Abstract

In recent years, earthquake mitigation is no longer dominated by pure science, but it moves towards various approaches based on sociology and anthropology. The main question of this paper is how local wisdom affect the way the people of Palu City faced disasters before there were legal arrangements and legislation regarding disasters and how to integrate this knowledge with the legal substance formulated by the government? Despite having a disaster mitigation policy, the local community and local government showed no disaster preparedness resulting in insurmountable victims and damage, even though they already living in a disaster-prone area. Therefore, a better system based on the integration of local wisdom that is obeyed by the local community needs to be established. Local wisdom is part of the Indonesian legal system, as it can be used as a material source for legislation. Through this research, we explored the possibility of accommodating local wisdom into the government’s policy in the form of legislation using a case study from Pasigala as the regions that were most
heavily impacted by the 2018 earthquake. As a result, a model of disaster mitigation based on local wisdom was created and can be implemented as a local policy.

**Keywords:** Disaster Mitigation, Traditional Law, Local Wisdom.

### A. Introduction

Disaster mitigation is becoming a very important part of basic knowledge for society and the government, in particular issues about disaster management. The recent state of affairs in disaster mitigation is no longer dominated by pure science, but it moves towards various approaches based on sociology and anthropology. The discussion about disaster mitigation from Law science perspective could direct the stakeholders to form certain rules and regulations on disaster mitigation with local wisdom content.

Indonesia is one of the countries with the highest number of natural disasters in the world. This is caused by the existence of the ring of fire, which has 295 active faults and 127 active volcanoes, that can cause earthquakes, tsunamis, liquefaction. Moreover, other kinds of hydro-meteorological disasters, floods, droughts, and landslides as the impact of climate change are also affecting the level of disaster events in this country.

Palu, Sigi, and Donggala are regions within the unitary state of the Republic of Indonesia that have just experienced one of the biggest natural disasters in the country. Astronomically, Indonesia is located between 60°08’ North latitude and 110°15’ South latitude, and between 94°45’ and 141°05’ East longitude and lies on the equator line located at 00 latitude line. Based on Minister of Home Affairs Regulation No. 39/2015, the administrative area of Sulawesi Tengah Province consists of 12 regencies and 1 municipality with a total area

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2 Trinirmalaningrum, 2019. *Disaster Management in Indonesia*, delivered at the National Seminar “Legal Protection in Natural Disaster Management in Indonesia”. IT Centre Tadulako University, 29 November 2019, Indonesia.
of 61,841.29 km$^2$. Among those thirteen regions, the city of Palu with an area of 395.06 km$^2$, Sigi regency 5,196.02 km$^2$, and Donggala regency 4,275.08 km$^2$ are the biggest areas with the most densely populated areas in Central Sulawesi.\(^3\)

![Figure 1. Map of Central Sulawesi Province](image)

The earthquake on 28 September 2018 with magnitude 7.5 in Palu, Indonesia (0.178°S, 119.840°E, depth 13 km) occurred at 10.02 UTC. The major earthquake triggered catastrophic liquefaction, landslides, and a near-field tsunami that resulted in a high number of deaths and massive economic loss. The impact of the disaster until Sunday (21 October 2018) 13.00 WIB, recorded 2256 deaths. It spread in Palu City 1703 victims, Donggala 171 victims, Sigi 366 victims, Parigi Moutong 15 victims, and Pasangkayu 1 victim. All the victims were already buried. With 1309 still missing, 4612 wounded, and 223,751 take refuge in 122 locations.

Table 1. Damage and Loss Assessment in the Aftermath of Earthquakes and Liquefaction in Central Sulawesi

<table>
<thead>
<tr>
<th>No.</th>
<th>Sector/Sub-Sector</th>
<th>Damages</th>
<th>Loss</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Housing</td>
<td>7,146,414,161.000</td>
<td>1,657,083,226.000</td>
<td>8,803,497,387.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7,069,321,275.000</td>
<td>1,648,259,935.000</td>
<td>8,717,581,210.000</td>
</tr>
<tr>
<td></td>
<td>Environmental Infrastructure</td>
<td>77,092,886.000</td>
<td>8,823,291.000</td>
<td>85,916,177.000</td>
</tr>
<tr>
<td>2.</td>
<td>Infrastructure</td>
<td>4,672,567,671.814</td>
<td>1,144,852,149.829</td>
<td>5,817,419,821.642</td>
</tr>
<tr>
<td></td>
<td>Transportation</td>
<td>3,090,038,750.749</td>
<td>763,467,711.029</td>
<td>3,853,506,461.749</td>
</tr>
<tr>
<td></td>
<td>Water and Irrigation</td>
<td>1,330,697,635.365</td>
<td>341,060,304.029</td>
<td>1,671,757,939.394</td>
</tr>
<tr>
<td></td>
<td>Post and Telecommunication</td>
<td>110,500.000</td>
<td>2,500.000</td>
<td>113,000.000</td>
</tr>
<tr>
<td></td>
<td>Water and Sanitation</td>
<td>247,420,785.700</td>
<td>39,479,634.800</td>
<td>286,900,420.500</td>
</tr>
<tr>
<td></td>
<td>Energy</td>
<td>4,300,000.000</td>
<td>842,000.000</td>
<td>5,142,000.000</td>
</tr>
<tr>
<td>3.</td>
<td>Social</td>
<td>1,918,596,195.625</td>
<td>86,922,347.484</td>
<td>2,005,518,543.109</td>
</tr>
<tr>
<td></td>
<td>Healthcare</td>
<td>299,912,787.125</td>
<td>31,122,529.584</td>
<td>331,035,316.709</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>844,347,823.500</td>
<td>28,272,289.900</td>
<td>872,620,113.400</td>
</tr>
<tr>
<td></td>
<td>Religion</td>
<td>651,758,000.000</td>
<td>26,455,270.000</td>
<td>678,213,270.000</td>
</tr>
<tr>
<td></td>
<td>Social Services</td>
<td>787,500.000</td>
<td>10,500.000</td>
<td>798,000.000</td>
</tr>
<tr>
<td></td>
<td>Sport facilities</td>
<td>105,586,000.000</td>
<td>131,210.000</td>
<td>105,717,210.000</td>
</tr>
<tr>
<td></td>
<td>Culture</td>
<td>5,450,585.000</td>
<td>137,900.000</td>
<td>5,588,485.000</td>
</tr>
<tr>
<td></td>
<td>Social Protection/Women and Children</td>
<td>10,753,500.000</td>
<td>11,546,148.000</td>
<td>22,299,648.000</td>
</tr>
<tr>
<td>4.</td>
<td>Economy</td>
<td>4,354,116,624.066</td>
<td>1,900,058,603.224</td>
<td>6,254,175,227.290</td>
</tr>
<tr>
<td></td>
<td>Farming, Plantation, Husbandry, Fishery</td>
<td>2,233,327,928.000</td>
<td>1,459,611,099.002</td>
<td>3,692,939,027.002</td>
</tr>
<tr>
<td></td>
<td>Industries and Trading</td>
<td>861,267,320.000</td>
<td>350,074,254.000</td>
<td>1,211,314,574.000</td>
</tr>
<tr>
<td></td>
<td>Domestic Industry, Union (Koperasi), Small, and Medium Business</td>
<td>41,508,813,566</td>
<td>8,642,900.222</td>
<td>50,151,713.788</td>
</tr>
<tr>
<td></td>
<td>Tourism</td>
<td>1,218,012,562.500</td>
<td>81,730,350.000</td>
<td>1,299,742,912.500</td>
</tr>
<tr>
<td>5.</td>
<td>Cross Sector</td>
<td>361,898,938.243</td>
<td>17,840,222.400</td>
<td>379,739,160.643</td>
</tr>
<tr>
<td></td>
<td>Government</td>
<td>338,455,233.293</td>
<td>17,292,860.400</td>
<td>355,748,093.693</td>
</tr>
<tr>
<td></td>
<td>Safety and Security</td>
<td>6,158,704.950</td>
<td>278,562.000</td>
<td>6,437,266.950</td>
</tr>
<tr>
<td></td>
<td>Finance and Bank</td>
<td>7,647,500.000</td>
<td>268,800.000</td>
<td>7,916,300.000</td>
</tr>
<tr>
<td></td>
<td>Environmental</td>
<td>9,637,500.000</td>
<td>-</td>
<td>9,637,500.000</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>18,453,593,590.748</td>
<td>4,806,756,548.937</td>
<td>23,260,350.139.685</td>
</tr>
<tr>
<td></td>
<td>PERCENTAGE</td>
<td>79.33</td>
<td>20.67</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Substantial damage was also found in buildings and infrastructures as a result of the disaster (Table 1). The damage included 68,451 house units, 327 praying sites, 265 schools, 78 office buildings, 362 store units, roads with 168 cracked points, 7 bridges, and many more. The result of the temporal calculation for the loss and damage caused by this disaster per 20 October 2018 is more than Rp. 13.82 trillion (equivalent to approximately 1 billion USD), which included a loss of Rp. 1,99 trillion and damage of Rp 11,83 trillion. The impact of loss and damage caused by this disaster comprise of 5 sectors of development, specifically, loss and damage in the housing sector reached Rp. 7,95 trillion, infrastructure sector Rp. 701,8 billion, economy productive sector Rp. 1,66 trillion, social sector Rp. 3,13 trillion, and cross-sector reaching Rp. 378 billion4.

Table 2. Numbers of Evacuees

<table>
<thead>
<tr>
<th>Area</th>
<th>Evacuees Point</th>
<th>Numbers of Family</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palu</td>
<td>127</td>
<td>11,165</td>
<td>40,738</td>
</tr>
<tr>
<td>Sigi</td>
<td>160</td>
<td>29,867</td>
<td>93,187</td>
</tr>
<tr>
<td>Donggala</td>
<td>98</td>
<td>11,478</td>
<td>36,346</td>
</tr>
<tr>
<td>Total</td>
<td>385</td>
<td>52,510</td>
<td>170,271</td>
</tr>
</tbody>
</table>

Source: Pusdatin of Central Sulawesi Province and Kompas.com; processed by Litbang Kompas/RGA

Table 2 shows that Sigi was the area with the highest number of evacuees and was the largest affected area. Two other areas also experienced strong shocks and caused people to choose to leave their homes temporarily because the earthquake was still felt a few days after the main earthquake occurred.

Table 3 exhibits the data that Palu City is the location with the highest number of house damage compared to Sigi and Donggala. This is because two liquefaction locations, Balaroa and Petobo, and the location of the tsunami were in the Palu City area so that more

housing damage occurs in the region.

As of 22 October 2018, according to the One ASEAN One Response (AHA) Centre (Sit Update 14)\(^5\), the earthquake and subsequent tsunami that had hit Palu and Donggala in Central Sulawesi Indonesia, Friday 28 September 2018, has killed 2077 people. 680 people are missing, 4,438 with major injuries, 205,870 displaced, and 688,451 houses damage. The three most affected areas were Donggala, Palu City, and Sigi. After the earthquake, a series of tsunami waves hit Palu City and Donggala Regency. Low-amplitude tsunami waves were also detected in Mamuju, a city overlooking the Makassar Strait and outside Palu Bay. The tsunami hit the coast, leveled houses, washed away various objects, and destroyed the coastal area of Palu Bay, Central Sulawesi Province.\(^6\)

In disaster preparedness and response, relocation from inhospitable areas should not be considered as the move as the expediency of disaster reduction or rather, sustainable livelihoods and poverty reduction can enhance the capacity of disaster reduction and the

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important aspects of DRM of the rural relocation communities.\textsuperscript{7} Traditional society usually depends on nature for their livelihood and without trying to alter nature, they live a life using indigenous, traditional, or local knowledge that is unique to a given society or culture\textsuperscript{8}. Indigenous knowledge, which may lead to having sustainable development, is often replaced by adopting technology-based Western knowledge due to the major force of industrialization and globalization.\textsuperscript{9}

Despite the successes of modern disaster risk management systems, risks are increasing due to these and other factors. In such a complex world, governance seems to be key to the future of disaster risk management and reduction, in which a range of actors across sectors and administrative boundaries have to coordinate and share knowledge.\textsuperscript{10} Government plays an important role in coordinating and policymaking.

In Europe and worldwide, governments and cities are gradually putting in place strategies that address disaster risk, and climate variability, and extremes. The goal is to increase resilience and ultimately, support sustainable development. Strategies can take various forms, policymakers have two basic options which are mutually supportive: mainstreaming (integrating) risk reduction consideration into existing sectoral policies and practices; or a dedicated approach that involves developing targeted stand-alone strategies.\textsuperscript{11} This trend, which

\begin{thebibliography}{99}
\bibitem{9} Ibid.
\bibitem{11} Christine Wamsler and Ase Johannessen. Meeting at the Crossroads? Devel-
\end{thebibliography}
is also driven by the occurrence of disasters is the ultimate reason for Indonesia to have a disaster mitigation plan. It is part of the Indonesia national development plan, which is a series of disaster management activities before, during, and after the disaster happens. There are several national policies regarding disaster mitigation, as follows:

1. Act No. 242007/ on Disaster Management.
2. Government Regulation No. 82008/ on National Board for Disaster Management.
4. Government Regulation No. 222008/ on Disaster Funding and Management.
5. Government Regulation No. 232008/ on The Role of International Institutions and Foreign Non-Government Institutions in Disaster Management.

While Indonesia already implements Act Number 24/2007 on Disaster Management, the system itself becomes less effective in the actual situation. For example, like the situation that happened in Palu, Sigi, and Donggala, where the community and the local government did not have the readiness to face a disaster until the disaster came, victims and damage were insurmountable, even though they already living in a disaster-prone area. Therefore, Indonesia needs to build a better system based on local wisdom that has been obeyed by the local community. Indigenous knowledge is receiving attention from international communities as a possible alternative option for progress. This paper uses normative legal research with sociological and anthropological approaches. The research was conducted by tracing the materials of disaster-related norms adhered to by the people in the form of local wisdom. In this context, this paper intends to make a model of disaster mitigation based on local wisdom which later on, can be accommodated in the local legislation.


B. The Local Wisdom of the Palu Valley Community in Disaster Mitigation

Human life and society, besides being guided by human morality itself, are also governed by religion, moral principles, politeness, customs, and other social norms. There is a close intertwined relationship between law and social rules in which one strengthens the other. The state makes laws by regulating and coercing through its apparatuses because the state has absolute power to make laws according to its nature. Therefore, the law that forces it is not appropriate and not compatible with social changes that occur in society, because the law supposedly is a reflection of the values that apply in society (local wisdom).

In Legal Development Theory, Mochtar Kusumaatmadja stated that the law that applies as a social rule couldn’t be separated from the values prevailing in a society. It can even be said that the law is a reflection of the values prevailing in society. A good law is a law that is following the living law in society, which of course is also appropriate or is a reflection of the values that apply in that society. Following this opinion, local wisdom is part of the customs that live and develop in society is part of the law. Because local wisdom and existing customs can be used as a tool to make social changes in society to achieve the legal purpose themselves.

In Palu and its surrounding areas, the community values or local wisdom were passed from generation to generation using spoken language. Facts and cultural heritage are the habits of local people who are not familiar with writing, so they only depict an event in the course of oral culture, storytelling, or narrating before it is lost into oblivion. The recent situation where life increasingly developed, the growth of life in an area, and the city where the native inhabitants become marginalized communities, far from the hustle and bustle of immigrant communities. In the fast-paced rhythm of life and the cur-

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rent literacy advances, there are forgotten histories and stories about incidents when communities experience natural events.

After 28 September 2018, stories began to emerge again one by one. Local writers start to raise awareness and tell old stories about the Palu region and Palu Valley at the beginning of the natural disasters and the naming of its locations. Nonetheless, the drawback of oral culture is that when the original speaker dies, the history is lost. This is because the next speaker will not be the same as the sources. Therefore, it is natural that many of these stories have become inaccurate or incomplete. Subsequently, even if there is a narrative, it is certainly refutable because it is not supported by accurate literacy.

However, it is different from the events of 28 September 2018. Due to the occurrence of natural events, the evidence left by the ancestors who have given the names of places according to the place, and their meaning (toponym) in local languages is recalled. The toponym is given based on four kinds of foundation which are geological, geographical, historical, and due to the vegetation found in the area. The example of the naming based on those four foundations are:

1. Geological:
   a. Duyu comes from the word naduyu which means landslide. The indigenous people have local knowledge regarding the hilly areas in the western part which are prone to landslides. Therefore, they built a settlement in the valley to the east on Jl. Gunung Gawalise (Figure 2).
   b. The street of Tagari Lonjo in Duyu Village. Tagari Lonjo means “the drowned place” (Figure 3). Located in the southern part of Balaroa housing complex which was hit by the liquefaction disaster in 2018. The place was used to be a river which then dried up so that what was above it often sank or nalodo. This is why the elders in the past did not inhabit it.

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14 Iksam Djorimi, archaeologist and curator of the Central Sulawesi Provin-
cial Museum, interview on 19 August 2020.
Figure 2. Map of Duyu village, Central Sulawesi

Figure 3. Map of Tagari Lonjo street in Duyu village
c. Biromaru in Sigi Regency is one of the areas that are deeply affected by the earthquake (Figure 4). It is a combination of the words *biro* (grass) and *namaru* (rotting). *Biromaru* means rotting grass. Initially, this area was a swamp area, as a result, the land was not strong and shaky when an earthquake occurs. Once upon a time, the people in *Biromaru* lived in the hilly areas, not in residential areas like today.

![Figure 4. Map of Biromaru, Sigi Regency](image)

2. Geographical:
   a. Tondo Village in Mantikulore District is an area that was prone to landslide occurrence (Figure 5). *Tondo* means “the edge”, or “the edge above the landslide”. The villagers originally settled in the hilly area to the east of the current Tondo area. *Tondo* refers to an area located on the outskirts where the landslide occurred.
   b. Tompe Village in Donggala Regency can be seen in Figure 6. *Tompe* means “carried away” or “washed away”. Tompe Village is not far from the main point of the earthquake epicenter in 2018. After the natural disaster, the ground level
Development of a Disaster Mitigation Model Based on Local Wisdom

in this village has decreased. Now, tidal flooding has routinely submerged the capital city of Sirenja District, Donggala.

3. Historical:

The street of Kaombona in Talise Village (Figure 7). The word Kaombona is derived from the word naombo which means
“to collapse”. Kaombona means “was collapsed”. The naming of Kaombona refers to the phenomenon of land collapse after the earthquake and tsunami in 1938. Today, the word is also used to name one of the city landmarks in Palu, The Kaombona City Forest.

![Figure 7. Map of street of Kaombona in Talise Village](image)

4. Vegetation:

Lere, means plants that grow with their purple flowers, also called horseshoe plants (*Ipomea pes caprae*), *batata pante*, *meneri*, or *laleri*. Another village is named Talise because it is overgrown by *talise* trees (*Terminalia catappa*) on the coast and surrounding area. Also, Kamonji (breadfruit tree or *Artocarpus altilis*) and Nunu (banyan tree or *Ficus benjamina*) are the areas named with plant species.

This kind of ancient information can be used as a guide to map potential disasters and develop regulations related to natural disasters under local characteristics. In Barrios’ work on an anthropological perspective on community resilience, he argued compellingly that cultural explanations of a disaster promoted psychological resilience and recovery from trauma. Cashman and Cronin (2008) emphasized
Development of a Disaster Mitigation Model Based on Local Wisdom

Figure 8. Map of Lere Village

Figure 9. Map of Kamonji Village
how culturally acceptable forms of explanation “help regain emotional stability within the community” and “enable communities to make sense of the experience”\(^\text{15}\). Wherefore maintaining the authenticity of cultural values can reflect the personality of a nation.

According to Clifford Geertz, the law is local knowledge, local not just as to place, time, class, and variety of issues, but as to accent-vernacular characterizations of what happens connected to vernacular imaginings of what can. Is this complex of characterizations and imaginings, stories about events cast in imagery about principles, that he has been calling a legal sensibility.\(^\text{16}\) Geertz’ argument sup-


ports the idea that law is sourced from local knowledge and it works best to the satisfaction of its people.

Besides, the aforementioned notions also confirm Mochtar’s opinion about the concept of living law that requires the existence of community values, which are the foundation of community submission to the law. The pre-existing traditional values of the local community are easier to follow and obey because of its familiarity and core that are sourced from the community itself.

C. Integrating Local Wisdom into Laws and Regulations

The Indonesian legal system adheres to the civil law system, but it should be noted that this system is side by side with customary law and relics from the Roman-Dutch law (the Civil Code, for example). Before the Dutch occupation of the sixteenth century, the kingdoms in the archipelago used different customary laws, which continue to apply today in varying forms and levels.

As a result, generally, in Indonesia, the people are still bound and subject to the values of local wisdom as a derivative of customary law adopted by ancestors, even though there are positive laws made and enforced by the State. State law was created with the aim of legal unification, which then led to legal pluralism. Local wisdom that has been long-lived and developed in society should be the main reference in the formation of law. In a simple perspective, it can be said that customary community/people are law bound community in terms of ethnicity and place of living. Consequently, this local wisdom has to be part of the formal legal system in the form of legislation, specifically in local regulation.

In the Indonesian legal system, it is possible to accommodate the values of local wisdom into formal laws and regulations, as long as it is still accepted and embraced by the community and in harmony with other laws and regulations. As a consequence of diversity, Indonesia consists of many different ethnicities and cultures. There-

fore, the State opened space for the fulfillment of citizens’ rights in legislation without differentiating their background. In this study, we proposed the process of adopting research outcomes into local regulation as can be viewed in a schematic diagram in Figure 9. Exploration of local wisdom values (in this case, toponym) is carried out through a research process. The results of the study are then used as material for policymaking at the local level, which can be realized in the form of local regulations. Local governments that have a better understanding of the local conditions of the region and the mentality of the population will then enforce this local regulation. As such, the resulting regulations can provide greater benefits for the affected area.

Figure 11. Schematic diagram on the proposed workflow to incorporate research outcome into local regulation

D. Conclusion

This research has academic and practical implications. Academically, it is expected to aspire future research which included other aspects of local wisdom related to disaster mitigation in Central Sulawesi. Practically, institutions and governments are expected to be able to facilitate the accommodation of local wisdom into the law sys-
tem and legislation, as sparked by the Legal Development Theory by Mochtar Kusumaatmadja. Thus, the value of the local wisdom of the people of Central Sulawesi related to natural disasters can be used to minimize damage and casualties in the disaster-affected area. Please provide here your remarks as closing statement. It could be a final conclusion from your discussion and analysis and your recommendations for further research project.

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