

Traditional Minangkabau disaster mitigation in the Semangko Fault in West Sumatra based on ecological site myths

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Abstract. This paper discusses traditional Minangkabau disaster mitigation based on the myths of Minangkabau ecological sites located in the Semangko Fault area in West Sumatra. Traditional communities believe in myths as a force that guides their relationship with ecological sites. Natural signs conveyed in myths serve as guidelines for the community in disaster mitigation. This belief has the consequence that the community must adhere to it. Myths may deviate from beliefs to the superstructure and, vice versa, originate from conventions so that they become superstructure. Therefore, through a qualitative study, myths related to ecological sites and their meanings are documented about community disaster mitigation in the Semangko Fault area. The analysis was conducted using the perspective of cultural materialism. It was found that myths are the superstructure of ecological sites that regulate human interaction with the environment; myths embody past local experiences of natural disaster events; myths become a reference for disaster mitigation management that is familiar in local communities. Recommendations in disaster management should consider myths in disaster mitigation.

1 Introduction

The ethnic Minangkabau, known for their unique cultural heritage and traditions, inhabit the central region of Sumatra Island. The area is geographically located on the Semangko Fault [1], in the Bukit Barisan range that extends along the island, with volcanoes stretching from north to south. This area is prone to earthquakes and hydrological disasters [2].

The influence of nature on Minangkabau society cannot be ignored. The Bukit Barisan, the coastline, and the towering volcanoes provide a dramatic backdrop to people's lives. The spiritual life of the Minangkabau people in this region is deeply connected to the natural surroundings. Belief in the power of nature is strong, and traditional celebrations such as *bakaua* and *balek padang* are essential moments in their annual calendar.

Life on the Semangko Fault is full of challenges. The natural topography significantly impacts the lives of the Minangkabau people in this region [3]. Despite this, they have maintained their cultural values and local wisdom in changing times. The Minangkabau people depend on nature for their livelihood, creating a harmony between their rich culture and daily life that is in tune with natural cycles. The region's infrastructure follows the hilly land's contours, earthquakes, and high rainfall [4]. The local community developed adequate infrastructure for daily life while preserving the natural surroundings.

1.1 Humans

Human familiarity with the ecology of the Semangko Fault area has given birth to myths that strengthen their relationship with nature [5]. Each area, forest, cave, river, and mountain are considered to have a history and power that must be respected. The myths tell the origins and natural phenomena and teach life values from generation to generation [6].

A well-known example of a myth is the story of Mount Marapi, which is not only the place of origin of Minangkabau's ancestors but also a guardian force and environmental sustainability. People believe this myth is not only a story but also a reminder of the importance of maintaining ecological balance and respecting the power of nature [7]. This familiarity is also reflected in rituals and traditional ceremonies held periodically to honour nature. These myths become a solid cultural heritage, binding the community in close unity with their natural environment and teaching the importance of respecting and preserving nature.

These myths strengthen humanity's spiritual connection with ecological sites [8]. In addition, they play an essential role in maintaining the fragile balance of the ecosystem in this area. For the people in this Semangko Fault area, the myths play a central role in guiding human interaction with the surrounding nature. Each ecological

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site is considered to have magical and protective powers that affect daily life [9].

These myths are born from a deep belief in supra powers and local people's conventions about natural events. These myths form the spiritual and moral basis of the community, teaching values such as respect for nature and solidarity in the face of natural challenges [10].

In this context, myths are not just stories but also ways to explain and understand complex natural phenomena. Myths are an integral part of the social fabric of society, regulating human interaction with the natural environment [6]. They recount the origins and forces of nature and establish norms of behaviour that promote ecological respect and sustainability. In this way, myths serve as moral and spiritual guides that establish a harmonious relationship between humans and nature, maintaining the ecosystem balance vital to their daily lives.

Understanding myths in the context of disaster mitigation is very important because it can change people's behaviour and decisions when facing the threat of natural disasters [11]. An accurate understanding of disaster risk myths can help address this by providing precise and verified information about potential hazards and actions that can be taken to reduce risks. Educating the public about the scientific facts of disasters and clarifying myths can increase the awareness and preparation required. Thus, understanding myths strengthens disaster mitigation strategies, helping communities to act more appropriately and effectively in the face of possible threats [12].

Although studies on myths have been conducted widely in various places, research focusing on ecological site myths as disaster mitigation management on the Semangko Fault in West Sumatra still needs to be completed. The existence of myths about the Semangko Fault in West Sumatra must be explained. Historically, myths became a spiritual and moral guide for the community in maintaining ecological balance. They retain their cultural identity today and inspire sustainable disaster mitigation management [13]. In the future, it is crucial to understand and appreciate myths as a source of local knowledge that can provide valuable insights into disaster mitigation to preserve nature and build harmony between humans and the environment.

2 Method and theory

The research method for understanding human and environmental phenomena is descriptive and interpretive. This research documents quality myths through in-depth interviews, participatory observation, and content analysis. Furthermore, it explores individuals' or groups' meanings, perceptions, and subjective experiences.

This provides the flexibility to capture the complexity of the social and cultural context in which the mythical phenomenon is located a purposive sampling technique to get suitable informants. The data obtained is analyzed inductively by identifying patterns, themes, or concepts that emerge from the data.

For analysis, the theory of cultural materialism is used. This theory emphasizes the role of materials or economics in shaping culture and social structure. It assumes that material aspects such as economic production, wealth distribution, and social class structure are central to shaping a society's values, norms, and cultural practices.

According to this theory, how societies produce and distribute wealth and material resources affects social hierarchies, the division of labour, and patterns of social interaction. It explains how material factors create social inequalities and broadly influence culture, collective identity, and social change [14]. The theory of cultural materialism is also a framework for explaining cultural and social dynamics in the context of global structural and economic change. For example, land ownership and agricultural tools can shape power structures and social status. It influences value systems, self-image, and individual aspirations.

3 Results and discussion

In the Semangko fault zone in West Sumatra, mythical ecological sites flourish. Each site has a name that matches its history. Traditional communities believe that history is a truth that must be respected, maintained, and sustained. Myths, in the view of cultural materialism, are stories built into superstructure forces to preserve nature's material and economic aspects for the benefit of human welfare [14]. The following describes some samples of these myths. Without ignoring the widespread myths in the discussion, examples of significant myths are shown in the description below and can be seen in Table 1.

Table 1. Myths of Semangko Fault ecological site.

Myths	Content	The message	The meaning
Gunuang Marapi	-Ancestral Origins Site -Mountain eruption	-Ring of fire sacred site -Eruption alert	Disaster mitigation
Batu Anguih	- Magma rock site -Lahar of Mount Marapi -Prayer to ward off disasters -Trust in leadership	-Ring of fire sacred site -Be aware of Eruptions and lahars -The importance of ritual power -Harmony with the nature	Disaster mitigation
Malalo	-Natural Disaster -Religious figures -Sacred tombs	-Semangko fault site -Sacred sites -Landslide alert	Disaster mitigation
Ngarai Sianok	-Natural resource area site -Maintaining forest sustainability -Respect for nature	-Semangko fault site -Fragile topography of the land -Be aware of land movement	Disaster mitigation

Myths	Content	The message	The meaning
	-The power of nature		
Rimbo Larangan	-Natural resource area site -Maintaining forest sustainability -Respect for nature -The power of nature	-Sacred sites -Source of protein and energy -Antidote for oxygen, landslides, and floods	Disaster mitigation
Landscape of Rumah Gadang	-Tribal landscape autonomy -Landscape infrastructure -Building structure -Interaction media	-Sacred landscape site -Eco-friendly building -Be aware of natural disasters	Disaster mitigation

1. Gunung Marapi

Gunung Marapi is one of the mountains in the Semangko fault area in West Sumatra. In traditional historiography, this mountain is the place of origin for the ancestors of the Minangkabau people. Many myths have grown around this mountain, such as *pancang*, *batu gadang*, *rimbo bunian*, *lurah mangaun*, *aia tajun*, etc. The big myth is about the mountain itself.

The community considers Mount Marapi to be the guardian force and sustainability of the environment. When the mountain emits smoke, flames, and lava, it is believed that the mountain warns the surrounding community about its wrong actions and behaviours and its readiness to face the next series of events. The local people believe that ignoring them can lead to disaster for them. This myth is a story and a reminder of the importance of maintaining ecological balance and respecting the power of nature.

2. Batu Anguih

Batu Anguih, located on the western slopes of Mount Merapi, is mythologized and believed by the Minangkabau people living near Sungai Pua. Many variations of stories about the stone have developed in the community. One of them is the story of the eruption of Mount Merapi, which released hot lava. Batu Anguih was originally a large rock above the village. The stone became a place of prayer for Inyiah, a religious figure, to ask for blessings and protection from the Creator and Owner of the Power of Nature so that the community would prosper and be kept away from the impact of the eruption and hot lava of Gunung Marapi. Thanks to Inyiah's prayer, the tongue of hot lava at that time was held in the rock where Inyiah prayed. Because of the hot lava flowing and stuck on the rock, the rock became black like burnt.

These myths are often related to magical powers or natural blessings. Local people believe this stone has spiritual energy that protects and brings them good luck.

It is usually a destination for pilgrimages and religious rituals, where prayers are offered for blessings and protection. It also influences the culture and social life of the surrounding communities, reflecting the deep connection between humans, nature, and the spiritual world.

Batu Anguih is considered to have spiritual powers that protect the surrounding communities. This myth often leads communities to rely on mystical protection rather than scientifically-based disaster mitigation solutions. Understanding the power of Batu Anguih can serve as proper education on disaster mitigation, help separate facts from myths, promote more effective solutions, and improve community safety in disaster-prone areas.

3. Malalo

The Malalo myth tells the story of a landslide in Nagari Malalo, located on Lake Singkarak's edge, after an earthquake and heavy rains. The community called this event Malalo because, at the time of the incident, the community was in a state of hysterics, and some asked while shouting *ma lolo* (where is the stone). Gradually, the community came to call the landslide site Malalo.

This area is landslide-prone but has slowly developed into a community village. Here, it became one of the centers for the development of Islamic teachings on the shores of Lake Singkarak in the past and present. There are two grave sites of qualified religious figures in this area: Syekh Tuanku Nan Limo Puluah and Syekh Tuanku Panjang Abuak. These two sites have supernatural powers, and if the tombstones of the initially upright graves become tilted, it is a sign that an earthquake or landslide will occur in the surrounding area. People believe this and prepare themselves for the disaster, such as staying away from disaster-prone places.

Local people view this story as a focal point of spiritual belief, often associated with the guardianship of nature and supernatural forces that must be respected. It is a mythological object and the center of attention in religious ceremonies and rituals. The existence of these myths is a reflection of the deep connection between humans and the natural environment. These myths are passed on from generation to generation, playing an essential role in maintaining the cultural and moral values of the community.

In a modern context, this myth offers insights into the history and local wisdom. It opens a window to understanding the complex interactions between humans, nature, and spirituality in Minangkabau culture. It also highlights the importance of maintaining cultural heritage as part of efforts to preserve the identity and environmental sustainability of the area.

In Minangkabau mythology, it is believed to have spiritual power to protect communities from natural disasters. These myths sometimes influence people's perception of the need to take real action in disaster mitigation. Myths have become a familiar educational part of the locality. Together with scientific facts, they are an effective mitigation strategy to help communities understand the real risks and take appropriate actions to improve their resilience to natural disasters.

4. Ngarai Sianok

Initially, Ngarai Sianok was the name of one of the villages located at the bottom of the canyon. In the Minangkabau language, *sianok* means quiet (Si Anak), and the name *sianok* is also due to the canyon's calm and peaceful conditions and atmosphere.

Ngarai Sianok is a visual representation of plate activity on the island of Sumatra. This canyon was formed due to the descending part of the earth's slab, causing a fault in a steep ravine.

Ngarai Sianok is a natural wonder and full of deep myths and legends. According to popular belief, the canyon is the scars of a magic man's dagger used to split the mountain to create this beautiful valley.

It is said that the canyon is also considered a place guarded by spiritual spirits or guardians of nature. Local people believe they should honor and care for this canyon as a sign of gratitude to the supernatural forces that protect and bless it.

The myth that developed in Ngarai Sianok is that there used to be a man named Katik Muno with a large and influential body. He came to accompany his leader, Sang Sapurba. During his stay in Minangkabau, Katik Muno wanted to become the ruler. Because his desire was so strong, Katik, who initially had a gentle nature, became an evil and violent person. His crimes caused suffering to the local people. Seeing his behaviour, Sang Sapurba felt very ashamed. To avoid conflict with his superiors, Katik Muno became a dragon and divided the land into two parts. The land was divided into two parts, and it became Ngarai Sianok. When it was formed, the canyon was flowing with burning fire. But after the battle between Katik and Sang Sapurba, Katik Muno changed the fire flow into a stream of soothing water. The gorge became a fault that separated two plateaus.

Ngarai Sianok is a Minangkabau natural icon with mythological value as a spiritual place. The myth of the canyon's natural beauty and power sometimes obscures the urgency of disaster mitigation around the Semangko Fault. People may focus on the natural beauty and forget about the real risks of natural disasters such as earthquakes, landslides, and floods. Education about potential hazards and the need for appropriate mitigation preparations can help communities appreciate the natural beauty while remaining aware of the threats, encouraging them to take proper steps to improve disaster resilience.

5. Rimbo Larangan

Rimbo Larangan is a myth and legend in many cultures in Indonesia, including in West Sumatra. In West Sumatra, they are scattered in various corners, especially in the mountains and hills. These forests have various names, such as *hutan ulayat*, *bukik bunian*, and *rimbo uduhan*. This concept refers to forests considered sacred or forbidden to be entered or utilized by local communities without special permission or certain customary agreements. In Minangkabau society, prohibited forests are often associated with spiritual forces or guardian spirits of nature that are thought to live within them.

This myth reflects the community's respect for preserving nature and ecological balance. The community

believes violating the prohibition may incur the wrath of the forest guards, who can cause disaster for those who do so. Therefore, Rimbo Larangan is a stronghold for ecological protection and a place to nurture cultural values and local wisdom.

Understanding these myths helps communities view their relationship with the natural environment. It also highlights the importance of maintaining and preserving areas that are considered sacred as an effort to care for the cultural and ecological heritage that has been passed down from generation to generations.

Rimbo Larangan is a forbidden forest area with spiritual value and local wisdom in Minangkabau. Myths surrounding the spiritual power of this *rimbo* may reinforce awareness of natural disaster risk. People reconsider the mystical protection of nature to be more dominant than scientifically-based mitigation strategies. However, education that focuses on scientific facts regarding potential and necessary disaster mitigation efforts is essential to help communities integrate local wisdom with safer practices in the face of real natural disaster threats.

6. Landscape of Rumah Gadang

Rumah Gadang is a living myth in Minangkabau society. It is an icon of traditional Minangkabau architecture that reflects the rich culture and identity of the people. It is built in a tribal autonomy landscape with unique characteristics. The landscape sits on tribal communal land with a history of ownership struggles and names. The Rumah Gadang has a steeply pitched pyramid roof and tall columns. The building materials are made from selected, solid, and durable wood such as ironwood or meranti wood, which are beautifully carved with distinctive natural or geometric motifs.

Rumah Gadang's architecture is not only aesthetic but also functional. Its interior spaces are designed to support the communal lifestyle of an extended Minangkabau family, with a spacious main room that serves as a place to gather, eat, and sleep. The building also features a spacious veranda in front of the rooms, providing an additional area for outdoor activities.

In this autonomous landscape, in front of the Rumah Gadang, there are four ranks of places to store food. There are four categories of food: daily consumption, exchange with other materials, social and disaster preparedness, and germplasm for the sustainability of food seeds. Each food is sequentially stored in *rangkiang sibayau-bayau*, *sitinjau lauk*, *sitangka lapa*, and *sikaciak*.

The same applies to the *surau* infrastructure within the landscape. *Surau* serves as a medium of worship and education and a place for men in the tribe to spend the night. In addition, the *surau* also serves as a place to maintain the security of the tribe's landscape by the tribe's men from threats from other living things and natural disasters.

Symbolically, Rumah Gadang symbolizes family unity, economic success, and social status in Minangkabau society. Rumah Gadang is believed to have spiritual and magical value in a mythological context. The construction and orientation of buildings are often

connected to creation myths or beliefs about harmony with the surrounding nature.

The mythical landscape of Rumah Gadang and its environment on the Semangko fault can be an essential part of disaster mitigation management because this traditional design considers local geographical and geological factors. With its structure and location integrated with the natural landscape, Rumah Gadang is designed to reduce the risk of earthquake damage. Selected building materials and robust construction can increase vibration resistance. In addition, choosing a geologically and hydrologically safe location can also reduce the risk of landslides or flooding. The same applies to other infrastructure. Thus, the landscape of Rumah Gadang is not only part of the cultural heritage but also plays a role in protecting the community from the threat of natural disasters. Disaster risk education and technical solutions can help improve and maintain Rumah Gadang as an essential part of cultural heritage while increasing their resilience to disasters and sustainable development goals (SDGs).

3.1 Ecological myths of the Semangko Fault area: disaster mitigation management

In the Semangko Fault area, myths have a significant role in disaster mitigation management. This area often faces the threat of natural disasters such as volcanic eruptions, landslides, and floods [1]. Local myths and beliefs reflect the cultural identity of the Minangkabau people and play an essential role in their efforts to manage and reduce disaster risks.

First of all, myths often include local knowledge about the geology and ecology of the area. For example, stories about rivers can provide clues about natural patterns and changes that may occur before a disaster strikes. This knowledge can help communities prepare and take appropriate precautions.

In addition, myths also often teach values about respect for nature and how to coexist with disaster-prone environments [15]. Minangkabau people have a tradition of performing certain rituals to invoke protection or appease the anger of the creator and guardian of nature. These actions strengthen their cultural identity and provide a more profound sense of involvement in disaster mitigation efforts.

On the other hand, myths can be a tool to educate and raise public awareness about disaster risk [16]. Stories of past disasters or mystical events associated with nature are often passed down through generations, warning future generations of potential dangers and the importance of vigilance.

In the context of modern disaster mitigation management, participatory approaches are essential. Local myths and beliefs can be integrated into education and training programs, allowing communities to actively contribute to the planning and implementing mitigation strategies [17]. For example, knowledge of myths about natural signals or signs that can be interpreted from traditional stories can be used to develop more effective early warning systems [4].

In addition, myths can also serve as a source of inspiration for mitigation technologies or systems innovations. Some myths may contain how past communities coped with or survived disasters. By understanding and exploring these myths, new ideas or strategies can be found that can be applied in modern contexts to improve community resilience to disasters [18].

However, it is essential to remember that the approach to myths in disaster mitigation must be accompanied by scientific research and accurate empirical data. Myths should not be used as the sole basis for decisions but can be used as an adjunct to enrich understanding of the natural and cultural dynamics in disaster-prone areas.

Integrating myths in disaster mitigation management in the Semangko Fault area can result in a more holistic and sustainable approach. Building bridges between local wisdom and modern science can create a safer and more sustainable environment for the people living in this disaster-prone area [19].

Traditional disaster mitigation management in Minangkabau communities through the utilization of myths and ecological sites in West Sumatra reflects the complexity of the relationship between local culture, traditional environmental knowledge, and modern mitigation strategies. The Minangkabau, a matrilineal ethnic group living in the western mountainous region of Sumatra, has developed a robust knowledge system about the natural environment over the centuries. Those traditional myths and legends are integral to cultural heritage and have significant value in planning and managing natural disaster risks.

3.2 Cultural and mythical context

Minangkabau people view nature as a living entity with certain powers and characters. Myths and folktales describe the relationship between humans and nature and how human behavior can affect or be affected by nature. These myths are stories to entertain and serve as tools to teach moral values, ethics, and practical knowledge on interacting with the natural environment.

3.2.1 Utilization of myths in disaster management

In the context of disaster mitigation, myths, and folklore often contain hidden clues on how to deal with or anticipate natural disasters. For example, some myths tell about natural signs that may indicate the coming of a disaster, such as animal behavior or unusual weather changes. Local communities use this knowledge to prepare themselves mentally and physically.

3.2.2 Ecological sites as knowledge centers

Ecological sites in West Sumatra, such as forests, rivers, and mountains, are sacred places closely connected to myths and legends. Local communities treat these places respectfully and maintain their ecological balance as part of their cultural identity. Knowledge of local flora and fauna passed down from generation to generation is also

crucial in sustainable environmental management and disaster risk reduction.

3.2.3 Integrated disaster mitigation approach

Disaster mitigation management in Minangkabau communities relies on traditional ecological knowledge and myths and includes an integrated approach with modern elements such as technology, education, and sustainable urban planning. These programs integrate local understanding of myths and ecological sites with modern scientific research and practical experience in disaster management.

3.2.4 Case studies and practical implementations

Some examples of disaster mitigation practices inspired by myths and local knowledge in West Sumatra include nature observation-based early warning systems, evacuation plans that consider the topography and river flow patterns described in folklore, and the use of certain plants to maintain the stability of mountain slopes. This case study shows that integrating local wisdom and modern science can lead to more effective solutions in reducing disaster impacts.

3.2.5 Challenges and opportunities

While local wisdom has excellent value in disaster mitigation, maintaining and transmitting this knowledge amidst rapid social, economic, and environmental changes is the biggest challenge. Formal education and community programs are essential in supporting this cultural heritage while adapting it to the modern context.

Traditional disaster mitigation management of Minangkabau communities using myths and ecological sites in West Sumatra shows how local wisdom can be effectively integrated into modern mitigation efforts. By utilizing existing knowledge and respecting cultural values, these communities protect themselves from natural disasters and maintain a harmonious relationship with their natural surroundings. This is an example of how cultural diversity can be a valuable resource in the face of global environmental challenges.

4 Conclusion

The discussion of ecological myths on the Semangko Fault and traditional Minangkabau disaster management in West Sumatra highlights the importance of local wisdom in mitigating natural disaster risk. The region, with its landscape of mountains, rivers, and lush forests, plays a vital role in the lives and beliefs of the Minangkabau people.

The myths spread across the Semangko Fault reflect the community's cultural identity and serve as a foundation for understanding and responding to the often unpredictable dynamics of nature. In disaster management, these myths and traditional beliefs become essential instruments. Local communities usually use knowledge from these myths as early signals or signs to

anticipate disasters such as volcanic eruptions, landslides, or floods. This role is not only as a warning sign but also as a guide to take appropriate precautions.

Traditional Minangkabau disaster management also includes ritual and customary practices integrated into daily life. Traditional ceremonies and offerings to the guardian spirits of nature are part of the strategy to invoke protection and blessings from nature. This strengthens the community's spiritual bond with the environment and promotes respect for nature as the source of life.

However, disaster management approaches cannot rely solely on local wisdom in this modern era. There needs to be integration with modern science and technology to improve early awareness, more precise risk analysis, and rapid response in the face of disasters. Combining traditional knowledge and scientific approaches can lead to more effective and sustainable disaster mitigation strategies.

It is also essential to continue building the community's capacity to understand and respond to disasters. Education about myths, cultural values, and traditional disaster risk management must be strengthened. This can be done through education programs, training, and information campaigns that promote collaboration between local communities, government, and academia.

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