PARTICIPATORY DISASTER RISK MAPPING FOR TOURISM INDUSTRY REGION

PEMETAAN RISIKO BENCANA PARTISIPATIF WILAYAH INDUSTRI PARIWISATA

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Abstract
Efforts to increase knowledge regarding disaster risk reduction are carried out by inviting representatives of residents in tourism industry areas to create disaster maps in a participatory manner. This is in accordance with the Sendai framework on disaster risk reduction which supports the use of local knowledge in forming disaster information. Disaster maps are obtained through short discussion groups that explore community knowledge regarding distress, vulnerability and disaster risk data. Data from this process is then visualized through participatory disaster maps. The pandemic disaster map cannot yet be drawn due to the emergence of signs of conflict among residents regarding the implementation of large-scale social policies and several other schemes that have an impact on tourism. It is hoped that making participatory disaster risk maps can increase citizens’ independent disaster mitigation efforts.

Keywords: tourism industry, disaster mitigation, disaster risk mapping

Abstrak

Kata Kunci: industri pariwisata, mitigasi bencana, pemetaan risiko bencana
INTRODUCTION

The rapid development of the tourism industry is one of the triggers for the Batu City area to undergo socio-economic and ecological changes. Throughout 2019, 5.6 million tourists visited Batu (Badan Pusat Statistik Kota Batu, 2019) demonstrated tourism sector grow faster. Meanwhile, the budget realization for the development of this sector in the 2018 fiscal year was IDR 15.2 billion (Badan Pusat Statistik Kota Batu, 2019). On the other hand, the process of massive land use change occurs in this tourist city. For example, the addition of built-up land, which consists of a combination of settlements, buildings, and industries, has increased from 2006 - 2018 by 5.2% or an increase of 1,035.8 ha. Rice fields experienced a downward trend from 2006 to 2018 of 0.5% or 94 ha. Meanwhile, in the same period, there was also a downward trend in forest land area, reaching 5.0% or 1,005.1 ha less. The decline in forest area shows not only the change in forest land use to non-forest, but also the destruction of the areas (Yudichandra, et al., 2020). The description above shows that massive land use changes occur in Batu City, one of which is utilized as a support for the massive tourism industry.

The consequence of the massive development of the tourism industry is a temporal increase of population in the location of the tourism industry centre, while the environmental degradation is also serious threat. The tourism potentially changes the condition of the physical environment, ranging from changes in land use to exploitation of natural resources (Reisinger, 2009). With the rapid growth of the tourism industry with all its consequences, it also increases the risk of disaster. One of them is the Songgoriti Area, Songgokerto Village, Batu District, Batu City. In the 2017-2022 Regional Disaster Management Agency (BPBD) Strategic Plan reported that this village is considered as a strategic area but has a level of disaster vulnerability. Songgokerto has a moderate, high, and partially non-vulnerable flood risk; while landslides are categorized as moderate and high; strong winds are categorized as moderate, and earthquakes are categorized as moderate and high (Badan Penanggulangan Bencana Daerah Kota Batu, 2018). In fact, this area has potential in the form of tourist sites in the form of Songgoriti hot springs, supported by 325 villas that are managed by residents (Biro Arema, 2020).

On the other hand, Songgokerto is also identified as having geothermal potential that will be utilized as an energy source. Although it can support energy development, this potential is considered by an alliance of civil society groups to threaten the lives of residents, because community water sources are potentially deprived by energy production activities to support the tourism industry (Agung, 2019). The concern is reasonable as several cases show that the construction of geothermal power plants also has potential disaster risks for surrounding communities (Adachi, 2011).

To cope with disasters, since 2017 BPBD Batu City has launched the Disaster Resilient Village (Destana) program based on the Head of BNPB Regulation No. 1/2012 concerning General Guidelines for Disaster Resilient Villages. One of the parameters of the establishment of Destana is a potential disaster risk assessment by conducting a study on the potential for hazard, vulnerability, and community capacity (Pristiyanto, 2016). Using those measurements, Songgokerto has not been designated as a disaster resilient village. However, facing the ecological changes and potentials, as a tourism area, Songgokerto needs basic disaster information that can be easily accessed by local community.

The outbreak of the Covid-19 pandemic has also affected the tourism industry Songgoriti. It was noted that in May 2020 when Malang Raya was subject to the Large-Scale Social Restrictions (PSBB) policy, Songgoriti tourism was suspended. During the restriction, for example, data from the Batu City Covid-19 Task Force as of May 17, 2020, stated that the number of positive patients was 7 people. There were 4 people undergoing treatment, two people declared cured and one person died (Aminudin, 2020). At the same time, it was recorded that no visitors came to this tourism area. During April 2020, villa managers in Songgoriti suffered losses of hundreds of millions of Rupiah (Biro Arema, 2020). At the end of the PSBB, the industry conditions have not yet recovered, while the number of positive infections in Batu City has increased. In this phase, symptoms of horizontal conflict also emerged between villa owners and managers with the public. There are groups that demand that villas reopen, for economic reasons while groups who oppose, feel that there is no guarantee of safety and health with the situation of the outbreak.

During the uncertainty, we offered several stakeholders in Songgoriti to graph a participatory disaster risk map that contains the distribution of hazards and community vulnerabilities. It is also a necessity for residents who will be useful not only as a source of information, but also to assist the BPBD's Destana program. Not only physical disasters, but also pandemic disasters are also tried to be discussed in this activity. The basis for choosing Songgoriti is that it has a high tourism potential, but also disaster risk.

This participatory mapping activity is based on
the crunch model concept in viewing disaster phenomena (Amiruddin & Rozalinna, 2020). The model places two important things, hazard, and vulnerability. The combination of these two things is then referred to as a disaster. In the crunch model, hazard is understood as the potential that comes from natural phenomena such as land slope conditions, soil types, availability of water sources, and so on. Meanwhile, vulnerability is something that comes from human interaction, such as urban planning, poverty, corruption, social mobility, and other socio-cultural phenomena. In this crunch model, the confluence of hazard and vulnerability as well as the multiplication between the two is considered as a disaster risk (Hansford et al., 2007).

**METHOD**

Our participatory mapping activity aims to create a participatory disaster risk map in Songgoriti area. To obtain initial data on natural hazard situations and vulnerabilities secondary data in the form of geographical maps of the area to be mapped were first collected. Subsequently, these maps were filled with disaster-related information, accomplished through a Focus Group Discussion (FGD) while maintaining physical distancing protocols for safety. However, we found some fundamental issues, including: (a) unavailability of a disaster risk map, which includes vulnerability and hazard maps. Using secondary data sources, we, along with the participants, attempted to create these maps; (b) unavailability of a study assessing threats, vulnerabilities, capacities, and analyzing disaster risks, with the additional consideration of the potential risks associated with geothermal utilization.

Therefore, the participatory disaster risk map is based on the basic assumption that disasters occur due to the intersection and amplification of natural hazards and social-cultural vulnerabilities. This mapping process involves the engagement of representatives from community groups, including the Chairman of the Villa Environment Association Songgoriti, Tourism Awareness Group (Pokdarwis), Family Welfare Empowerment (PKK), village elders’ group, community leaders, Guardians of the Supo Temple (built in 888 AD during Medang Kingdom Period), and Hot Springs sources. This activity follows the participatory disaster mapping model using Participatory Geographic Information Systems (Pgis) (Amiruddin & Rozalinna, 2020). Therefore, it is essential to consider FGD strategies carefully to ensure that the proposed solutions can be achieved in the following ways identifying disaster risks using secondary data, preparing the geographic base map, mapping hazard, mapping vulnerability, mapping disaster risk, and reporting to the community.

Identifying disaster risks using secondary data. The secondary data obtained from the Batu City Disaster Management Agency (BPBD) as the basis for FGD activities. The data provided a general guideline for gathering information through discussions. Thus, researchers and participants can explore and map what has been a source of natural hazards and vulnerability factors triggering disasters. Ultimately, a model for addressing hazards and vulnerabilities with local knowledge potential can be formulated.

Preparing the geographic base map. As the primary material for preparing disaster risk maps, the Songgoriti environment was prepared first. Subsequently, this base map will be identified and filled with maps of population distribution, land use (agriculture, plantations, and forests), and hazardous points and their types.

Mapping hazard. Participants were invited to draw on the prepared village base map participatively. They were encouraged to observe and redraw the natural hazard distribution, such as hill areas, river valleys, water sources, forest fire sources, low-lying areas, and potential tornadoes based on their knowledge and social memories.

Mapping vulnerability. Participants were once again invited to map vulnerability distributions by identifying densely populated areas, pockets of poverty, public facilities, tourist locations, and other infrastructure. This mapping was part of the identification of social, political, and cultural vulnerability mapping.

Mapping disaster risk. The combination of hazard and vulnerability draw results in a disaster risk map. The community's knowledge of natural features such as hills, river flows, forests, and others were depicted through the hazard map. Meanwhile, vulnerabilities were represented by the distribution of settlements and tourist villas, public facilities such as schools, health centers, public roads, and others. However, the Covid-19 pandemic situation affecting the tourism sector has significantly impacted this industry. Measures to prevent virus transmission, such as social distancing recommendations, have had a significant impact on the tourism industry. Moreover, the Large-Scale Social Restrictions policy in the Malang Raya area throughout May 2020 led to a decline in Songgoriti's tourist visitors. After hazard and vulnerability maps are created collaboratively, the next step was to redraw the maps to tidy them up. After the maps were reshape, they are scanned and converted into digital formats using computer software.

Reporting to the community. Following the maps were created, the next step was to report the previously
created maps to the stakeholders. This process aimed to create the perception that the community possesses disaster maps based on their own knowledge and experiences.

RESULTS AND DISCUSSION

The outcomes of the mapping process are expected to yield maps of disaster risks, hazards, and vulnerabilities. These participatory maps will serve as guidelines for determining disaster risk reduction priorities and as sources of information for the community's preparedness in facing disasters by locals.

Hazard Data

The hazard data were gathered from natural elements in the vicinity and within the community's living space. Often, when communities do not understand or cannot control these natural elements, they can transform into hazards. Aspects that need to be depicted regarding hazard sources include river flows, hills with landslide potential, water sources, forests, and other relevant factors. Relying on residents' memories and knowledge, hazard data can be collected more accurately year by year.

Geographically, Songgokerto Sub-district is divided into three regions: Songgoriti, Tambuh, and Klumutan. The region is situated amidst the hills of Mount Banyak and is the highest among the three regions within the Songgokerto Sub-district. Several water sources and historical sites are in the Songgoriti region, including Supo Temple, graveyard of Mbah Patok, and Goa Jepang (Japanese cave from WW2). There are water springs in the vicinity of the Candi Supo Songgoriti area. Additionally, three rivers flow through the Songgoriti region, known as Kali Lor (north), Kali Tengah, and Kali Kidul (south), according to the local community.

Vulnerability Data

Vulnerability map depicts the social, cultural, and economic conditions of the community. It also illustrates the potential impacts on the tourism industry traditionally managed by the residents, densely populated residential areas, poverty area, and various public facilities. Although it hard to depict pandemic map, the Covid-19 situation has also introduced new vulnerabilities. This is evident when the tourism sector, which has been a primary source of livelihood for the community, came to a standstill due to the outbreak.

Disaster Risk Map

Disaster risk map is the results of a combination of hazard map and vulnerability map both derived from the residents' perspectives. These perspectives originate from people knowledge of their living space and daily experiences. The following is disaster risk map generated through the FGD process with residents.

Picture 1 Participatory Map of Disaster Risk, Songgokerto, Batu City

To create participatory disaster risk map, we invited and engaged local people, assuming they have a better understanding of their environment. This disaster map contains complex knowledge that may never be seen from the government's perspective. As a part of the Sendai Framework for Disaster Risk Reduction, it utilized local knowledge to support disaster information participatively (UNISDR, 2015). Consequently, the community can be more self-reliant in managing disaster information, ultimately empowering them to create disaster mitigation mechanisms. In other words, local communities no longer need to rely solely on the City Disaster Management Agency (BPBD) for disaster risk reduction in their living areas.

Given the hilly and forested characteristics of the area and its proximity to forests, Songgoriti faces several disaster risks, such as flash floods and landslides. Couple years ago, a flash flood occurred, but it did not have a significant impact as it occurred for only about five minutes, specifically in the area around the Kali Tengah river. Our participants mentioned that this flood was caused by the overflow of water from Coban Rondo waterfall, with a significant amount of dead wood and debris covering the Kali Tengah river. The potential for landslides in the Songgoriti area is due to the hilly terrain and its proximity to Payung Tourism area and Klemuk route.

The Songgoriti region is more densely populated compared to the other two regions within the Songgokerto Sub-district. One contributing factor is that Songgoriti serves as the central tourism area providing villa accommodation services to tourists. Approximately 90% of the community is involved in villa accommodation services as their primary source of income. In addition to the tourism sector, the
Songgoriti community also engages in dairy cattle farming, with their milk being supplied to the Batu City Dairy Cooperative (KUD). In or map, villas and houses of residents cannot be separated because most of the houses inhabited by residents, given that nearly 90% of the population earns a living by providing this accomodations.

The Covid-19 pandemic has raised awareness among participants that there is a potential risk of a pandemic threatening the livelihoods of the residents. For instance, in May 2020, no tourists visited this tourist area then a month earlier, villa operators in Songgoriti also reported losses in the hundreds of millions of Indonesian Rupiah (Biro Arema, 2020). The end of the Large-Scale Social Restrictions (PSBB) did not necessarily restore the tourism circumstances. In fact, there were signs of horizontal conflicts between villa owners and operators and the public. The Songgoriti community was divided into two major groups: one demanding the reopening of villas due to economic reasons, and the other opposing the reopening and the influx of tourists. This group felt that there was no guarantee of safety and health with the ongoing pandemic. These conflicts also reflect the vulnerability of the community involved in the pandemic-affected tourism industry.

However, it is important to note that this participatory mapping activity was unable to comprehensively depict the Covid-19 pandemic as a disaster. The Covid-19 outbreak should ideally be mapped, just like flood or landslide risks in this area. Surprisingly, we encountered problematic issues when discussing Covid-19, as potential horizontal conflicts arose among people. Mapping the pandemic, including the locations of Covid-19 positive individuals, healthcare facilities, potential tourist congregation points, could have been very beneficial for disaster information. Ultimately, due to the emergence of conflict symptoms, we decided to abandon the creation of a pandemic disaster map.

The Covid-19 pandemic has had a significant impact on the economy of the Songgoriti community. To prevent the spread of the pandemic, they temporarily closed access to tourists and outsiders. People greatly restricted outsiders from entering their area, including journalists wanting to cover the situation. Since their primary source of income is in the tourism sector, for two months, they had almost no income at all from villa services. To meet their basic needs, some of them even had to sell household assets such as televisions and motorcycles when their savings were nearly depleted.

As an illustration, the global tourism industry is the sector most affected by the Covid-19 pandemic. The United Nations Conference on Trade and Development (UNCTAD) estimated losses of US$1.2 trillion in the first four months of 2020. In just one year, losses were estimated at US$3.3 trillion. Furthermore, in the same report, it was projected that there would be a 20% increase in unemployment in the tourism industry throughout 2020 (United Nation World Tourism Organization, 2020). Not only at the global level, but losses due to the pandemic were also felt by our participants. One of them mentioned that there was a significant decline in the quantity of visitors from 2020 to 2021.

CONCLUSION
The rapid growth of the tourism industry in Batu City has had an impact on one of its districts, namely Songgoriti. The vast deforestation triggered disaster risk and became a significant threat, including landslides and floods. In recent years, there has also been the discovery of geothermal potential which is claimed to support electrical energy sources but is also perceived as detrimental to the local people. Additionally, the emergence of the Covid-19 pandemic has necessarily affected tourism in this area. However, the potential for conflict due to the plague’s impact on tourism operators has prevented the community service team from creating a participatory pandemic potential map. Given the risks of both natural and unnatural disasters mentioned above, there is a need for a study that delineates disaster risk maps at the village or district level. To address this need, a disaster risk mapping process was carried out in the tourism industry area, utilizing the knowledge of local people. Using their local knowledge and collective memories are useful to build accessible information of calamity. It is hoped that with a participatory disaster risk mapping model, it can serve as an effective source of information for residents in their living spaces.

REFERENCES


