

Local Sustainable Resilience in Coping with Disaster: Mitigation of Sea and Land Disasters in Southeast Sulawesi

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Abstract

Living in the area of the Circum-Pacific Belt and often-recurring calamities, Indonesian native people are able to endure and develop. Local knowledge plays a crucial function in this section. This study aims to explore the way in which local knowledge was used by traditional groups of Indonesia to deal with adversities during natural disasters. Historical, anthropological, and philological approaches were employed. Data in the form of manuscripts, oral traditions, and institutionalized knowledge on disaster experiences were collected and analyzed to explore how the resilience affect the local people's lives. This study finds that local people's resilience was formed by the internalization of local knowledge and social cohesion that developed in society. Local knowledge in disaster mitigation was contained in manuscripts, folklores, and rituals. With this knowledge, local people have effective warning system in the time of disasters, so that they could evacuate accordingly. This paper is expected to provide alternative solutions in overcoming the impact of disasters experienced by the community. The local knowledge can be utilized to prepare the community before a disaster occurs, to make accurate solutions when facing a disaster and to adapt to environmental changes post disasters.

Keywords: Sustainable resilience, Local community, Sea and land disaster, Mitigation, Local knowledge

1. Introduction

Indonesian local people have experienced on how to treat numerous repetitive natural disasters which have damaged the existing ecosystems. The everlasting impact of disasters has driven the communities to build sustainable survivability. Adaptive local knowledge can respond positively to environmental changes caused by natural disasters. In Indonesia, natural disasters caused both physical environmental changes; it also shifted people's patterns or ways of surviving (Puspitasari et al., 2018; Daryono et al., 2019). In the context of mitigation and resilience, local communities who based their survivability on their collective knowledge are more adaptive towards environmental changes caused by natural disasters, as indicated by local communities

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DOI <https://doi.org/10.5281/zenodo.7936583#93>



in mitigating natural disasters is a very important to carry out in order to provide a comprehensive understanding of patterns and ways of surviving both before, during and after disasters.

Studies on disaster mitigation have generally looked into disasters from two viewpoints. One, from the perspective of geology and related sciences, studies explored the issues of disaster mitigation technology to reduce disaster risk and recovery strategies (Watkinson & Hall, 2017; Supendi et al., 2018; Sasmi et al., 2020). Systematic disaster detection can be carried out with geological knowledge and combined with archeological data (Syamsidik et al., 2018; Pasari et al., 2021; Nugraha & Hall, 2022). Two, from a social perspective, studies mapped out the social consequences caused by the disaster and the community's adaptation to the experienced difficulties. The existing studies have not yet analyzed the important role of local wisdom used by the community to build resilience in facing disasters. Meanwhile, local knowledge owned by the community can be an alternative in disaster mitigation (McAdoo et al., 2006; Gusmian, 2020; Daud et al., 2021).

This study aims to fill a gap in the existing studies by examining the ability of local communities to minimize disaster risk through local knowledge in the form of collective memory. Local knowledge including oral/written traditions and local practices are the reference for this research. It also aims to both map out the local teachings in disaster mitigation (manuscripts, oral traditions, rituals) and to analyze the impact of this local knowledge on community resilience. It is expected that this study could provide more comprehensive knowledge about the nature of the difficulties experienced and role of local knowledge in dealing with the difficulties.

The argument underlying this study is that the community's sustainable resilience in facing disasters is determined by the existence of historical continuity of shared knowledge and in social orders. Past experience as written in the manuscripts serves as a reference that educates the community in formulating actions to deal with disasters. Comprehensive knowledge about the nature of disasters and their impacts has enabled the community to formulate disaster mitigation strategies. In addition, community resilience in dealing with disasters is determined by the existence of social orders that grow and develop in response to the disasters. In sum, past experiences and historical documents have been sources of community sustainable resilience.

2. Literature review

2.1 Sustainable resilience

Sustainable resilience consists of the word 'resilience' which is opposite to the word 'vulnerability'. Sustainable resilience is the ability to respond to threats and dangers of life caused by certain disasters (Manyena, 2006; Doorn, 2017; Parker, 2020). This resilience can take place at the community level, households, or and individuals. Human survivability cannot be separated from psychological resilience that makes them survive longer. Bekić defined resilience as a process of maintaining and recovering mental well-being after experiencing difficulties (Mahmud, 2008) (Mahmud, 2008; Bekić, 2019). In line with this, Norris added that concept of resilience was initially used in the context of ecological systems, and was then developed for human context. Recent development gave birth to the term 'ecological-social system' that requires adaptation rather than stability or status quo (Norris, 2008; Prior and Hangmaan, 2014). In another context, the concept of resilience is also used in relation to climate change which was then followed by disasters (Rana, 2020). Therefore, resilience becomes an ability, process and recovery so that a chain of resilience is formed (Bogardi & Fekete, 2018; Scheten, 2014) which can then be referred to as sustainable resilience in the face of disasters.

Sustainable resilience can be developed by considering the human needs within communities and country. Building sustainable resilience in the face of disasters can be seen from at least two categories. *First*, from the early warning system as a follow-up to strengthening existing resilience, building partnerships, and educational management in facilitating personal resilience during disasters (Liu et al., 2014; Fjäder, 2021; Kwabena et al., 2021). For instance, the community resilience community during earthquake in China was

shown by the facts that local people get sufficient knowledge in geological disaster education, evacuation drills, and supportive income (Cui, Han, & Wang, 2018). *Second*, from the incorporation of indigenous and local knowledge, wisdom and skills that builds resilience. In Nepal, for example, the integration of the two types of knowledge is applied as an on-going knowledge to avoid natural disasters and climate change that often befall them (Pokhrel et al., 2021).

2.2 Indonesian local community

Local communities are a group of people who live in shared areas or islands, and carry out their daily life arrangements based on traditions passed down from generation to generation. These groups have identities and rules that are made and obeyed together. Cooperation and togetherness are built in facing life's problems and conflicts, including how to deal with disasters that can destroy their lives (Harrison & Cornell, 2008). In Aceh, the handling of conflicts is resolved according to custom and Islamic law by the people of Aceh. Likewise in Yogyakarta, the strength of Javanese values of *nrimo* (acceptance), *ngaruhke* (direction) and *gotong royong* (helping each other) were implemented and shown especially during the disaster in 2006, and proven to be solving the psychological problems of residents (Sutriyono et al., 2021; Kasim & Nurdin, 2020). Traditional values become important factors in maintaining, preserving, even advancing their culture and religion.

In Indonesia, each local community has its unique character, culture and behaviors in responding to natural events including disasters. There are at least two factors underlying diverse characters from one community group to others. *First*, Indonesia's geographical situation consists of large and small islands of 17,000 islands influencing the lifestyle and mindset of its people. Broad natural landscapes and length of distances have made them live with their own local environment. *Second*, cultural and religious factors of its people go hand in hand and support each other. Local people have beliefs, knowledge, awareness, which gives birth to certain behaviors and rules that are followed in dealing with disasters, as is the case with the Garut community (Santoso, Buchari, & Darmawan, 2019; Suparmini, Setyawati, & Sumunar, 2015). The case of *tametan kucing* as a disaster mitigation ritual is another example (Hakim, Putro, & Rusmana, 2018).

2.3 Disaster mitigation

Natural disaster is a series of natural events that threaten human life and the environment. Disasters can be caused by environmental changes, changing layers of the earth and climate change (Hidalgo & Baez, 2019; Daryono et al., 2019). Regarding Indonesia's natural landscape which consists of oceans and lands, disasters in this region include: sea disasters and land disasters, of which occur with different characters (Setyawan, 2007; Permatasari, 2021). Marine disasters include coastal and underwater disasters. The coastal disaster can be in the form of coastal abrasion caused by land subsidence, wave hydrodynamics, and destruction of mangrove forests (Hartomo et al., 2022; Permatasari, 2021; Handayani, 2019). On the other hand, underwater disasters can be caused by the movement of sea plates or volcano eruptions. Volcanic eruptions of Mount Merapi and faults in the earth's plates, for instance, can be a potential for earthquakes and tsunamis (Patria & Aulia, 2020; Triarso & Arief Troa, 2016). Meanwhile, land disasters can be in the forms of floods, landslides, droughts, or agricultural loss. There are several types of disasters which share common characters, such as: volcanic eruptions of Mount Merapi eruptions cause land and underwater earthquakes, because both are formed from ecosystems that interact with each other (Morimoto, 2012; He et al., 2018; Guo et al., 2019). All of these disasters threaten the stability of human life which require serious mitigation from multiple parties.

In responding to the disaster that occurred, every nation sought to find a resolution for the difficulties and instability of life. Systematic mitigation was also carried out from various sides, including revisiting the nation's history in reducing disaster risk in the past. In Japan, the preparedness of the population for earthquake disasters is established as early as possible to reduce victims when a disaster occurs. Their readiness in dealing with earthquakes, for instance, is seen from an organized training in preparing people to

be alert and to look for a safe place when a disaster occurs (Norio et al., 2011; Kawamoto & Kim, 2016; Widiandari, 2021). The similar mitigation strategy was also practiced by local residents in Indonesia, for example in the Simelue Aceh region. The power of local wisdom has functioned and played an active role in saving local residents in natural disasters. The tsunami for them is known as *smong* (large water) and earthquakes are known as the swaying earth. This local wisdom teaches them to think positively about disasters and teaches them to take the right attitude to save themselves from disasters (Rahman et al., 2018; Gadeng et al., 2019; Suciani, 2020).

3. Methods

The sustainable resilience of local people in mitigating the disasters is potential phenomenon to study. First of all, the exploration of sustainable resilience in local traditional people has been understudied. Secondly, sustainable resilience is essential to study the ways of local communities in disaster mitigation. Thirdly, sustainability resilience of local communities before/during/after the disaster could influence the disaster mitigation process.

This present study takes the case of Southeast Sulawesi, Indonesia, which consists of four main ethnicities, namely: Muna, Moronene, Kendari, and Buton. These ethnicities have differences in terms of practicing existing local knowledge. Commonly, these groups emphasize the religion and local culture as an umbrella in disaster mitigation. These characteristics constitute the basis for this study to be conducted.

Descriptive qualitative design, particularly *grounded research* was employed. Primary data was obtained through the *field research* which consists of three aspects. One, community views, their response to disaster events, and their experience of repeated disaster events. Two, folklores, legends, myths that have been passed down from generation to generation which relate to disaster mitigation. Three, local community traditions represented through writings and ancient texts. This written tradition has become a guideline for the local community in determining attitudes and life principles from generation to generation. Additionally, the secondary data in this study include relevant books and journal articles.

The data in this study were collected from the oral and written traditions of the local community. Oral tradition data were obtained through observations and in-depth interviews relating to the patterns and ways of the local people of Southeast Sulawesi by focusing on the experiences and knowledge of the Muna, Buton, Tolaki, and Moronene ethnicities. The selected informants consisted of traditional leaders, religious leaders, and indigenous peoples, who have passed down knowledge and experience in disaster mitigation. Additionally, field observations were carried out to document the long-standing teachings or practices on disaster mitigation. Meanwhile, the data on written traditions was collected by focusing on three ways. *First*, visiting the place where the manuscripts are stored, namely the Kendari Museum, and the houses of residents who store manuscripts. *Second*, identifying the mitigation data included in the manuscripts. *Third*, sorting the types of disasters and their mitigation by coding them to the disaster categorization. In a simpler way, the description of the stages of data collection, themes and substance are described in Table 1.

Table 1 The stages of data collection, themes and sources

Methods	Themes	Data collected	Sources
Observation	Natural occurrences and social responses	Documentation of sea and land disasters stated in manuscripts and rituals	Southeast Sulawesi area
Interview	Social memory and practices	Informations regarding oral traditions including: rituals, folklore and myths	Local figures Religious leaders/figures Maestro
Texts	Elderly teaching	The stories of disasters, predictions and strategies in dealing with disasters	Manuscripts on disasters

Data analysis was conducted through three stages, including: *data reduction*, i.e. organizing data in a more systematic form, *data display*, i.e. describing data in tabular form containing excerpts from interview summaries and excerpts from manuscript texts, *data verification*, i.e. concluding data based on trends from existing data as a basis for interpretation of existing data. These stages then conclude on the knowledge and experience of local communities in Southeast Sulawesi in mitigating disasters.

4. Results

Natural disasters in Southeast Sulawesi region occurred in the sea and on land, as this region consists of islands. Various types disasters were handled according to the culture of the regions. The local people of Southeast Sulawesi have three forms of collective memory which become their local knowledge in their daily lives. *First*, the handwritten ancient teachings contained in the manuscripts. These teachings are read and applied in their lives. They became disaster resilient because they have references or guidance about disaster events. *Second*, oral traditions that are continuously taught and passed down to the next generation. This type of knowledge familiarize them with the characteristics of disasters and their impacts, so that they can develop a mitigation strategy and then lead to the resilience. *Third*, the use of local terms for certain disasters that can be said spontaneously to avoid and mitigate from. Resilience, is therefore obtained through the process of institutionalizing knowledge of disaster experiences in the form of social order.

4.1 Local references on disaster mitigation and resilience

The ancestors in Southeast Sulawesi have passed down some manuscripts on disaster for younger generation to read, learn, understand and practice from the contents. The discussion on disaster was intertwined or mixed with the content of other themes. Hence, there was no single specific manuscript that particularly only discusses about disasters. In these manuscripts, the issue of disaster was connected to other issues of life. Table 2 presents the guidance of disaster mitigation as contained in the old manuscripts.

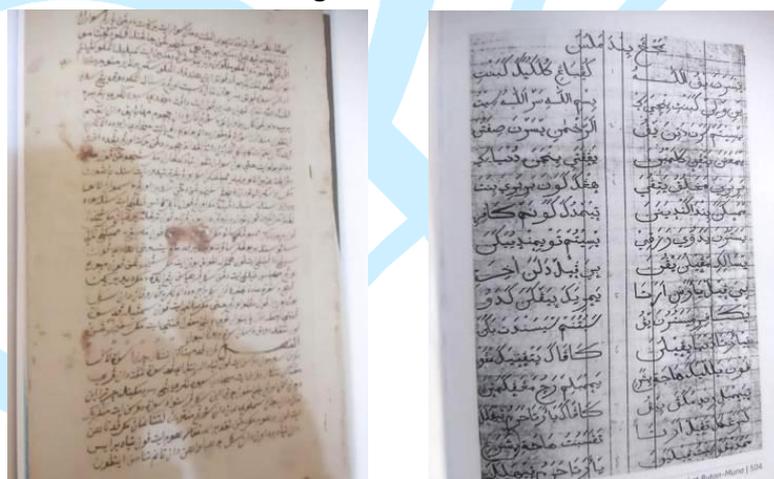
Table 2 Local teachings on disasters contained in manuscripts

No.	The title of manuscripts	Excerpts from the manuscripts	Codes (collective memory)
1	<i>Hikayat Negeri Butun</i>	<i>Tatkala kami berlayar dari Mengkasar hendak pergi ke Negeri Sumbawa pada tiga likur hari Bulan Syafar kepada tahun 1267. Maka tatkala sudah sampai di Gunung Api, lawan takdir Allah Ta'ala dipukul ribut tiga hari tiga malam tiadalah melihat daratan maka jaruh di Pulau Kalantoa (Syukur, 2009: 39)</i>	The memory of Butons about volcanoes
	<i>Hikayat Negeri Butun</i>	<i>Syahdan ada sehari semalam pelayaran tengah maka turunlah ribut, topan, halilintar, kilat, maka sampailah palulang itu pada suatu pulau, Malalang namanya. Maka takdir Allah Ta'ala angin pun teduhlah. Maka palulang itu berlabulah saat di Pulau itu, tujuh hari tujuh lamanya menanti akan angin tiada juga turun (Syukur, 2009: 42)</i>	Kapal Palulang was hit by disaster in the sea, yet it remained stable and was able to return to the land.
2	<i>Bulamalino</i>	<i>- Wahai diriku, kemudian akan datang/angin untuk berlayar sudah akan berhembus/siapkan kelengkapan tumpanganmu/menantikan waktu</i>	Spiritual mitigation in facing the death (including the death caused by disasters)

		<i>berlayarmu/Mati itu pelayaran yang tidak kembali/ Dan itulah pelayaran yang sesungguhnya/tidak kembali semua yang pergi/Yang menuju di jalan itu/Mati itu yang dinantikan orang alim/Yang diharap-harap orang salah (La Niampe, 2009:54)</i>	
	<i>Bulamalino</i>	<i>Sementara engkau dalam pelayaran/tetapkan haluan perahu itu/layarlah jangan engkau turunkan /itulah angin topan yang menjadikan pecah perahumu//jika salah haluan perahumu itu/kerugianmu kelak pada hari kemudian/Itulah penghabisan yang tidak baik (La Niampe, 2009:55)</i>	Suggested mitigation strategies in facing strong wind at the sea
		<i>Dunia ini akan hancur/ angin kencang jelas akan ada/akan menghancurkan semua gunung/dan akan kering semua lautan// Dan gempa yaang sangat dahsyatnya/itulah kehancuran alam/penghabisan semua makhluk/fanalah semua keadaan (La Niampe, 2009:71)</i>	The danger of strong wind at the sea
3	<i>Syair Wolio Lipu Tana Butuuni</i>	<i>Syarat aparat Masjid Keraton/ melaksanakan urusan agama/atas kuasa Sultan Buton/Yang pimpin jabatan lakina agama/tugasnya mengurus agama dan adat/ dan juga penghubung syarat dan agama/Imam agung sultan batin/yang mengetahui lahir dan batin/ khatib sebanyak 4 orang/....hukum agama syariat allah/ hukum adat benteng agama (La Abdurahman, p. 8)</i>	The Jumat tradition in Masjid Tua, Buton, as a place of mitigation. The mosque offers weekly prayer for avoiding disasters.
4.	<i>Kabanti Ajonga Yinda Malusa</i>	<i>... binasalah negeri yang kita diami/binasalah semua isinya/siapa yang tinggal// tidak saja kepada negeri itu misalnya negeri ini guci/ kita orangnya misalnya air/ pecah guci ketahuilah// semua airnya tertumpahlah rukun negeri itu empat/kalau kita di negeri Wolio ini /pertama gau lalu bitara// kemudian sara dan tutura/salah satu dari keempatnya itu yang salahlah/ semua pemegang kekuasaan (La Niampe, p. 326-327)</i>	A disaster for a nation is like a vase with water overflown
	<i>Kabanti Ajonga Yinda Malusa</i>	<i>Seperti kata orang mosabuna/ikumbewaha waktu pembuatan benteng/sudah bosan semua orang/sudah lelahmengerjakan benteng (La Niampe, p. 376. Verse 7), Menjawab beliau tidak mau dahulu turun/kecuali selesai dahulu pembuatan benteng/selesai benteng ini saya maulah/dipecat tidak lagi menolak</i>	Fortress was built as a armor from disasters

	(La Niampe, p. 379. Verses 1-3)	
<i>Kabanti Ajonga Yinda Malusa</i>	<i>Sebab karena negeri itu/itulah pagar sara/sara itu paling disayangi/dan itu yang utama diperbaiki//oleh karena itu biarlah binasa/negeri ini sebab karena /menjadi keteguhan sara/ dan menjadi untuk kebaikan</i> (La Niampe, p. 383. Verses 5-7, p 384 verses 3-4)	The last “fortress” from disaster is religion
<i>Kabanti Ajonga Yinda Malusa</i>	<i>Rumah tanah dekat pantai/ baru saja dibangun telah dihanyutkan air</i> (La Niampe, p. 397. Verses 4-7, p 398 verses 1-7)	Prohibition of building houses at the coastal area due to the danger of sea disaster

Table 1 above shows the tendency of local people to use the teachings from their ancestors as a part of their lives. The teachings take forms of advice, prohibitions and explanations about the recurring forms of disaster, which are then recorded and remembered in their daily lives. Disaster mitigation strategy was to obey what was conveyed by the ancestors, to protect the community and to protect nature and other creatures. Obeying the ancestors means practicing the teaching of the elderlies. Forms of protection that are manifested to the people are: building fortresses to prevent disaster risks and creating disaster-friendly housing structures. It is hoped that a good relationship can be established and the existing ecosystem can run as it should among humans, other creatures, and the natural surroundings.



Hikayat Negeri Buton manuscript *Kabanti Ajonga Yinda Malusa* manuscript

Fig. 1 Manuscripts of Buton Disasters

4.2 Disaster knowledge in the rituals and folklore

Local communities in Southeast Sulawesi have sufficient local knowledge to deal with disasters in the form of ritual traditions and folklore. From generation to generation, they have been transforming knowledge about the characteristics of disasters and their impacts to formulate strategies in dealing with disasters before, during and after. Pre-disaster knowledge was also kept in the forms of rituals and folklore. The inherited rituals were passed down and carried out from generation to generation as an effort to prevent the destructive effect of disasters. In addition, folklores contain knowledge of how disasters occurred in the past and what the people did to prevent the worse impact. When a disaster occurs, they were taught how to deal with disasters by using physical and psychological strength. Physically, they are required to perform an action to escape from the threat of disaster, while psychologically the people are taught not to panic and stay calm by looking for a way out from the disaster. In more details, table 3 describes the types of rituals related to disaster mitigation practiced by the four major ethnic groups in Southeast Sulawesi Province.

Table 3 Disaster mitigations in the ritual practices

Ethnic groups	Types of disasters	Rituals	Codes (collective memory)
Tolaki and Moronene	earthquake and tsunami	<i>Mo'oli</i> ritual	Ritual performed in avoiding the disaster (before a disaster occurs)
		<i>Mosehe</i> ritual <i>Sangiatahe</i> ritual	Ritual perform post disasters as a cleansing
Muna	The attack of land mythical creatures that threaten human life	<i>Kadahonobara</i> ritual (the change of seasons)	1. Chants: <i>salisu sumanku umar bin hatab</i>) 2. Prayers to avoid the disaster 3. Azan (call to prayer) at the four corners of the village, followed by an invocation of safety in the old mosque of Loghia.
		<i>Katingka</i> ritual (offerings to the spirit of <i>Katalasa</i>) <i>Kasumpui</i> ritual (the welcoming of spirit on Friday nights)	1. Sermons led by Laode Jamil. 2. Sermon read from Firus Muhammad year1437.
Wolio/Buton	<i>Kasukarana nalipu</i> (the nation problem)	Night vigil at 00.00 by 18 mosque officials	Chanting <i>la ilaha illa Allah</i> 1000 after silent prayers
	Tornado	<i>Kasumpui</i> tradition	
	Draught	Sermon read from Sultan text	

Source: These ritual practices are obtained from AJ, LZ, LO, MZ, HL who have the status as traditional leaders, religious leaders, and also as indigenous people

Table 3 shows that the rituals performed to deal with disasters include some efforts to safeguard the residents even before a disaster occurs. These rituals are performed in some ways: (1) restraining from doing the prohibited actions set by the ancestors, (2) performing the commanded actions, (3) solemnly following the instructions of the ritual leaders and reciting certain prayers taught by traditional teachers and elders. In carrying out these rituals to save individual, community and the surrounding nature, certain sacrifices or offerings are required before, during and after the rituals. These sacrifices can be in the form of monetary to prepare the offerings, or to sacrifice time and energy to carry out rituals.

Besides rituals, the people of Southeast Sulawesi also have other disaster knowledge in the form of folklore. This story contains the knowledge of disaster risk reduction that has been passed down from generation to generation. There are at least three folklores that emphasize the importance of obeying the rules and messages from the nature to prevent various disasters from occurring. *First*, the story of a two-headed buffalo residing in the belly of the earth. It can shake the earth and causes earthquakes. The Tolaki tribe believes that the buffalo could shake the earth when humans are not following the prevailing rules of life and breaking taboos that are forbidden. Because of this, local residents perform rituals *Mosehe* to purify oneself.

The second folklore is related to a long draught. The story was entitled *Liimonoyo* narrated by AJ, a Tolaki figure. This story tells about a long draught was caused by the eviction of Goddess of Paddy *Sanggalombae* as the people were bored in harvesting the paddy. The local people agreed to draw the goddess in the lake in a ceremony called *Liinomooyo*. After the ceremony, the people persuaded *Sanggalombae* that the lake is a perfect place for her. She knew the actual purpose of the villagers and she was sad and crying all the time. As a result, a long draught happened and paddy cannot be harvested. After a year long draught, people left the village to a place called *Lawali*. They stayed overnight in this place and their leader dreamt of a bird called Pupu that sounds "pu pu pu pu" which means there would be a danger coming. They moved up to a mountain and stopped by a place called Unaaha. This story is believed to be the origin of Unaaha people.

The leader dreamt again about the the Pupu bird, but this time he saw the bird flew from the lower place to a height. It means that the Unaaha can be a safe place from any danger. One day, these people met a local named Nanggalamaha who told that in order to reside in the village and eat the resources in the village, they have to make offerings to the Sangia Mokala. These newcomers followed this suggestion, they made a tambourine made of clay called *lulo ngganda*. Right after the ritual, rain fell so heavily and grew some crops. Then, the people permanently stay in the village and plant some crops.

Third, a folklore related to tsunami disasters. The story tells about *Iweniwule* a village girl. It was told that when *Iweniwule* was hunting for fish by the sea, she saw a giant wave called *Iwoino*. This little girl was washed by the wave and stranded on a tree. Many of her friends were dead. When the villagers searched and called for her, she answered that she was at the top of a tree. She was then rescued by the villagers by climbing up to the tree and bringing her down. Ever since, the villagers were known to a term *Iwoini Weniwule*, meaning a big wave in the time of *Weniwule*.

The three folklores mentioned above have three main tendencies in saving the people from disasters. One, the folklores introduce the types of disasters that have occurred in the past, with a description of the origins of the incidents. Stories are repeated continuously from time to time so that they become shared collective memories. Two, the folklores contain disaster mitigation methods in fictive mythical versions of stories by combining prevailing cultures and religions. The mythical story becomes strong and functions well for the Tolaki tribe because there is an element of belief towards the unseen. Mythical stories then influence the attitude of the storyteller and listeners to stay away from things that are prohibited and do things that are commanded. Three, the stories give lessons to the storyteller and the listeners to take care of the environment and be grateful for what they already have.

4.3 Institutionalizing mitigation knowledge

Recurring disasters have made local people aware, concerned and looking for solutions to deal with them. Disasters are interpreted not only in the form of rituals, but also in local terms, which are internalized to their lives. The purpose of having these local terms is that local people can spontaneously rescue for themselves, their families and the community, according to the type of the disasters. These local terms become a code for evacuation and forming an alert to avoid the dangers of disasters. Table 3 shows the terms used by the four major tribes in Southeast Sulawesi with their respective characteristics.

Table 4 Local terms used by Muna, Wolio, Tolaki, and Moronene ethnics for disasters

Local terms used by local people to remind disaster	Translation	Ethnic groups used the words
<i>Galoro</i>	Large waves	Wolio
<i>Iwoino Iweniwule</i>	Tsunami	Tolaki
<i>Lombu lengkowahan</i>	Flooded land	Konawe
<i>Tambosisi</i>	Tornado	Muna and Wolio
Tamboro	Crocodile attack	Muna
Embo	Mythical creatures attacking humans in the sea	Muna, Wolio, Tolaki
Olelu	Earthquake	Tolaki, Moronene
Luali	Earthquake	Muna
Borombonga	Mythical creatures attacking humans on land	Muna, Wolio, Tolaki, Moronene
Bungke	Sudden disaster	Wolio
Tahiboto	Erupting sea	Tolaki Moronene
Botonotahe	Exploding sea	Tolaki Moronene

Table 4 shows the usage of different local languages/terms to describe the type of disaster they faced. The local terms are used for repeated disasters and make local people remember and understand the actions to take in avoiding the disaster threats. Disasters that occur in one place differs from another place, therefore the local terms for mentioning the disaster types also vary. When there is no local term for a particular disaster, such as in the Muna tribe that does not have a specific term for a tsunami, it means that this disaster has never occurred in this area. Opposite to the Wolio tribe, they have many terms to refer to a tsunami disaster, namely *Ewo* for big waves and *Galoro* for the tsunami itself. While the Tolaki and Moronene tribes name *tahiboto* for the erupting sea, and *botonotah*e for the exploding sea, both of which indicate a large flood that threatens life on land known as a tsunami.

Table 4 also shows that there are two types of disasters that are commonly known with local words of the Southeast Sulawesi region, including earthquakes and mystical creature. Earthquake is a disaster that often occurs in several regions in Southeast Sulawesi, even each major tribe in this region has its own term for earthquake, namely *Ulelu* and *Luali*. Meanwhile, mystical creatures are called *imbo* that threaten human life in the sea and *brombongan* that threaten human life on land. When a disaster occurs, Southeast Sulawesi people can easily identify the type of disaster, hence everyone will understand and respond quickly to avoid disaster by practicing existing traditions.

5. Discussion

This study analyzes the relationship between local community and local disaster knowledge and finds that both factors have an effect on sustainable resilience in the face of disasters. Local knowledge consisting of predecessors' guidance, traditions and folklore have been maintained for a long time and has become the collective memory of the local community. This knowledge has served as a driving force in dealing with the disasters that befell on them (Gusman, 2020; Daud et al., 2021). On the other hand, this mitigation knowledge has been institutionalized in their lives and become an effective method for local communities to fight against the unstable situation caused by the disaster. This knowledge is used by local people before, during and after disasters. As such, local people become tough human beings in dealing with disasters and can survive for a long time.

The findings of this study imply that in the next 20 years, traditional groups who have local knowledge will be more likely to be resilient during disasters compared to the communities or nations that only rely on technological advances. Traditional community is prepared for any kind of disasters with their local knowledge by using it as an oral tradition. The repetition of stories passed down from generation to generation and routine rituals can serve as a barrier to disaster risks. With such knowledge, these groups will not be easily panicked in the face of disaster. Rather, they could use this knowledge as the right solution in dealing with disasters. This local knowledge can serve as an early warning long before a disaster occurs. The system of caring for others built by traditional elders in the tribes of Southeast Sulawesi functions well to help residents in need. Mental, physical strength, a sense of empathy that is built can build a quality life not only for oneself, but also for his family and wider community. Communities with local knowledge for dealing with disasters minimize mental issues such as: stress, depression and even suicide, as found in China and Haiti's disasters (Tang et al., 2018; Cénat et al., 2020).

On another side, the sustainable resilience of Southeast Sulawesi people sourced by the local knowledge. Their own cannot be separated from the religious and cultural context that has been internalized since the Majapahit era. Hinduism was the early religion and is still maintained until today, then Islam came until the two can go hand in hand. They believe in myths, legends and stories that do not always make sense. To avoid disaster, people often combine mantras with Islamic verses, such as *Batata* chants which ends with *Bismillah* (Ali, 2016; Asrif, 2017; Setiawan, 2018). With such method, people could avoid disaster. The strength

of this local knowledge was also shown by other tribes in other regions of Indonesia. For instance, Simeulu ethnic in Western Aceh, are able to avoid disasters through the teaching of *Smong* (large water) from generations to generations, so that they are alert at all times. They must be prepared to evacuate themselves when there are signs of large water occurring, which means a Tsunami (Gadeng et al., 2019; Kurniasih et al., 2020; Rahman, 2022).

This research suggests that local knowledge owned by the local people of Southeast Sulawesi can be an alternative solution to address disaster risk reduction. This research provides solutions before, during and after disasters by using local knowledge. This research complements previous studies by geologists such as Daryono et al (2021) focusing on seismic disasters. Early warning alternatives, for example, can also be implemented using local knowledge and references provided by predecessors. The ability of local people to adapt to the difficulties when facing disasters, as found in this research, can be paired with other mitigation strategies set by the government.

The results of this study have implications for offering solutions to deal with disaster impacts ranging from early warning to post-disaster events. Action plans need to be carried out at the community level, such as: educating the younger generation to be aware of the local knowledge passed down by their ancestors. Knowledge internalization in young people needs to be carried out gradually, so as to create organic strength that is formed maturely and permanently. This strategy is useful for remote regions far away from the access of government's aids during disasters. To conclude, listening to what local people are saying is another solution that must be of mutual concern (Harris & Major, 2017).

6. Conclusion

This study found out that the local knowledge of Indonesian people, particularly Southeast Sulawesi people has been functioning as an effective method in the disaster mitigation. This local knowledge has been passed down and practiced for some generations, building sustainable resilience for the local people. The knowledge distributed among Southeast Sulawesi communities regarding disaster mitigation is contained in three forms. *One*, hand-written references authored by the elderlies (manuscripts). These manuscripts contain strategies in dealing with disasters in the forms of teachings and advices, which then become the life guidance for the people. *Two*, rituals and folklores. These cultural forms tell the features of each type of disaster, its impact and mitigation strategies. *Three*, institutionalized local knowledge in the form of social order. The application and practice of the three forms of shared knowledge became the foundation for the local people in Southeast Sulawesi to become resilient sustainably in the face of natural disasters.

The results of this study complement the previous findings of other researchers. The combination of local tradition and culture, religion and historical knowledge has shaped local knowledge and reflected the ability of local communities in adapting to disaster events. Culture, local tradition and written references passed down by the elderlies are locally contextualized, hence the solutions offered are relevant to the local situation. Often time, locally developed mitigation generates positive attitudes and efficient actions during the disasters, hence people are safe and able to survive their life. The religious knowledge, culture and psychology contribute and give space for the birth of local knowledge. Therefore, this study finding can be enriched with geological and social studies to offer more effective solutions for disaster mitigation.

This study has some limitations that need to be filled by further research. The number of individual participants is still minimal, due to limited data collection period. Much broader and more comprehensive participants in different regions are needed to gain richer data on local knowledge. Geographically, Southeast Sulawesi region has a large number various tribes. This research has only focused on four groups, namely Muna, Wolio, Tolaki and Moronene tribes. Local knowledge by other groups in the Southeast Sulawesi could be of future studies' focus. Further studies are needed to accommodate larger samples and more ethnic variations.

Acknowledgements

We are very grateful to our informants living in Muna, Buton, Kendari, and Moronene who shared their stories and experiences with us. This work was supported by Organisasi Riset Pengkajian dan Penerapan Teknologi, Badan Riset dan Inovasi Nasional, Indonesia.

Funding Information

The authors did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Conflict

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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