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The implementation of local wisdom in reducing natural disaster risk: a case study from West Sumatera

Z Zulfadrim*, Y Toyoda, H Kanegae

Graduate School of Policy Science, Ritsumeikan University, Iwakura-cho 2-150, Ibaraki, Osaka, Japan.

*Corresponding Author: ps0335hh@ed.ritsumei.ac.jp

Abstract. The purpose of this paper is to introduce some local wisdoms in West Sumatra and propose their challenges that modern values have degraded its knowledge. In a contemporary context, traditional stories (written and oral stories) still relevant to be used and internalized in disaster risk reduction. Traditional knowledge or local wisdom is a system of knowledge derived from long experienced process in the past, adopted and handed over to next generation through evolutionary process. Indigenous or traditional knowledge can be practiced in understanding the nature of natural disaster, to propose the best action in mitigation, to respond in emergency phase, and to suggest more option for recovery process based on previous experience. The paper based on four weeks field research in west Sumatra which is known with their natural hazards due to its geographical location. In the beginning, this paper discusses the nature of local wisdom and how it can be matched in disaster management, then continues to the specific case how the traditional stories in West Sumatera can be internalized and integrated with contemporary disaster risk reduction. This paper proves that local wisdom can be useful as an effective instrument to deal with natural disaster or natural hazard.
Keywords: disaster risk reduction, local wisdom, natural hazard, West Sumatra

1. Introduction

When the success story of Simeuluean in Aceh and Moken society in Andaman Sea widely publicized aftermath of 2004 Indian Ocean earthquake and tsunami, the studies of local wisdom substantially increase. Knowledge that helped those communities survives show the importance of local wisdom (written and oral stories) to disaster risk reduction. Even though the documentation and report about the application of local wisdom related to disaster risk reduction can be tracked back long before this disaster, as Dekens [1] stated that there was an evidence since 1970's that local knowledge and practice could improve preparedness in facing natural disaster, however, only in recent years practitioners have paid more attention to this issue and integrated it in policy making and planning [2].

Even though there are many definitions of local wisdom; depending on the field of study, the characteristic of local wisdom can be generalized as follow: (a) locally bound (b) context specific (c) non-formal and (d) dynamic [3]. Local wisdom is a result of experiment and continues process that makes them a dynamic evolution and non-formal form of knowledge. Local wisdom usually handed down from one generation to the next generation through oral histories, myth, song, and legends. Unfortunately, in some region such knowledge handed down through oral and written stories to a certain key member of the society only and not to be shared widely. This information may be considered as a sacred and taboo and not disseminated among family or other community members. Only key person in

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community such as clan leaders, or elders can keep the information with their own memories. This practice makes this knowledge less accessible.

According to Rajid [4], local wisdom can be divided into two aspects, which are technology and belief system. Below, we will discuss more about technology and belief system from local wisdom in West Sumatra. Traditional housing system, food storing system as technology aspect are considered as preparedness measure in disaster risk reduction while in the other hand during the post disaster and recovery process the appliance of *Tuddukat* and *gotong royong* is an example of local wisdom practices that meet local and socio-economic context.

2. Research Method

The research was conducted in two phases, from January – March 2017 and from Mei – June 2017. West Sumatra was chosen for their high vulnerability to the impact of natural disaster as well as their cultural diversity in that area. Community and groups' leaders, traditional and religious leaders, local government, Non-Governmental Organization (NGOs), and experts were involved in the action research that included interviews, field observation and focus discussion group (FGD). Local wisdom and practices related to natural hazard were identified and documented. The first phase is a collecting data process while the second phase is validating the data through FGD to establish scientific base for local wisdom.

According to UNESCO [5] Local wisdom refers to the understanding, skill, and philosophies developed by communities in their interaction with natural surroundings. From that definition, it implies that this type of knowledge dynamic evolved in day-to-day activities [6]. Moreover, researcher agreed that term local wisdom is analogous to local knowledge, peasant knowledge, community knowledge, traditional knowledge and indigenous technical knowledge.

3. Result and Discussion

West Sumatra is the homeland of *Minangkabau* people; one of the largest ethnic groups in Indonesia situated in the middle of the western coast of Sumatra. It has a distinct culture for its matriarchal system which makes them different from the rest of the Islands; it is influenced by Islam culture and adapted it into their own way of life. Geographical feature of west Sumatra varies from plains, mountainous volcanic, highland and an offshore archipelago called Mentawai Islands. From the following discussion, West Sumatra inhabitant can be distinguished into two main groups, first *Minangkabau*, those who live in the main island, second *Mentawaians* those who inhabit in Mentawai Islands, that are also part of the province, however their culture and language are intelligible with neither *Minangkabau* nor Indonesians. Thus, they have different local wisdom among others.

Based on Indonesian Disaster risk index, West Sumatra is one of the highest disaster risk area in Indonesia, due to its geographical location which is located between the confluence two major continental plates, (The Eurasian plate and Indo-Australian Plate) and Great Sumatera Faults [7] and based on 2003 Indonesian Seismic Zoning Map [8] belongs to Zone 5 -6 of zoning type (1=lowest, 6=highest). It is also vulnerable to other natural disasters such as cyclone, drought, flood, landslide and combine with environmental degradation such as pollution and deforestation. This vulnerable condition exacerbated by social problem like poverty and inequality.

West Sumatra province has experienced many kinds of natural disaster in the past. Based on historical document, since 1822 till nowadays, approximately there were more than 15 destructive earthquakes occurred in west Sumatra, some of them followed by tsunami. Another natural disaster that affects west Sumatra people is flood that occurs almost every year in rainy season. The heavy rainfall is not only resulting floods but also followed by landslides. In coastal area, they have a different problem. Other hydro meteorological hazards that threaten their community are tropical cyclone, coastal erosion and sea level rise.

3.1. Local Wisdom in Minangkabau Community

Communities in urban and rural area in Minangkabau have developed ways to prevent or to reduce disaster risk by adaptation and well preparation. Their ancestor has experienced recurrent of hydro meteorological disaster and utilize their knowledge to deal with them. The most interesting features

about *Minangkabau* communities are their traditional house. Most people know about traditional house of West Sumatra, which has a unique triangular roof. This traditional house is called *Rumah Gadang* (Big House) because of its function as the main venue for several activities and festivities. In addition to its function as a house for daily life activities, it is also a place for clan meetings and marriages [9]. This house built on stilts with high ground space to protect them from flood, animal attack and moisture, sometimes it is also being used as a place to keep their cattle stock. This traditional house also has an ability to withstand an earthquake, since the column of this building is normally laid on stone pedestal foundation rather than inserted into the soil [10].

Generally hydro meteorological hazards often lead to food shortage; however, in West Sumatra mostly on rural area this phenomenon is not existed. Next to the traditional house or *Rumah Gadang* (Figure 1, left) there is another structure called *Rangkiang/Lumbuang* (Figure 1, right). This structure used as granary or rice barn use in times of scarcity and unpredicted events. *Rangkiang* can be found in courtyard of *Rumah Gadang*. Every clan (family) in *Minangkabau* has their own *Rumah Gadang* and *Rangkiang*. When the disaster occurs, they use their stockpile to fulfill their needs.



Figure 1. *Rumah gadang* (left) and *rangkiang* (right).

Another local wisdom in coping disaster effect that can be identified in West Sumatra is mutual assistance i.e people helping each other. This is a common practice in many rural areas in Indonesia; the term for this practice is *GotongRoyong*. According to Mardiasmo [11] this value suggests a principle that all activities are performed in cooperative and equal manner, and promote efficiency in order to quickly re-build the community. The recovery process from 2009 earthquake in Padang showed that this practice was preferred method of disaster recovery rather than aid and initiatives from Indonesian government. In West Sumatra, Gotong Royong not only takes place in disaster event but almost in every occasion, they keep working together in good time as well as in bad time, from building a house to marriage parties. This activity not only exists in the disaster moment, moreover this "togetherness" may occur and carry on in many other aspect of lives.

3.2. Local Wisdom in Mentawai Community

In Mentawai Island, M*entawaians* also have their own local wisdom for natural disaster. As one of indigenous tribe in Indonesia, they still preserve many of their original values. As Hilshorst [12] stated that the foundation of indigenous people's resilience in the face of natural disaster provided by the intimate relationship between indigenous community and nature. Mentawai Islands had experienced some small, medium and big disasters such as earthquake, tsunami, flood and landslide. The last disaster took place in this area was 2010 tsunami that caused hundreds of people lost their lives. In this case, as told by Jimi Richard disaster mitigation activist in Mentawai, quoted that local wisdom that belongs to

experience knowledge have saved many lives in Tumale, Silabu village. All villagers who inhabited in Tumale survived because they applied small *Tuddukat* to give warning signal to people for incoming tsunami. *Tuddukat* itself is the traditional instrument use to communicate with clan members (Figure 2, left). It is a drum made from wood, which is struck, to produce sound. In their original land, deep in the Siberut Island, *Tuddukat* is an accessory every *Uma* should have.

Uma is traditional house for *Mentawaians* (Figure 2, right). This kind of building has existed for century and may have experienced their toughest test by nature for any kind of natural disaster and phenomenon [13]. Similar to Minangkabau, this construction plays a significant role in mitigation process, mostly for flood and earthquake disaster. From field observation, there were evidences that this construction could survive from severe earthquake and flood because of the earthquake resistant technology in these houses. Some of key points which might have contributed for their superior performance in earthquake are; the use of light structure using wood as building structure frame, the use of knock down and tied joint in joint system and the use of lightweight material for roof in this house.

For storing food, they buried *sago* (sago is the main intake for *Mentawaians*) underground, where it will last for months without putrefying. This method already practiced by their ancestors and used for their food stock in their agricultural field or can be used for emergency. When disaster occurs, the community relies on the storage in every *Uma.*



Figure 2. A set of *Tuddukat* (left) and *Uma* (right).

Both technology aspect and belief system from of local wisdom practices recognized in Minangkabau Community are questionable soon. Fuadi [14] blamed social and economic changes as reasons for a decline of function and number of traditional houses in Minangkabau. A discussion with Z. Dt. Tumanggung, one of *tukangtuo* (head carpenter) in Batusangkar, revealed the factors behind the declining (interview held in June 5th 2017). Underlying causes that were mentioned was lacking*tukangtuo* existing nowadays, while the young generation more interested on modern technology. Secondly, social values changes that caused clan members to build a house for their nuclear family. And thirdly, modern values simply replace traditional values and practices where using new designs and materials are considered prestigious and modern.

Most of interviewees in all research sites felt that *gotong royong* has been declining in this modern era. In everyday practices, this activity is limited to formal use only. *Gotong royong* is held by request from the government officers. They believe that the integration of modern technology make people are less dependent on others, until the late of 1980, *gotong royong* still being used in farming, from land cultivating until the end of process which is harvest time, always carried on by these methods. When new technology replaced human labor, people felt they were less dependent to their neighbor. However, they still believed that *gotong royong* revived in emergency time.

In Mentawai, the *Tuddukat* which designated to communicate among the clan members; to tell about death, born and their successful in capturing the prey; was modified to alarming villagers that a disaster might occur in their area. The *Tuddukat* itself may not look like the original one, yet the spirit that

brought by that sacred tool remains in the community minds. As an early warning system, this type of knowledge may be found in another area, however the *Mentawaians* case is quite unique, since the tool itself may represent their original technical knowledge. Food storing practice may help *Mentawaians* survive in their hard time, when their land struck by severe disaster such as flood, landslide and tsunami. Their food supply is still available till the time they can cultivate their agricultural land.

Both practices still can be found in many traditional villages in Mentawai islands. Nevertheless, for another reason, which is national policy implementation that urges indigenous people to be integrated with national community, the knowledge and understanding of their native culture and environment is now considerably low. The policy itself intends to increase the quality of life for indigenous people through PKMT (Pembinaan Kesejahteraan Masyarakat Terasing) or resettlement for Indigenous Community, where they are relocated into area alongside the main river and coastline [15]. This policy, for native Mentawai means the eradication of their cultural practices. They are not allowed to practice their religion and ritual behavior since their practices considerably do not match with basic principle of Indonesia.

4. Conclusion

Local wisdom can be applied as an effective instrument to undertake hazard and disaster in many communities. The usefulness of this knowledge in disaster risk reduction has been demonstrated in many case studies conducted with indigenous culture. Despite the limited record of samples, it is likely that there are more similar phenomena remain "un-touched" that exist to support this finding. In this paper, we present the local wisdom that can be found in West Sumatra, however in the modern era, technologies and social value changes made this knowledge lost their meaning. Such action to promote local wisdom and its integration with science may improve and increase their resilience to face natural hazard and disaster. It is important to emphasize that implementing local wisdom for disaster risk reduction is not a panacea. However, some local wisdom can be classified as transferable local wisdom, where this knowledge having potential to be applied to other area with the same risk and context.

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