

# Local Wisdom of Gayonese in Landslide Hazard Mitigation

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## ABSTRACT

Local wisdom related to natural disasters mitigation has been much discussed in recent years. The occurrence of natural disasters somehow cannot be prevented, but the casualties can be minimized if the community has preparedness. Local wisdom is assessed as one way that can be used to minimize the impact of natural disasters. Natural hazards often occur in Gayo Highland. The hazards potentially harm humans that may cause loss of life, injured, and missing properties. At least around 40 occurrences of natural hazards in Aceh Tengah Regency since 2006-2016. This study is aimed to reinforce local coping mechanisms that can help people and communities prepare better for managing future disasters. This research is designed by using a descriptive research method with a qualitative approach. Data collection was done through observations and interviews. The observations were carried out on (a) the nature and environment of the Gayo community, (b) local customs as local wisdom of the Gayo community, (c) landslide mitigation practiced by the Gayo community. Meanwhile, interviews were conducted with informants using snowball sampling. The informants include *reje kampung* (head of the village) of Jamat Village, Gayo people, and *pawang uten* (local forest handler). After having some observations and interviews, it can be concluded that there are several kinds of local wisdom that have been applied within Gayonese people to prevent or minimize the impact of natural disasters and need to be preserved in the community for disaster risk reduction.

**Keywords:** Local Wisdom, natural disaster, natural hazard, mitigation

## 1. INTRODUCTION

Local wisdom related to natural disasters mitigation has been much discussed in recent years. The occurrence of natural disasters somehow cannot be prevented, but the casualties can be minimized if the community has preparedness. Local wisdom is assessed as one way that can be used to minimize the impact of natural disasters [1]. This indigenous knowledge is practiced by local people and has a great potential for reducing risk in the local areas. The United Nations has recognized this as a key element of Priority 3 of the Hyogo Framework for Action (HFA), which focuses on education and knowledge. One of the key activities identified under this priority action is information management and exchange and highlights the use of relevant traditional and indigenous knowledge and cultural heritage to be shared with and adapted to different target audiences.

People living in disaster-prone areas over a long period have gathered knowledge of their environment and have identified methods to mitigate disasters impacts. In this case, the people have shown themselves to be a source of strength, contributing innovative ideas and local knowledge that can lead to solutions that can make a fundamental contribution in mitigating the negative impacts of natural disasters. Therefore, exploring local capacities must be considered as an essential component in any disaster management plan.

To strengthen the capacity of households and communities in managing the effects of disaster, we have done a study to collect local wisdom in Jamat Village, Linge sub-District, Central of Aceh District, Aceh Province. The study is the potential to reinforce local coping mechanisms that can help people and communities prepare better for managing future disasters. It is hoped that the local wisdom captured in this report will benefit a wide audience who are faced with the challenges of rapid onset or chronic disasters.

## 2. BASIC CONCEPT

The use of local wisdom in the mitigation of natural disasters can be found in various community groups, for example in the Turpan community located in China's Xinjiang Province, that apply their local wisdom of *Karez* technology that can reduce the risk of drought disaster [2]. In the other case, the Nandeswar people in India planted bamboo trees along rivers for flood mitigation [3]. The local wisdom in Indonesia also can be found in several places, such as the local wisdom of *smong* in the Simeulue community, who were living on Simeulue Island in Aceh during the 2004 earthquake and tsunami [4]. The events of the earthquake and tsunami disaster have caused many casualties in the coastal area of Aceh, but few victims died on the island of Simeulue due to the local wisdom.

Each region has its local wisdom. Sometimes the local wisdom has not been developed properly, including in the Gayo people. The Gayo itself refers to a group of people who live and are bound in the unity of tribes around Central Aceh. Although they are can be found also everywhere in Aceh Province, specifically, the Gayonese mostly live in Gayo Lues, Central Aceh, and Bener Meriah districts. The areas are located on a hilly plateau and overgrown by dense rain forest that is close to an active volcano namely Burni Telong and passed by the Great Sumatran Fault. Thus, the areas are potential with natural hazards occurrences [5]. Gayo people who are used to living closely in their environment, of course, have their local wisdom associated with the mitigation of natural hazards.

The contributing factor to the persistence of this belief is supported by the tradition of folklore. The folklore is known as *kekeberen* in the Gayo tribe. In the past, written rules were not familiar in the Gayo community. Various aspects of their cultures exist only in the form of folklore (*kekeberen*) [6]. *Kekeberen* is one of oral tradition by telling stories of history, rules, and social life containing moral messages of local wisdom.

Natural hazards often occur in Gayo Highland. The hazards potentially harm humans that may cause loss of life, injured, and missing properties. At least around 40 occurrences of natural hazards in Aceh Tengah Regency since 2006-2016. The most recent earthquake on July 2<sup>nd</sup>. 2013 caused 35 people to die, hundreds injured, thousands displaced and many buildings damaged. Other natural hazards, such as landslides and floods that occurred recently also caused fatalities [7].

## 2. METHOD

The Central Aceh district is an area prone to natural hazards. The hazards may cause damage and affect the social life of Gayo people. Since they often experience

natural hazards, along with the time they develop local forms of wisdom in disaster mitigation. However, most of the local wisdom practiced by the people has not yet been explored. In this paper, it will be discussed some findings of local wisdom practiced by the people of Jamat village, Linge Sub-district, Central Aceh District, Aceh Province associated with landslide mitigation.

This research is designed by using a descriptive research method with a qualitative approach. Data collection was done through observations and interviews. The observations were carried out on (a) the nature and environment of the Gayo community, (b) local customs as local wisdom of the Gayo community, (c) landslide mitigation practiced by the Gayo community. Meanwhile, interviews were conducted with informants using snowball sampling. The informants include *reje kampung* (head of the village) of Jamat Village, Gayo people, and *pawang uten* (local forest handler). They are known as *sarak opat* in Gayonese society.

## 3. RESULTS

Jamat village is located about 70 km from Takengon, the capital city of Central Aceh district, to the southeast. Most of the area in the Central Aceh district is located at an altitude above 1,000 meters above mean sea level, while Jamat village is situated at an elevation below 600 meters above sea level with an area of about 30,000 ha. The main livelihood of the community in Jamat village is agriculture and livestock. The village is located on the right side of the Krueng Arakundo upstream.

Natural hazards that often occur in Central Aceh District are earthquakes, floods, landslides, storms, and fires. However, in Jamat village landslide and flood hazards are considered more dominant than other natural hazards. Topographically, Jamat village is surrounded by mountain slopes and riverside of Krueng Arakundo.

Although situated on such a topographic area, people in Jamat village admitted that they have not experienced landslide hazards for more than one decade. Because the occurrence of landslides is rare, they believe that landslide is a legend story. Landslide events are seen as a spirit in form of a dragon or giant snake descending from the mountain. One of the informant as a local public figure (73 years old) said: "*Ulak mien ku perdu, oya kati murelas, ho...toron ni nege kene jema jemen*" (the point that cause the rocks avalanche, by our ancestors were perceived as a dragon descends from the hill).

In Jamat village, there is an unwritten local rule that prohibits cutting down trees and destroying the forest. More specifically, people are forbidden to cut certain trees such as trees that are stuck together (twin trees)

and trees that grow on the cliffs or around springs. They believe that the trees are pegs of the earth that have to be preserved. According to the informant as a local forest handler of Jamat Village (49 years old), "*Bor kati murelas, pakan ea meh i onohi, pancang ea le kayu. Oya kati kene jema jemen gere nguk nebeng nebeng kayu musepit, kayu wan karang rom kayu i ulu Ni weh*" (landslide occurred because the earth's pegs have been damaged, the pegs are trees, therefore our ancestors banned to cut timbers that grow together as well trees growing on slopes and around springs).

Implementation of these rules is based on custom rules that have been made and acknowledged by the Gayonese community in Jamat village. One of our informants as head of Jamat village (51 years old) stated: "*Betawe kami isen, gere sembarangan, gere nguk mayo ku uten rom nebang kayu, turah ara berijin ari pawange ya, ike mulanggar oya kona dene*" (anyone should not carelessly enter and cut down the forest, permission from forest local handler is needed. Any violation will be fined.).

According to Ibrahim and Pinan [8], the customary rules on forests were also adopted during Dutch colonialism (1901 to 1942). People are prohibited to cut timbers and opening forests without permission of the government through the recommendation of *reje* (head of the village), anyone who violates the rule is explicitly punished by imprisonment sanction.

#### 4. DISCUSSION

To interpret the unwritten customary rule in the Jamat village about landslide hazard mitigation, we will discuss the basic concept of landslide based on geological view as below. Landslide is the downhill movement of rock and soil under the influence of gravity. The stability of a slope and the severity of mass wasting depend on (1) steepness of the slope, (2) orientation and type of rock layers, (3) nature of unconsolidated materials, (4) climate and vegetation, and (5) earthquakes or volcanic eruptions. Landslides can be triggered both naturally and as a result of human activities.

Landslides occur when the driving force on the slope is greater than the retaining force. The retaining force is generally influenced by rock strength and soil density. While the driving force is influenced by the magnitude of the angle of the slope, water, load, and soil or rock type. Based on the definitions it can be concluded that landslide is the movement of a slope constituent material in the form of rock, soil, or material rendering material (which is a mixture of soil and rock) down the slope, which occurs when the driving force on the slope larger than the retaining force. The process is through three stages, namely discharge, transport or movement, and precipitation.

There are many types of landslides, translation and rotation landslides are most common in Indonesia. This is because the weathering rate of rocks is high that forms a significant thick soil layer. For the translation and rotation landslides, materials can flow at a considerable distance that can reach hundreds or even thousands of meters. The velocity of materials is strongly influenced by the slope, volume, and pressure of the water and the type of the materials. The controlling factor of avalanches is a phenomenon that conditions a slope to be potentially in motion, although at this time the slope is still stable. The potential moving slopes will move when there is a disturbance that triggers the movement.

Other factors that can also cause landslides are soil porosity or the ability of soil to absorb water, they are mostly formed by loose material such as sand and clay. With the absence of vegetation around the slopes, such materials potentially move during the rainy season. With dense vegetation, the rainwater will be absorbed by roots. In this case, the water content in the pores of soil is maintained. On the other hand, the vegetation roots can also make soil structure compact.

Landslides can be protected naturally by maintaining vegetation in the area. The vegetative method is a non-technical method by planting trees on the slopes. The trees should be planted from the foot to the top of the slope. Soil stabilization takes precedence over the foot of the slope. In less dense vegetation areas, the surface should be filled with grass or covered by crops with good drainage such as agroforestry. On the slope and top of the slope, a good drainage system (internal and external) should be improved to protect water entering the soil to the deeper part. In this way, the water saturation level within the soil above the impermeable layer can be reduced.

The plantation method is widely used by Gayonese in Jamat village. Every community is willing to volunteer to plant trees in terms of preserving the forest. This activity become a tradition conducted by the people from one generation to the next generation. They plant some local trees like pine, *dedalu*, and *temung*. These trees typically are not too high, but they have a wide root distribution in the ground that can be functioned as a soil binder. Planting trees or vegetation methods can be a factor in controlling the movement of lands or landslides. The less vegetation the less compact of soil and the easier the soil crack during the dry season. In the rainy season, water will easily seep into the soil layer through the crack and cause the soil to be in water-saturated condition. Thus, sooner or later will result in mass movement or landslides.

The Gayonese community in Jamat village has their way that become part of their cultural system in protecting forests. Forests are an integral part of nature itself, therefore to maintain the forest ecosystem in

which some rules or norms must be obeyed by all people. They are still connected and obey their customary rules, which are full of trust related to the management and maintenance of their environment. They manage forests using knowledge derived from their local wisdom.

The Gayo community in Jamat village classify their forest in two types, namely *uten was* (inner forest) that is located inside the village and *uten deret* (outer forest) that is situated outside the village. The outer forest must be maintained by the whole community. Anyone is strictly prohibited from damaging it by burning or cutting it down without any permission or guidance of a local forest handler. If a person or group of people wishes to clear a forest for a rice field, plantation, or to harvest timber for construction materials, they should ask for permission or acknowledge the forest handler. The person who persists to do so without the permission of the forest handler will be punished by the local rule in form of a certain amount of money or materials.

Usually, Gayo people cut down timbers based on their local knowledge. There are rules of cutting the trees based on the achieved needs, such as cutting down trees selectively based on the size and type of trees. Unlike the land clearance, some activities like hunting animals, birds, or other wildlife, taking rattan, collecting honey, or various flowers and vegetables from the forest do not require permission from the local forest handler.

The forest inside the village (*uten was*) is smaller than the *uten deret* (outer forest). This type of forest is not overgrown by various types of trees that can be used for building materials but is covered by bamboo, vegetables, and bushes. Anyone in the village is allowed to pick vegetables for food, bamboo for constructing fences, or temporary houses in the paddy field. Although the trees in the inner forest are allowed to be exploited, it was still kept under control. People are recommended not to cut down carelessly and not to sell them.

There are various indigenous views or opinions about natural disasters events that grow and develop in a certain society. Such views and opinions are appropriate to the level of education and personal or group understanding of disasters. The views and opinions of the community about disasters can be classified in terms of fatalism, anthropocentrism, Cosmo centism, and inclusivism.

Fatalism is a view that assumes that disasters are a punishment of God as a result of human activities that are not following His will. Thus, disaster events cannot be overcome or resisted because they all are destiny. Anthropocentrism is a view that disasters are a natural phenomenon caused by human activities that exploit nature that causes an imbalance of the universe, which in turn leads to disaster. The Cosmo centism is a view

that disasters are a natural phenomenon that occurs naturally, something natural happens. In this case, human intervention to exploit nature does not significantly affect the occurrence of disasters. While the inclusivist view is that disasters are a natural phenomenon that occurs because the interrelationships between natural and human elements are inseparable from each other.

## 5. CONCLUSION

The way of Gayo community in Jamat village views disaster can be classified as anthropocentrism. Anthropocentrism assumes that disaster is a natural phenomenon caused by human activities that exploit nature including the forest environment, causing an imbalance of natural elements, which in turn leads to landslide disaster. They believe that the elements of nature have a spirit, such as a dragon or giant snake, if they are disturbed, the spirit will be angry. To minimize the possible dangers caused by the uncontrolled destruction of the forests that resulted in the spirit of the mountain guard, the *datu muyang* (ancestors) of Gayonese in Jamat village acted wisely in the preservation of the forest. They inherit stories relating to the effects of forest destruction. Landslides are the impact of forest destruction. Thus, they consider the landslide event to be a sacred thing. They believe that a landslide hazard is a kind of a dragon or a giant snake descending from the mountain.

In essence, *kekeberen* teaches moral values to listeners. Thus, they adopted the wisdom from *kekeberen* and practiced them in everyday life. The same thing has been practiced by the Gayonese community in Jamat village about landslide hazard as an incarnation of the dragon. They assume that a dragon rests on a mountain. Exploiting the forest unwisely may trigger the anger of the dragon from the rest. As a result, people are afraid and do not dare to destroy their forests. Such beliefs cannot be explained empirically and logically, but these beliefs implied a reliable effort in landslide mitigation. Such kind of local wisdom needs to be preserved in the community for disaster risk reduction.

## AUTHORS' CONTRIBUTIONS

M.M: data analysis, composing, editing, and revising the manuscript. H.R.G: data collecting and data analysis. Both authors reviewed the manuscript.

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