

Disaster mitigation through oral stories: A case study around Singkarak Lake

Khairil Anwar^{1*}, Oktavianus², Varhanno Khallifhatul Khanh³, and Vitrya Qurratu Ayuni Khanh⁴

¹Department of Minangkabau Literature, Universitas Andalas, Padang, Indonesia

²Department of Linguistics, Universitas Andalas, Padang, Indonesia

³Department of Biotechnology, Postgraduate Study, Universitas Andalas, Padang, Indonesia

⁴Department of Environmental Engineering, Postgraduate Study, Universitas Andalas, Padang, Indonesia

Abstract. This study describes the disaster mitigation strategy around Singkarak Lake, Solok, and Tanah Datar District West Sumatra through the oral stories of ecological sites. Disaster management in Indonesia seems to ignore local memories contained in oral stories because they are considered myths. This study is an attempt to investigate how people build knowledge of disasters and how they understand disasters by utilizing the oral story of their environmental ecological sites. It is qualitative research in which the data for this study are collected by using the participant observation method. Besides, the interview with the local community as the source of data is also done. The results of the study indicate that the communities have an oral story on ecological sites. They believe in the contents of the story as truth and follow it as part of the social structure. The communities know and realize that they live in disaster-prone areas so the taboos and advice contained in the oral stories are agreed upon as oral norms to always maintain the balance of nature in their environmental landscape. Pilgrimages and salvations are routinely held at the graves of village leaders as a part of building togetherness and loyalty to the ancestors.

1 Introduction

Efforts to reduce the risks and impacts caused by disasters, whether natural disasters, human actions, or a combination of both in society are regarded as disaster mitigation. The main things in disaster mitigation are the availability of information and maps of disaster-prone areas, socialization of knowledge and understanding and awareness of the community in dealing with disasters, knowing actions and arrangements if disasters occur at any time, and structuring vulnerable areas to reduce disaster threats.

Old memories, volcanic eruptions, and the occurrence of Maninjau Lake are a picture of a major disaster that has an impact on property and property losses, which is depicted in the story of Bujang Sambilan. The catastrophic event that caused many victims was the 9.1 SR earthquake followed by the tsunami in Aceh in 2004. Many buildings were destroyed and approximately 115,000 people lost their lives. The big earthquake had an impact on Africa and South Asia across the Indonesian Ocean. However, only seven people were crushed by the destroyed buildings, not because of the tsunami on Simeulue Island in the middle of the ocean [1].

The small number of casualties on the island benefited from the revitalization of the Smong folklore or song, a story about the past tsunami on the island by the Simeulue community. Similarly in Palu, Central Sulawesi, the revitalization of the Nalodo Story helped the indigenous

people avoid the liquefaction that followed the upheaval in 2018. The story revolves around being buried in the mud. For a long time, the indigenous people did not want to live in the liquefaction area. Many victims are those who consider the story to be mere fiction and illogical so they do not care about the knowledge that is displayed in it. In Thailand, the Moken people living in the Surin Islands are revitalizing oral stories about the big waves into knowledge [2]. The story is summarized in Legend of the Seven Rollers and the Laboon which tells of a wave that eats humans (tsunami). The story lives on from one generation to the next and becomes shared knowledge so that the collective knows the signs of a tsunami [3].

Oral stories of life from one generation to the next are passed on orally. Oral stories contain local values and knowledge about all histories and aspects of collective life [4]. Revitalization of local knowledge of disasters in oral stories needs to be done, especially for people living in disaster-prone areas to maximize disaster mitigation. Community adaptation to disasters based on ecological oral stories is part of the revitalization effort. The revitalization process is a model of the interaction of oral stories with the community, the interaction as a form of a field of meaning and transfer of shared culture. This interaction aims to maintain the sustainability of social structures and friendships. Interaction in disasters is characterized by the use of metaphors or allusions to past experiences with disasters.

* Corresponding author: khairilanwar@hum.unand.ac.id

This study explores local knowledge or wisdom in oral stories of ecological sites around Singkarak Lake as the content of disaster mitigation. In addition, it describes the community's interaction with the oral story which is seen through their thoughts, attitudes, and behavior towards the environment, such as traditions and ceremonies that are friendly to a disaster-prone environment. Previous studies have shown that interaction is the basis for community recovery and local wisdom about the environment is one of the factors determining the community's ability to reduce losses due to disasters [5]. On the other hand, neglect will fail to adapt to natural phenomena [6], for example, what happened to the people of Aceh and Palu.

Singkarak Lake area is in the Solok and Tanah Datar districts. Some parts of the lake environment have a high potential for disaster, such as in the Malalo area, South Batipuh District. This area is located on the Semangko Fault Cesar which is prone to earthquakes. Not only earthquakes, but the topography of the hills also causes this area to often experience disasters such as landslides. The location of this research is located on a slope of approximately 35 degrees at an altitude of 927 meters above sea level. Another condition is high rainfall. In addition, there is still uncontrolled deforestation. These indicators further increase vulnerability to landslides.

Disaster mitigation by BPBD for communities around Singkarak Lake is generally still structural mitigation (focusing on repairing physical buildings) instead of developing local interventions that are accepted by the community and can reduce disaster risk. The community still maintains local wisdom in disaster mitigation. These include oral stories of forbidden forest sites, powerful figures named Tuanku Nan Limo Pulauah and Tuanku Panjang Abuak, Tonggak Tujuh, Batu Bajanjang, Gunung Rajo, and the oral tradition of pilgrimages and the ritual of cleaning the Kapalo Banda before planting. This shows that oral stories are one of the traditional methods of disaster mitigation communication.

According to Bascom [7], folklore research must see it in a functional context. Oral stories in a collective have a function, one of which is a normative and pedagogical function about the environment and life. Meanwhile, Tyler justified that social research should no longer test hypotheses, but rather focus on strengthening communities in disaster-prone environments, building communities and families into disaster mitigation assets [8]. As happened on Simeulue Island, the Smong story is revitalized and well cared for by the community and serves as a strategy for earthquake and tsunami disaster mitigation. This paper discusses how oral stories and knowledge of ecological sites are maintained by the community around Singkarak Lake as a form of disaster mitigation. Focus on the form of local wisdom, oral stories of the ecological site of the Singkarak Lake community, and revitalization efforts through the introduction of disaster mitigation content.

Disaster mitigation includes three main processes [9]. First, it is called hazard mitigation, which includes structural mitigation and non-structural. Second, it is disaster preparedness, which is to build community readiness for disaster risk. Third, it is called emergency response which is a response to the issue of disaster

prediction and warning; evacuation and other forms of protection; emergency mobilization and organization, volunteer and material resources, search and rescue, damage control, and restoration of survivors [9].

The impact of disasters can be minimized by the psychological readiness of the community [10]. One of them is the means of disaster mitigation by utilizing local wisdom of oral stories in understanding the signs of disasters. According to Wisner, local knowledge is the totality of perceptions, beliefs, understandings, and skills used by a community in interacting [11]. That wisdom becomes the basis or customary law of decision-making in activities of daily life for subsistence and social interaction [12]. There are several characteristics of local wisdom, namely (1) originating from within the community itself; (2) disseminated informally and non-formally; (3) collectively owned; (4) passed on from one generation to another and adapted in people's lives [13].

2 Method

This study uses a qualitative method with an exploratory case study method. The locations are around Singkarak Lake, especially in the Malalo area. The data consists of primary and secondary data. Primary data was collected through in-depth interviews, while secondary data was collected from socio-cultural and disaster documents around Singkarak Lake owned by BPBD Solok and Tanah Datar Regencies. Informants were determined by the snowball method and technique, consisting of community leaders, guardians, and the people around Singkarak Lake. Meanwhile, secondary data was collected from the results of previous studies on local wisdom that discussed disasters.

3 Results and discussion

Public knowledge of dealing with disasters in disaster-prone areas is very much needed because disasters cannot be predicted. Therefore, the community's understanding of disasters in their environment needs to be built. Researchers found potential disasters around Singkarak Lake such as floods and landslides or Galodo. One of the strategies taken by residents to protect their environment from the danger of landslides is to maintain vegetation according to the contours of the land. The results and discussion will be explained in several points. First, what is the socio-economic background of the people around Singkarak Lake? Second, local knowledge is part of the interaction in dealing with disasters. Third, disaster mitigation communication management.

3.1 Geocultural and socio-economic communities around Singkarak Lake

The environment of Singkarak Lake is a tectonic area surrounded by hills. It has an area of approximately 107.8 km² which stretches over two districts, namely Solok Regency and Tanah Datar Regency. The depth of the lake reaches 268 meters and its height is 36.5 meters above

sea level. This lake is also touted as the second-largest lake on the island of Sumatra after Lake Toba.

Its geographical location is at the coordinates of 100.30 East Longitude (BT) and 0.360 South Latitude (LS). The surface area of this lake reaches 11,200 hectares with a width of approximately 6.5 kilometers and a length of 20 kilometers. This lake has a watershed of 1,076 km with rainfall of 82 to 252 millimeters per month.

This lake is part of the Singkarak-Solok Basin of the Sumatran Fault. The lake water comes from two large rivers and springs in the hills around the lake, including the Batang Sumpu River and the Batang Sumani River, and flows into the Batang Ombilin River. This area is influenced by the active Sumatran Fault. The basin was formed because of the submerged section caused by tectonic processes and the movement of the Sumatran Fault. This large basin has been hindered by the accumulation of volcanic material from volcanic eruptions in the vicinity, as stated by ITB Geologist Danny Hilman and Dutch Geologist Van Bammelen.

According to Verstappen [14], tectonic activity in the Solok Singkarak segment is indicated by activity during the quarter. Quaternary tectonics is characterized by fissure eruptions that appear to be associated with tectonic and volcanic activities. This condition causes this area to be vulnerable to geological disasters in the form of earthquakes, volcanoes, and landslides [15]. This hurts the social life of the community, especially in the physical aspects of land related to disasters. While positive impact Singkarak has the potential as a tourist attraction, rice fields, and lake fisheries are the economic source of the community.

On the Singkarak lakeside, there is an inscription of historical heritage that is thought to be related to Minangkabau history. The inscription (*Basurek Stone*) had already sunk a few meters into the lake. Under the Basurek stone, there is a Bajanjang stone (stone ladder) that goes down to the deepest part of the lake. and on either side of the inscribed stone are caves. This information has been circulating for a long time, namely in August 1970 through the Minangkabau History and Culture seminar. However, no further studies have been conducted to reveal this information.

Such environmental contours have a high vulnerability to landslides. Based on the observations of the researchers, several points in the Singkarak Lake circumference area are not used properly, as in Figure 1. Especially in the use of land as residential areas, some of which are located at points with a slope of 35 degrees. This is considered very dangerous if more and more residents are building houses in that location because the soil conditions will be too burdened with the building structure.

Population + 2,000 people, with 704 households, 60% are farmers, some traders, employees, and freelancers. The area of Nagari Padang Laweh Malalo is + 1,470 Ha. Residents tend to live in disaster-prone areas, therefore it is important to recognize disasters in their area. The Regional Disaster Management Agency (BPBD) of Tanah Datar Regency has conducted an introduction to the potential and level of vulnerability. However, the

strategy for dealing with disasters based on local wisdom has not been touched.

Based on field observations and interviews with residents, the Tanah Datar Regency BPBD once installed a bulletin board, which serves as a warning for the ground movement that could potentially become a landslide disaster. The installation of this notice board is not without reason, the location of the Malalo area has a fairly steep degree of slope and quite frequent ground movements that can endanger residents if there are activities around the slopes. However, when the author interviewed one of the residents in the Malalo area, he said that the announcement was not well received. For them, what is more, important is to build a shared awareness that is maintained from the values and local knowledge of the residents.

3.2 Communication of oral stories of ecological sites as disaster mitigation

Pareek and Trivedi [15] state that indigenous knowledge is based on cumulative experience passed down from generation to generation. Oral stories are an effective memory to store that knowledge. It is also a deep structure [16]. Public knowledge of natural disasters is very much needed, not only knowledge about the use of technology that can reduce disaster risk but also maintaining knowledge and local wisdom. Local knowledge is also obtained from the empirical experience of human interaction with the environment. Boven and Morohashi [17] state that local knowledge can be seen as the basis or norm for decision-making at the local level (daily life) to maintain subsistence and social interaction. In other words, local knowledge persists in society, becomes culture, and is embedded in daily practices such as institutions, relationships, and rituals [18].

The people of Malalo and around Singkarak Lake realize that their dwellings are categorized as disaster-prone. Therefore, residents maintain local wisdom or values to protect themselves from disasters through literary activities, agriculture, religious rituals, and the nature of cooperation. Mitigation activities which are one of the stages of pre-disaster an important aspect to involve local values contained in oral stories. Referring to Ngwese's writing [19], to find out how the community has good knowledge and adaptation to disasters, the discussion is divided into two sub-sections, namely (1) community practices in predicting disasters and (2) community practices in dealing with disasters. Initial findings are that there is a meaningful interaction with the oral stories of ecological sites and local traditions in the form of expressions of gratitude for the blessings of the earth and prayers to reject reinforcements.

3.3 Malalo ecological site origin story

The Malalo area is an ecological site that includes two Nagari administrative areas, namely Padang Laweh Malalo and Guguak Malalo. Based on the history of memory and the origin story of the name Malalo conveyed by residents, the name Malalo comes from the

etymology of the word Ma - Lolo ? The word comes from two facts, the words ma (question word: where) and lolo (a term for landslides that is expressed when surprised, lo.. lo..).

In the year 1700 AD in the Malalo area, there were frequent landslides called lolo, because often lolo, lolo everywhere. In the end, the area was called Malalo. Apart from being caused by tectonic earthquakes and rain that hit Malalo many times, it caused landslides. The incident had a psychological impact and became the moans of the community and was used as a song to put the children to sleep. The song was about *Batu o batu tanggulai, batu o batu tanggulai mande* 'rocks rocking from the top of the hill'. The oral stories and songs are passed on from one generation to the next generation passing on local knowledge and reminding them of living in disaster-prone areas.

The Malalo settlements were originally located far above the hills or highlands called *Pucuk Padang, Puak, Sikabu, Silengkeng, Puncak Siamang, and Taratak*. Because this area is located in the active Semangko Cesar, earthquakes often cause the lake water to undergo a decrease in the surface so that people slowly begin to move to the flat shores of the lake. This migration is also due to the emergence and proximity of sources of protein and energy as well as livelihoods from the lake.

In addition to oral stories about landslides, there are stories about Angin Pusako. This story comes from local knowledge of the community about the natural phenomenon of strong winds that occur in Singkarak Lake. The area on the edge of Singkarak Lake has a hot climate, once a season the heat is accompanied by strong winds coming down from the hills. The heat is the influence of the monsoon winds from the ocean west of Sumatra or the hot winds from the Indian Ocean. This hot wind by the elders is called the Angin Pusako wind because it comes once a year for 3 months between June and August since a long time ago. The strong winds affect the life that comes from the lake. During this season, the community considers the time to go down to the lake as fishermen, to avoid disasters caused by the wind in the middle of the lake and the possible number of fish to be harvested.

3.4 Ecological site stories of tombs and pilgrimage rituals

Based on oral stories conveyed by residents in the Malalo area, it is stated that there is the tomb of *Tuanku Nan Limo Pulauah*, as in Figure 2. *Tuanku* is a sacred figure who can solve life problems in a village that is prone to disasters and is often hit by landslides. This Nagari is located on the edge of a lake and hills with fertile soil and provides life for its people. *Tuanku* is believed to have the ability to know the upcoming disaster to befall the area to avoid disaster and loss and loss of life. Until now, the acknowledgment of *Tuanku* is still there which is marked by the tradition of pilgrimage to *Tuanku's* grave. The tradition becomes a ritual that is carried out by the residents of the Nagari to respect and express love for their services. In addition, a follower of *Tuanku Panjang*

Abuak is also a figure who is believed to have the ability to know future events. His grave is also often visited by residents of the community. If during a pilgrimage to the cemetery, the tombstone is seen tilted, then residents interpret it as a sign of impending disaster. Therefore, residents are always alert to face disasters that will occur that are not known when they occur.



Fig. 1. Topographical Malalo.



Fig. 2. Tomb of Tuanku Nan Limo Pulauah

3.5 Story of forbidden forest ecological site

The Malalo area stretches along the western edge of Singkarak Lake. In this area, there are hills which are the ecological sites of the forbidden forest. According to the people's memory, this area was the result of an agreement between the village pioneers and the Dutch colonialists. The agreement is realized in the form of an agreement on the forest area which contains rules and sanctions for violations. Thus, the area becomes a forbidden forest. To protect the area, various stories were built based on the strange experiences of the local community which contained mystical aspects and strange events. According to Harrist, the oral story is a community infrastructure that contains a superstructure to protect the area[20]. Economically, this forbidden forest area has the potential for spices needed by Europe. But ecologically, the forest area in the hills is a source of protein, springs, and a source of boards. On the other hand, the condition of the area is prone to landslides during high rainfall, so the forest area must be protected by trees that bind the contours of the land. Thus the forbidden forest becomes vital for ecological sustainability and human safety from disasters.

The oral story is an ancestral heritage. Symbolically, this story is a representation of the beginning of life starting from nothing into existence. Then, it became a link between humans and the Creator which is the relationship between the macrocosm and the microcosm. In the life of the people of Malalo, they interact actively with oral stories. The community applies local knowledge in the story in their lives, by understanding the ecological site that is told and carrying out the rituals ordered in the story.

Then how is the community's interaction with the site's story related to the practice of dealing with disasters? This tradition is part of the daily practice of the Malalo people. The community considers that the traditions passed down from generation to generation by their ancestors through oral stories of ecological sites should not be forgotten. For them, there is a certain meaning to why they have to interact with the story and carry out the ritual. Likewise, in social life, it is shown that there is a close relationship between the macrocosm and microcosm of the Malalo people. The ability of the community to read natural signs is a manifestation of local wisdom which is communicated by oral stories of ecological sites.

The oral story of the forbidden forest is meant to remind the people of Malalo and around Singkarak Lake not to just cut down trees and to know the criteria for vegetation that can be used for their daily needs. There is an unwritten agreement or customary law, that if it is found that residents violate and cut down trees that cause landslides, then the residents must pay a fine. In addition, tree felling may only be carried out for personal use, not for sale.

The method used by the Malalo people is to interpret the stories of ecological sites according to their socio-cultural conditions. Oral stories can bridge knowledge (science) to find out the microcosm relationship between humans and nature. However, the disaster risk reduction model initiated by the government has not touched local wisdom. Oral stories are only seen as mere entertainment in the structure of Malalo society, so they do not contribute to disaster mitigation. When disaster strikes, people do not have time to prepare themselves because they are not familiar.

To preserve the customs and traditions that have been passed down from generation to generation, the community pays respect to the village leaders. In addition, traditions are routinely carried out within a certain period as a representation and hope for a better life journey in the future. The tradition refers to the values in oral stories as guidelines for nurturing and protecting the village from all kinds of disasters, free from bad influences. According to residents, the tradition must continue to be held so that the village remains safe from disasters. Even though it's a very sophisticated era now, residents are not allowed to leave their ancestral heritage. So that this Nagari is clean from disasters, landslides, and floods. All citizens must come together, for their good.

The quote from the residents' comments above shows that the tradition carried out is one of the efforts to maintain a harmonious relationship between humans and nature to keep the village away from disaster. People

believe that God's relationship with humans is not only in the form of religious rituals, but local values are also a way to understand God and nature. Thus, traditions and rituals must be carried out to maintain safety.

Tradition is understood as a habit that is passed down from generation to generation and usually has the function of organizing social relations [21]. Hoffman and Oliver-Smith call this tradition "cultural preservation" which is manifested in the form of rituals based on myths or legends known to the public [22]. The tradition carried out by the Malalo people is a form of applying local values in dealing with and understanding disasters. So far, the term disaster is mostly conveyed by the government, so the disaster construction that is conveyed becomes the basis for public understanding of the disaster.

Even though it doesn't look real, religious activities and creative storytelling go hand in hand. This is done so that the relationship between nature and society remains in harmony, both those who still maintain their ancestral heritage and those who consider tradition only as a local cultural practice. However, oral stories from ecological sites carry messages to be aware of disasters and advice to always preserve nature.

3.6 Disaster mitigation management based on ecological site oral stories

Because of the complexity of disasters in Indonesia, they must be handled by all parties who are formally responsible for natural and other social disasters [23]. Based on Law Number 24 of 2007, concerning Disaster Management, it is explained that a disaster is an event or series of events that threatens and disrupts people's lives and livelihoods, caused by both natural and/or non-natural factors as well as human factors, resulting in the emergence of loss of life, environmental damage, property loss, and psychological impact. Based on the legal aspect, disaster management is not only providing material assistance but also providing moral support for victims.

Preparing disaster-prone communities to be resilient in facing disasters is a form of moral support. For example, packaging local wisdom in people's oral stories about disasters is part of their daily culture. The message of the community to always be alert, alert, and respond to disasters is a must. A combination of top-down and local linear communication models should be practiced. So far, what is practiced is still linear, top-down, and does not pay attention to the local wisdom of the target. As a result, when a disaster occurs, confusion occurs where the location is safe and information can be trusted. If the community is given an understanding and communicates about disasters using local terms and languages, then losses can be minimized.

Symbols used for generations are a field of meaning to communicate all kinds of messages. Langer mentions that communication symbols, one of which is a traditional ceremony (worship) are a manifestation of culture [24]. Thus, all interactions in society are forms of communication.

Therefore, revitalizing oral stories of ecological sites represented in life is a form of disaster mitigation strategy. The revitalization was built through the use of the oral story values within four phases.

First, interaction with oral ecological sites is understood as an activity of sharing and participating, gathering, making friends, and having the same ownership of certain values [25]. The message in the oral story and the norms in it become a tradition as a means of communication between residents, the ritual is a form of respect for residents to their ancestors. The story always reminds residents to keep the environment safe and safe from disasters or reduce disaster risk. Interaction with oral stories on ecological sites is not just dialogue and information transfer, but an effort to share the common culture of disaster mitigation.

Second, community dialogue in oral stories on ecological sites is a process of self-meaning that is sacred and sacred, human interaction with nature as a source of protein and energy, and always maintaining harmonization through their respective roles. According to Radford, the core interaction is togetherness and dialogue, both between communities and with the superstructure [26]. The details of local wisdom in the oral stories of ecological sites that are conveyed aim to maintain the safety of the environment and humans from disasters or minimize the impact of disasters.

Third, dialogue with oral stories on ecological sites is analogous to a ritual of self-reflection or catharsis of 'purification of the soul' and requires all the participatory elements together. For example when the pilgrimage ritual. Almost all Malalo residents have a dialogue and maintain local values. Rituals led by religious leaders become a means of conveying messages related to the environment and disasters. This activity is important because residents feel more trust in information from religious and traditional leaders. The reason is that the character has a 'vision' of what will happen in the future.

Fourth, community interaction with oral stories of ecological sites is part of integrating traditional practices and religious beliefs in disaster mitigation. According to Syadzili, in Islam, there are rules for religious procedures (ubudiyah) and procedures for life on earth (amaliyah), including harmonious interactions with nature [27]. Furthermore, Syadzili explained the disaster category in the Qur'an, first, as a test (ibtila') of human faith (Surah Al Baqarah [1]: 155). Second, as a warning (tadzkirah) so that humans always obey Allah (Surah Yunus [10]: 44). Third, as a punishment (uqubah) for human mistakes and to regret mistakes, ask forgiveness, and repent to Allah SWT (Surah Al Baqarah [2]: 59).

4 Conclusion

In disaster mitigation, community dialogue with local wisdom is important in oral stories of ecological sites, traditions, and rituals. Disaster mitigation for people living in disaster-prone areas through the construction of their local values is important. The Malalo people have awareness of disasters through local wisdom, traditions, and rituals related to disasters, and are still practiced

today. The application of local wisdom about disasters from oral stories of ecological sites is a good thing to do because meaning can be built and understood in mutual agreement through a traditional process guided by religious rituals. Therefore, residents do not feel worried about their daily lives, because the community already has self-defense which is manifested in the form of norms that are sourced from oral stories of ecological sites.

Information on local wisdom is believed by older people, while some of the younger generations believe it because they feel the need to respect older people so that there is no conflict over information choices related to disaster mitigation. The active role of local actors and intellectuals has contributed to preparing the community for disaster response. The success of disaster mitigation management based on local wisdom cannot be separated from the formation of citizen awareness that they live in disaster-prone areas.

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