RESEARCH PAPER

The hazard zone of Mount Merapi and the community's perception of (in)securities

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Abstract. Human beings identify security based on their life experiences and their ability to calculate risk, determining the degree to which risk is acceptable or unacceptable. Living years in a risk-prone area bears the sensitivity that enables adaptation to temporary risks, such as volcanic eruptions. Mount Merapi, located on Java Island, is considered one of the most dangerous volcanoes in the world. In the prone area, the perception of risk has been invented by a legal body, such as the government and Non-Governmental Organizations (NGOs), through hazard mitigation strategies that dominate the discourse. At the same time, the voices of local people are less prominent. Local communities tend to perceive the dichotomy concept of hope and despair in a contextual manner, which influences their sense of uncertainty. The article explores how security and danger are contextualized under specific times and conditions. The empirical study aims to understand the varying perceptions by focusing on translating the term "human security" into the local language. The concept of human security, introduced as an international framework, was introduced using a top-down approach, adopted by the government, and applied at the local level. Thus, managing their own risk, will enhance local security and become active agents in defining risk and formulating their coping strategies.

Keywords: Community perception; human (in)security; hazard zone; Mount Merapi

1. Introduction

Mount Merapi, located on Java Island, is considered one of the most dangerous volcanoes in the world. However, the local populations perceive a sense of convenience in living the prone area. Widodo, et al., (2017) reported that 61.6% of residents feel comfortable and at peace due to environmental, economic, and social factors. For these communities, living with danger has seemingly become an integral part of their lives, passed down through generations. The article fundamentally seeks to provide evidence that security and danger are contextualized in certain times and conditions. The idea of living in danger, combined with the community's participation in disaster preparedness programs, highlights their adaptive processes to coexisting with the danger.

Geographically, Mount Merapi is located across four districts – Magelang, Sleman, Boyolali, and Klaten - and spans two provinces: Central Java and Yogyakarta. The 2010 eruption of Mount Merapi was the most violent volcanic eruption in the country's recorded history. The eruption began on October 25, 2010, and continued until November 30, 2010, resulting in 353 fatalities and

the evacuation of over 350,000 people from the affected areas. Many of the victims were buried in mass graves. Among the casualties was Mbah Marijan, the mountain's caretaker and prominent mystical figure. This loss was deeply regretted by the government, which believed it had fulfilled its responsibility by issuing early warnings- warning that unfortunately went unheeded. In March 2023, Mount Merapi erupted again, but this time, no victims were reported. Since the eruption in 2010, volcanologists have noted changes in the mountain's eruption symptoms, signaling a shift in its behavior patterns.

According to Lavigne et al. (2008), the volcano has deeply integrated into the daily lives of the local people and is regarded as an essential part of their lived experiences. Mbah Maridjan, the gatekeeper appointed by the Sultanate of Jogyakarta, had the role of observing and interpreting it's the volcano's moods. Mount Merapi is personified as "Mbah Merapi", With *Mbah* meaning grandfather or grandmother, symbolizing a familial connection to the human world. Instead of being solely considered a source of danger, the volcano embodies the common patriarch respected by all the villagers. The Javanese term *wedhus gembel* (pyroclastic flow or hot cloud) is similar to the Indonesian expression "*mengeluarkan kotoran*", which means "to expel excrements", similar to natural human's act. While this expression might be considered impolite, it implies the villagers' perception of the mountain not only as a potential hazard but also as a vital part of lives, beliefs, and a source of blessings.

Several articles about Mount Merapi, based on the volcanological approach, have discussed on the history of volcanic activities, eruption timelines, and the magnitude of catastrophes (Voight et al., 2000). However, only Lavigne et al. (2008) and Laksono, (1988) have discussed the perspectives of Javanese communities, including their knowledge, risk perception, and behaviours. Lavigne et al. (2008) described Javanese behaviors in response to volcanic hazards across four volcanic mountains, including Mount Merapi in Central Java. Laksono (1988) conducted research in Gimbal, Sumberrejo Village, and explained the different perceptions of volcanic hazards between villagers and the government. He concluded that the government tends to be less objective, while villagers are less subjective in their responses to volcanic hazards, as both perspectives have their own validity. Notably, villagers' assessment of hazards is shaped by tradition and custom, making them more subjective and less inevitability. In contrast, the government's assessment are influenced by economic and political considerations (Laksono, 1988). In my opinion, the term 'hazard' can be both objective and subjective, as it is deeply embedded in the political power and knowledge structures of discourse.

This article explores the different conceptualizations and perceptions of hope and risk, which affect how risk management is applied to disaster preparedness programs. According to the government, establishing a forbidden zone helps minimize the victims and destruction caused by volcanic activities. However, some villagers accept the possibility of total loss caused by the eruption, viewing death as a martyrdom and intertwining their belief with the idea that the soul becomes everlasting and continues to protect their hamlet. Therefore, Javanese rituals play a role in their approach to risk management, serving as a means to prevent catastrophes.

Meanwhile, the government and Non-Governmental Organizations (NGOs) introduced modern approaches to risk management through preparedness programs. Differences in perceptions of managing risk for volcanic hazards between the government and local communities are reflected in community behaviors. Some people followed government orders to relocate from the forbidden zone and accepted the resettlement program. While others chose to stay in the forbidden zone without legal permission.

This study is intended to examine local perceptions of human security in a region continual threatened by volcanic eruptions. Tensions between the government and the local communities have arisen due to different risk perceptions. Michel Foucault's work is explicitly concerned with how knowledge and political identity are constructed. According to Philpott (2000), knowledge arises from a complex interaction between individual and institutional authority, as well as

scholarly discourse. Consequently, the official perception of security significantly influences the community. During the 2010 eruption, local residents demonstrated two different mitigations strategies, either increasing or decreasing their sense of uncertainty.

I propose two key points for discussion on this topic: the local concept of human security and the local concept of risk. Both points are within the topic of perception or discourse. Human security, as an international concept, was introduced using a top-down approach, adopted by the government, and applied at the local level. Meanwhile, the government and NGOs have influenced local perceptions of risk through hazard mitigation efforts. However, individuals can define their security based on their own risk calculations, opening a discussion on what degree of risk is considered acceptable or unacceptable. Thus, managing one's own risk enhances local security. Risk management is intended to protect individuals, although the choice of strategy and its application often intermingled with political considerations. This issue highlights the dichotomy of humanitarian aid and human rights, as revealed by Alkire (2003). According to Alkire (2003), human security should enable people to engage freely in valuable activities, even if they carry some degree of risk, while institutional protection must align with long-term benefits.

According to Gasper (2005), the meaning of 'security' depends on its grammatical function, for instance as a noun, verb, or adjective. The noun "security" derives from the adjective "secure"., which means being free from danger and fear. Collin in Gasper (2005), defines security as being secure, assured freedom from poverty or want, and precautions taken to ensure against loss. As a verb, "secure" means to make or become free from danger, to obtain or take possession of something, and to provide a particular guarantee. As a noun, "security" means concepts such as safety, home, and inclusion. Nooteboom (2015) argues that, for Javanese, the meaning of security extends beyond everyday life to include robust strategies for coping with the shocks and stresses that endanger the continuity of their livelihood.

Ullman defines a threat as one that draws upon national security, in which the government takes an action or sequence of events that (1) drastically and within a relatively short time degrades the quality of life for a state's inhabitants, or (2) significantly narrow political choices available to the government, state, private, or non-governmental entities such as individuals, groups, or corporations within the state (Alkire, 2003). Threats could be categorized into seven categories: economic security, food security, health security, environmental security, personal security, community security, and political security (UNDP, 1994).

Lavigne et al. (2008) argue that villagers experience different levels of threat: "the probability of theft during the volcano eruption in 2006 was higher than that of being injured or killed in a pyroclastic flow, although more than 60% of the villagers were aware of the volcanic threat". Both studies show the dynamics of local insecurity. In a Javanese study conducted by Nooteboom (2015), the concepts of danger, threat, fear, and insecurity are vary. People in Krajan use various local terms to express hazard or threat (*bahaya*), anxiety (*takut*), and uncertainty or doubt (*bingung*). Conversely, the word safety (*keamanan atau jamin*) indicates the absence of these threats, fears and uncertainties. Therefore, understanding these terms require a deep exploration of the local context.

According to Knight (1921) and Douglas (1985), risk is a situation where probability or alternative outcomes can be calculated. In contrast, uncertainty is defined as a situation characterized by indeterminacies, with three different forms: ecological, livelihood, and knowledge uncertainties (Mehta et al., 1999). Risk as the expected number of lives lost, persons injured, property damage, and disruption of economic activity resulting from a particular natural phenomenon (Lavigne et al., 2008). Therefore, risk can be understood as the product of hazard, value, and vulnerability. Boholm (2003) defines risk in mathematical terms as cost, which is the statistical probability of an outcome combine with the severity of its effects. This cost can be estimated in terms of monetary loss, fatalities, or cases of ill health. She further defines two types of risk: objective risk and subjective risk. Objective risk refers to phenomena and causality in the

natural world that have harmful effects. In contrast, subjective risk acknowledges that people perceive and evaluate risk regarding emic, locally defined values and concerns. Therefore, the concept of risk inherently integrates descriptive/factual and normative components, making it intrinsically open to negotiation and contestation.

Risk in the mountain hazards is defined as the expected number of deaths, injuries, properties damage, and economic disruption. At Mount Merapi, risks are indicated by hot ash clouds, volcanic bombs, ash fall, and lava flows. Certain areas are classified as forbidden zones, where permanent residence is prohibited. Additional dangers during and after an eruption are, called secondary dangers, include lahars or pyroclastic flows. The most dangerous effect of a Merapi eruption is a lahar, which is particularly feared because its ability to travel long distances (Lavigne, 1999).

Focusing on translating local terminology of human security reveals a key challenge in community-based disaster reduction programs: the gap between idealistic concepts and practical actions to enhance security. Thus, the problem can be addressed, and the meaning of (in)security can be reframed. As a result, local people can actively involve in and engage with preparedness programs as part of their coping strategies.

2. Material and method

This article provides a conceptual debate on human security involving, focusing on local perceptions of (in)security among people living in the hazardous area surrounding Mount Merapi. Ethnography was employed as the primary method to figure out the social life of Javanese people. Fieldwork was conducted in Turgo Hamlet, located in the village of Purwobinangun, Pakem District, Sleman Region of Special Region of Yogyakarta, Indonesia, shortly before the volcanic eruption on October 2010. Local materials were collected to enrich the data and provide a broader perspective on the topic. This process was involved gathering resources from both institutions and individual collections.

As a Javanese woman living close to the area, I conducted participant observation, following the process of "stepping in and stepping out". Sunstein and Chiseri-Strater (2007) believes that through this method, a researcher lived and observed with local people to investigate the cultural landscape and gain a broader understanding of how a culture functions, such as its rituals, rules, traditions, behaviors, and language. Using this method, the local perception of human security was drawn from lived experiences within the context of dangers shaped by political dynamics. Herbert (2000) mentions that ethnography is studying the processes of meaning-making and understanding culture.

Triangulation and analysis of the data involved techniques such as individual interview and group discussion, as well as informal dialogues. These methods were used to encompass the meanings and behaviors in various situations, including during the calmness of the mountain environment.

3. Result and discussion

3.1. Perceptions of human security

In this part, I discuss the human security concept based on the literatures and documentary reports of human security experts. Human security has attracted significant attention since its introduction in the Human Development Report (UNDP, 1994). According to Alkire (2003), human security encompasses a range of valuable definitions and characteristics, in which the concept of protection becomes a central issue. The primary goal of human security is to establish political, economic, social, cultural, and environmental conditions where individuals are assured that their vital rights and freedoms are secured.

According to the Human Security Commission (HSC) (2004), human security means protecting fundamental freedoms and people from critical and pervasive threats and situations. The approach builds on people's strengths and aspirations, aiming to create political, social, environmental, economic, military, and cultural systems that collectively provide the foundation

for survival, livelihood, and dignity. Krause (2004) emphasizes that human security is closely connected to different types of freedoms: freedom from want, freedom from fear, and freedom to take action on one's behalf. Among these, freedom from fear is given greater emphasis, as noted in the Human Development Report (UNDP, 1994) and the HSC report (HSC, 2004). This focus is because freedom from fear is tied up with threats and violence, making it integral to a robust and coherent practical and intellectual agenda.

In the Human Development Report 1994, there was a shift in the perspective on security from a focus on the nation-state to a focus on individuals, placing greater emphasis on human life and dignity. Security was redefined as threats from hunger, disease, and repression, as well as protection from sudden and hurtful disruptions to daily life, whether at home, work, or within communities. The concept human security thus shifted its focus from state-centric concerns to the protection of individuals, which enables people to participate in governance and have their voices heard. Achieving this requires building strong institutions, establishing the rule of law, and empowering individuals.

According to the Commission on Human Security report, human security offers two general strategies to protect fundamental freedom: protection and empowerment, which together form an integrated approach. Protection involves shielding people from dangers and requires a concerted effort to develop norms, processes, and institutions that systematically address insecurities. Empowerment, on the other hand, enables individuals to realize their potential and actively participate in decision-making processes. The two strategies are mutually reinforcing and are both essential in most situations.

Meanwhile, Soherwordi (2004) states that the human security concept is transforming from a classical framework to a new paradigm that stresses collaboration and developmental interventions. This perspective is grounded in the observation that most conflicts occur within nations rather than between them. Security, in this context, concerns how states use force to address threats to their territorial integrity, autonomy, and domestic political order, primarily from other states. It also reflects a shift away from traditional warfare toward a social agenda centered on development.

Discussing the issue of human security and development, Edson (2001) noted that human security places equal emphasis on both security and development. The threats to human security are multifaceted and often interrelated, encompassing economic security, food security, health security, environmental security, personal security, community security, and political security. The human security lies at the intersection between security and development.

In the context of the state's relationship, human security highlights how national governments can reorient their security policies, providing the same rigor and force but with a slightly different emphasis (Alkire, 2003). According to Gasper (2005), while the human security is an expansive concept, its central focus lies in the distinction between the security of the state and that of individuals. Sometimes, the security of the state and the security of individuals may conflict.

In Nooteboom's study of social security during the economic crisis at Krajan village, East Java Province, he shows that villagers coped with the economic crisis primarily through their own efforts, with the state playing a significant role in providing support to the needy and poorer member of society - a critical observation (Nooteboom, 2015). Nooteboom argues that not everyone lives under the same conditions or creates security similarly. Individuals adopt different strategies to minimize risk and maximize social security, reflecting both the habitual and structural dimensions of strategic and creative action.

3.2. Perceptions of disaster: A political matter?

This section discusses the concept of human security based on the lived experiences of the local community under the phenomena of "moving up" and "moving down". "Moving up" refers to the local survival strategies during volcanic hazards, where some of individuals decided to stay in

the prone areas. In contrast, "moving down" refers to a fleeing strategy, where few of the local community decided to follow the government policies aimed at resettlement.

The phenomena of "moving up" and "moving down" reflect various strategies produced by local communities to avoid danger and minimize risk. According to Boholm (2003), defining and managing risk is inherently a political act. Sometimes, these strategies – whether hidden or overt - are employed to achieve goals and gain confidence and support. Strategies often form part of political competitions, with risks frequently playing a central role in the political arena. In the context of volcanic eruptions, furthermore, Weichselgartner (2001) defines natural disasters as socially constructed phenomena. These definitions provide a framework for understanding how disaster management practices evolve through the accumulation of collecting experiences. Similarly, Foucault examined how knowledge is created and utilized by individuals and institutions, emphasizing the relationship between power, knowledge, and practice.

Before the eruption in 2010, the community, together with NGOs, established a community-based preparedness program under the voluntarily efforts. Iqbal (2021) stated that the local governments were perceived as slow in responding to and disseminating information, as indicated by resource mobilization issues, budget constraints, disruptions in regional government functions, and an insufficient number of government personnel. After the eruption, the government recognized the importance of continuing the locally initiated community-based preparedness program. Following Foucault's discussion on the power/knowledge nexus, Rouse (1994) explains that discourses have a specific epistemic context within which bodies of knowledge become intelligible and authoritative. The phenomenon of "moving up" and "moving down" implies optional strategies adopted by the community to seek security while navigating complex dilemmas. Through community-based preparedness program, accompanied by NGOs and the government, the group's confidences in living with danger increased. A psychological study by Tedeschi et al. (2021), found that in response to potential threats, research participants tended to choose larger groups when experiencing high levels of threat and anxiety, as larger group sizes provide a salient signal of protection and safety for humans (Tedeschi et al., 2021)

In the context of cultural risk and danger, the impulse for submission is rooted in fear. Russell (2004) argues that addressing dangers is not an essential purpose of economic or governmental organizations but rather a function they adopt in response to such threats. This perspective is evident during the Merapi eruption period.

3.3. Analysis of life experience

My empirical study shows that the mountain can be simultaneously serve as a source of security and insecurity. Definitions of (in)security are perceived differently between the experts and ordinary people, both of whom constitute their views on life experiences. For local communities, Merapi can represent threat, danger, and fear when attention is focused solely on its destructive effects. Yet, it also becomes a source of security when its benefits –such as a beautiful landscape, fertile lands, sand mining, and water reservoir – are emphasized. The differing perceptions among scientists further shape their definitions of (in)security. Therefore, the willingness to take risks depends on how individuals perceive danger and threats, which is closely related to predicting when and how severe an eruption might be.

Analyzing the local concept of security in this study began by translating the word "security" into an indigenous language and exploring its local meaning. One informant said

> "There is no danger in here; living in here is safe. There is no robbery, or anything else …
> it is different from living in the city (*ah yo ora ono opo-opo Mbak, aman wae neng kene, ora
> ono rampok, ora ono dang … deng ora koyo urip neng kutho*) (interview, 15/1/2009).

Based on the statement above, I interpreted that the word *aman* (secure) refers primarily to the absence of criminal activity or chaos. It is not associated with the mountain, because the respondent did not mention the dangers caused by the eruptions.

Another informant living in the relocation area described *ayem temtrem* (security) as:

> "….no sadness, feeling safe, happy, [even though there is] less food, [there is still something] to eat, and being healthy (*wis ra mikir susah, pikiran tentrem, seneng, mangan ora kurang dan sehat*).

The word security is interpreted by the communities in various ways, such as *ayem tentrem* (peaceful and calm), *damai sejahtera* (peace and prosperity), *bersyukur* (thankful to God), and *nrimo ing pandum* (feeling grateful). Hence, the concept of security extends beyond material aspects to include spiritual things.

Furthermore, there are varying perceptions of danger and security between the local community and experts. Based on our study, the life experiences of the community are shaped by two different sources of knowledge. One source is produced by experts such as a geologists and historians, while the other is shared amongst the communities. These types of knowledge are illustrated in the Table 1.

Table 1. Different perceptions of (in)security between expert and community knowledge

Expert knowledge	Discourse
According to the vulcanological report, Mount Merapi has experienced 68 historical eruptions since 1548 (BBC, 18/5/2006).	Drew upon the vulcanological data
Based on vulcanological studies, eruptions ate Mount Merapi occur approximately every 4.7 years, with larger eruptions happening roughly every 7.5 years. The first recorded eruption was in the year A.D.1006 and resulted in significant loss of life. High death tolls were also recorded during eruptions in 1672 (3,000 victims), 1872 (200 victims), 1930 (1,369 victims), 1954 (64 victims), and 1976 (28 victims), with many villages destroyed in the process (Schlehe, 1996).	Drew upon historical perspectives
Scientists warn that Mount Merapi is likely to erupt but state that they cannot predict the exact timing (BBC 4/5/2006.) Scientists recorded 27 tremors from the 3,000-meter (9,700 foot) volcano on Saturday (BBC 14/5/2006).	Drew upon the dangers of the eruption

Community knowledge	Discourse
"If I don't have money to buy rice or cigarettes, I feel sad (*ngenes*). Of course, I do not feel secure (*ayem*). Can you imagine? Each day I search for sand in the valley, and I only earn five thousand Rupiah (less than a half euro). It is not enough to fulfil my daily needs" (interview 16/1/2009).	Drew upon economic security
"ah fear from what …? Here, we are together. No … I am not afraid (*ah wedi opo Mbak, wong akeh kancane kok wedi…. Ora…ora wedi opo-opo*) " (interview Mbah Warto, 9/2/2009).	Drew upon togetherness
"If I die here, it means I am fighting for our native land (*ngrungkepi tanah tumpah darah*)".	Drew upon a concept of heroism

Source: Qualitative data analysis

The table above shows the various discourses consumed and reproduced differently by the local communities and the government. The government relies on experts, including historians and scientists, while the community bases its understanding on live experiences related to economic security and cultural way of thinking.

Discussion about hazard mitigation is now widely accepted as a component of risk management and has become general approach to decreasing vulnerability, emphasizing consciousness and empowerment (CFE-DMHA, 2021). However, choosing the scenario of risk management is also a political decision. Boholm (2003) argues that the political interest in risk

management is evident in the processes of identifying, defining, and managing risks, where political actors may use these processes – whether overtly or covertly - to achieve their goals, gain confidence, secure support, and attract voters.

In this case, to understand the issue of political interest in risk management, it is essential to consider questions of representation: which representation prevails, who has the authority to represent, to what extent risk deemed acceptable or not, and which scenario is ultimately chosen. According to Boholm (2003), the conceptualization of risk extends beyond a standalone phenomenon; it is highly contextual and fluid, shaped by the interplay of social and political power relations and hierarchies, cultural beliefs, trust in institutions and science, knowledge, experience, discourse, practices, and collective memories.

Risk is interconnected with the object of risk, serving both as a potential source of harm and as a potential target for damage, and it entails an evaluation - either implicit or explicit - of human consequences. Risk is usually followed by agreement upon which degree of loss that is considered acceptable or unacceptable. The government and NGOs formulate risk management scenarios based on certain perceptions of risk and vulnerability. From the perception of the government, local communities understanding of and knowledge about risk are is viewed as part of their vulnerability. In contrast, NGOs consider local perceptions of risk as encompassing both vulnerability and capacity. According to ET Paripurno, an NGO and academic expert, low understanding of risk contributes to communal vulnerability, while a "high" understanding of risk is seen as a strength or capacity. These perceptions of vulnerability shaped the basis for institutional intervention, affecting local risk management through the establishment of hazard mitigation program. Hence, risk management becomes a contested field, often compounded by power dynamics and decision-making.

4. Conclusion

This article concludes that the local community formulates their understanding of risk and hope as central to their human security, grounded in life experiences. The local community defines the threat posed by the mountain as not entirely undermining their sense of security. However, they acknowledge that the mountain also brings fortune to their life, particularly in terms of economic and cultural security. By translating the concept of security, the local understanding encompassed physical, economic, social, and psychological dimensions, or "*ayem tentrem*" which aligns with the international concept of security.

The term *ayem Tentrem*, a Javanese concept of human security, reflects a holistic view that includes psychological security, deeply interwined with religion. In certain situation, religion can be a source of comfort and assurance. Villagers perceive the volcano both as a source of security and as a risk, accepting the dangers of living in the hazard zone. They perceived deaths caused by the eruptions as matters of destiny, sacrifice, and heroism. Therefore, to mitigate risks, the local community adopted the community-based on disaster preparedness programs initiated by the government and NGOs, thereby increasing their sense of security.

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