knowledge in the formal development approval process in Jamaica. *Environmental Hazards*, *14*(3), 252–269. https://doi.org/10.1080/17477891.2015.1058740

Carter, W. N. (2008). *Disaster Management: A Disaster Manager's Handbook*. Mandaluyong City, Philippines: Asian Development Bank.

Chikodzi, D., Murwendo, T., & Simba, F. M. (2014). Reliability of indigenous knowledge in monitoring and mapping groundwater fluctuations in Zimbabwe. *International Journal of Development and Sustainability*, *3*(1), 231-241

Crosweller, H. S., & Wilmshurst, J. (2013). Natural hazards and risk: The human perspective. In Rougier, J. C., Sparks, R. S. J., & Hill, L. J. (Eds.), *Risk and Uncertainty Assessment for Natural Hazards*. Cambridge University Press.

Dahl, R. (1957). The Concept of Power. *Behavioural Science*, *2*, 201-215. https://doi.org/10.1002/bs.3830020303

Foucault, M. (1980). *Power/Knowledge: Selected Interviews and Other Writings*, 1972–1977 (ed. Colin Gordon., & Trans.). Sussex: The Harvester Press.

Garud, R., Gehman, J., & Karunakaran, A. (2014). Boundaries, breaches, and bridges: The case of Climategate. *Research Policy, 43*(1), 60–73. https://doi.org/10.1016/j.respol.2013.07.007

Gieryn, T. F. (1983). Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists. *American Sociological Review, 48(*6), 781–795. https://doi.org/10.2307/2095325

Halffman, W. (2003). *Boundaries of Regulatory Science*. Amsterdam: University of Amsterdam (diss.).

Hartmann, M. A. (1934). Der grosse Ausbruch des Vulkanes G Merapi (Mittel-Java) im Jahre 1872. *Natuurk, Tijdschr. Ned. Indie, 94*, 189–210.

Hayati, R., Benardi, A. I., Laksono, H. B., & Kahfi, A. (2019). Penilaian Pengurangan Risiko Bencana Erupsi Gunung Merapi Berdasarkan Aspek Kapasitas Masyarakat di Kecamatan Selo Kabupaten Boyolali. *Jurnal Geografi, 16*(2), 105–110.

Hinga, B. (2015). *Ring of Fire: An Encyclopedia of the Pacific Rim's Earthquakes, Tsunamis, and Volcanoes*. Retrieved from http://publisher.abc-clio.com/9781610692977

Lamont, M., & Molnar, V. (2002). The Study of Boundaries in the Social Sciences. *Annual Review of Sociology, 28,* 167–195. https://doi.org/10.1146/annurev.soc.28.110601.141107

Langley, A., Lindberg, K., Mørk, B. E., Nicolini, D., Raviola, E., & Walter, L. (2019). Boundary Work among Groups, Occupations, and Organizations: From Cartography to Process. *The Academy of Management Annals, 13*(2), 704–736. https://doi.org/10.5465/annals.2017.0089

Lavigne, F., De Coster, B., Juvin, N., Flohic, F., Gaillard, J. C., Texier, P., Morin, J., & Sartohadi, J. (2008). People's behaviour in the face of volcanic hazards: Perspectives from Javanese communities, Indonesia. *Journal of Volcanology and Geothermal Research, 172*(3–4), 273–287. https://doi.org/10.1016/j.jvolgeores.2007.12.013

Maarif, S., Pramono, R., Kinseng, R. A., & Sunarti, E. (2012). Kontestasi Pengetahuan dan Pemaknaan tentang Ancaman Bencana Alam (Studi Kasus Ancaman Bencana Gunung Merapi). *Jurnal Dialog Penanggulangan Bencana, 3*(1), 1–13.

Mahaswari, M. (2012). Jalin Merapi: Penggunaan Media Baru dan Gerakan Sosial Penanggulangan Bencana. *Jurnal Komunikasi Indonesia, 1*(2), 6.

Mei, E. T. W., Lavigne, F., Picquout, A., de Bélizal, E., Brunstein, D., Grancher, D., Sartohadi, J., Cholik, N., & Vidal, C. (2013). Lessons learned from the 2010 evacuations at Merapi volcano. *Journal of Volcanology and Geothermal Research, 261*, 348–365. https://doi.org/10.1016/j.jvolgeores.2013.03.010

Novia, N. (2012). *Manajemen Komunikasi Bencana (Studi Kasus Komunikasi Bencana BPBD Kabupaten Sleman dan Jalin Merapi Selama Masa Tanggap Darurat Bencana Letusan Gunung Merapi 2010)* [Undergraduate Thesis]. Universitas Gadjah Mada. https://etd.repository.ugm.ac.id/penelitian/detail/122018

O'Mahony, S., & Bechky, B. A. (2008). Boundary Organizations: Enabling Collaboration among Unexpected Allies. *Administrative Science Quarterly, 53*(3), 422–459. https://doi.org/10.2189/asqu.53.3.422

Perkmann, M., & Schildt, H. (2015). Open data partnerships between firms and universities: The role of boundary organizations. *Research Policy, 44*(5), 1133−1143. https://doi.org/10.1016/j.respol.2014.12.006

Phillips, N., & Lawrence, T. B. (2012). The turn to work in organization and management theory: Some implications for strategic organization. *Strategic Organization, 10*(3), 223−230. https://doi.org/10.1177/1476127012453109

Sanders, T., & Harrison, S. (2008). Professional legitimacy claims in the multidisciplinary workplace: the case of heart failure care. *Sociology of Health & Illness, 30*(2), 289−308. https://doi.org/10.1111/j.1467-9566.2007.01052.x

Seidman, S. (1998). *Contested Knowledge: Social Theory in the Postmodern Era (Second Edition).* Blackwell Publishers.

Simanjuntak, A. S., & Chintia, Y. (2022). Local Wisdom untuk Solusi Masyarakat Global. *Jurnal Riset Rumpun Ilmu Sosial, Politik dan Humaniora.* https://doi.org/10.55606/jurrish.v1i2.151

Surono, Jousset, P., Pallister, J., Boichu, M., Buongiorno, M. F., Budisantoso, A., Costa, F., Andreastuti, S., Prata, F., Schneider, D., Clarisse, L., Humaida, H., Sumarti, S., Bignami, C., Griswold, J., Carn, S., Clive, O., & Lavigne, F. (2012). The 2010 explosive eruption of Java's Merapi volcano—A '100-year' event. *Journal of Volcanology and Geothermal Research, 241−242*, 121−135. https://doi.org/10.1016/j.jvolgeores.2012.06.018

Syafuddin, K., & Purworini, D. (2021). Keterbukaan Informasi BPPTKG Yogyakarta dalam Menghadapi Krisis Erupsi Merapi. *Jurnal Ilmu Komunikasi, 18*(2), 219–238. https://doi.org/10.24002/jik.v18i2.2452

Wisner, B. (1995). Bridging "expert" and "local" knowledge for counter-disaster planning in urban South Africa. *GeoJournal, 37*(3), 335–348. https://doi.org/10.1007/BF00814014