Flood Disaster and Madurese Local Wisdom: Case Study of Flood in Sampang Madura Area

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Abstract. Technological developments have allowed the human to predict natural disasters thereby they can anticipate and avoid negative consequences of the natural disasters. In Sampang area, Madurese people are accustomed to flood disasters that routinely hit their areas. This condition makes the local people fully understand the character of the flood disaster in their areas. The objective of this study was to identify the local wisdom of the Madurese people in dealing with, mitigating and adapting to disasters, especially floods. The research was carried out in four stages, including preparation, observation, in-depth interviews, and data analysis. In the preparation stage, the secondary data about the Sampang area and Madura areas in general, such as the geographical location of Sampang, the history of disasters, the customs and traditions of the local people were collected. In the second stage, in-depth interviews were conducted with the Sampang people and BPBD about how the people faced disasters and adaptation to the disasters. The third stage was data analysis where the results of data analysis showed that the Sampang Madurese people have a strong belief inherited from their ancestors that everything comes from Almighty God therefore they must face it. They believe that God has a special purpose for them. They also carry out disaster mitigation and adaptation to the disaster by recognizing signs of disaster early and following the advices given, besides that they always make contacts with their relatives in other areas who give early indications of flooding.

1. Introduction

Indonesia is a country with many natural disaster prone areas. This is indicated, among others, by Disaster Risk Index (DIR) issued by the National Disaster Management Agency (BNPB), which shows 27 provinces in Indonesia with high DIR and six provinces with moderate indexes.[1]Natural disasters that hit Indonesian areas have caused considerable damages to humans and their physical infrastructures. In addition, natural disasters can also result in new vulnerabilities for victims, where this vulnerability did not necessarily occur before a natural disaster.

A disaster is an event or series of events that threaten and disrupt people's lives and livelihoods caused either by natural factors and/or non-natural or human factors, resulting in human casualties, environmental damage, property loss, and psychological impacts[1].

Natural disasters refers to any disasters caused by natural events or a series of events caused by nature, including earthquakes, tsunamis, volcanic eruptions, floods, droughts, hurricanes, and landslides. Natural disasters that hit Indonesian areas have brought about considerable damage to humans and their physical infrastructures. In addition, natural disasters can also result in new vulnerabilities for victims, where this vulnerability did not necessarily occur before a natural disaster. A disaster represents any event or series of events that threaten and disrupt people's lives and livelihoods caused either by natural factors and/or non-

DOI: 10.2478/9788366675827-007

natural or human factors, resulting in human casualties, environmental damage, property loss, and psychological impacts.[2]
The incidence of flood disasters is greatly influenced by some factors such as rainfall that is above normal and the presence of tides in sea water. In addition, other factors such as human activities may also contribute to disaster, including improper land use (settlements on riverbanks, in catchment areas, deforestation), dumping of garbage into rivers, construction of settlements in flood plain areas. However, basically 80% of disasters occur due to the climate change

Floods represent the most common natural disasters, both in terms of their frequency in a place and the number of incident locations in a year, which account for around 40% among other natural disasters. Even in certain places, flooding is an annual routine incidence. The floods may occur in urban or rural areas, developing countries or even developed countries. The locations of flood incident can be distinguished based on the impacts of the flood itself. The impacts of flooding in urban areas are generally felt in residential places only, while the impacts of flooding in rural areas are felt not only in settlements but also agricultural areas which may have an impact on the food security of the relevant areas and at national level especially if it occurs on a large scale in a country [3].

Flood is one of the natural disasters that frequently occur in Indonesia. Sampang is one of the districts on Madura Island which is regularly flooded during the rainy season. In addition to the high rainfall factor, several other factors such as slope, land height, soil type, land use, and river density are used as parameters in the study of flood hazard levels [4].

2. Methodology

This research is a qualitative research. Data were collected by observing, in-depth interviews and documentation. Interviews were conducted with the Sampang community, and the Regional Disaster Management Agency (BPBD), and members of the disaster-concerned community. The research was conducted in Sampang Regency, which is the location where floods occur almost every rainy season. The informants of this study were the Regional Disaster Management Board (BPBD), community members and community members who care about disasters. The research instrument used was in-depth interviews (in dept-interview). The data analysis technique used the Spreadley (1980) data analysis model with the following stages: 1. Analysis before going to the field. Results of preliminary secondary data studies to determine the focus of research. 2. Data analysis while in the field. The researcher analyzed the data simultaneously by conducting observations and interviews. When the researcher feels that the informant's answer is not sufficient, the researcher continues the question until the data obtained is valid. 3. Complete data analysis from the field.
Several steps are taken at this stage, including: 1). Domain analysis, which provides a general and comprehensive overview of the panel object. 2). Taxonomic analysis, namely the detailed description of the domain analysis through focused observation. 3) Componential analysis, namely looking specifically for every detail of the internal structure, and 4). Analysis of cultural themes, which is looking for relationships between data whose results are substantive and formal findings. The data analysis methods used vary according to the stages of the research being carried out. Disaster mitigation identification was collected by means of in-depth interviews and then analyzed. After identifying all types of problems and how to overcome them, the researcher held discussions with the team of related parties to make conclusions.

3. Result and Discussion

History of Floods in Sampang.

Topographically, Sampang District consists of a stretch of hills with altitude in range of 0-300 m above sea level and an average slope of 2 - 25%. This topography is very supportive of the soil erosion process which in essence carries sediment from the top which is then deposited in river flows and causes silting of rivers so that the river's capacity for continuous rainwater will cause flooding. The occurrence of flooding in

Sampang District, besides due to topography, is also caused by the condition of the natural environment that does not support the hydrological cycle process or the water cycle process on the earth's surface. Each factor is interrelated and supports the occurrence of flooding. Most of the forests which have been logged without selective logging and theft of forest wood will result in deforested forests, then resulting in critical land and accelerated erosion [5].

The flood that occurred due to the overflow of Kemuning River in Sampang District was very detrimental to the local people, especially if the flood occurred in the urban area of Sampang. Various local people's activities are seriously disturbed. Like the flood that occurred in May 2011 where the water began to overflow on 4 May until it receded on 6 May. The flood submerged five villages/urban villages in Sampang Subdistrict, resulting in education activities to be closed forcedly due to flooded schools. Office activities were considerably hampered because many houses of employees were flooded and they had to evacuate their property and themselves so that they cannot move in the office. The flood with water level of 50 cm - 150 cm also disrupted the flow of transportation among subdistricts due to the inundation of the Sampang-Omben roads and cut off the flow of transportation between districts due to inundation of the main roads from Bangkalan-Pamekasan and vice versa[6]

Demographic Condition of Sampang

Sampang District is located in the eastern part of Madura Island where an average elevation is almost the same as high tide (+0.3 m). The Sampang district area topographically consists of various types of slopes, namely 0 to 2%, above 2 to 15%, above 15 to 25%, above 25 to 40% and above 40%. Soil types in Sampang district consist of alluvial, grumusol, mediteran, and litosol soils [7]. Most of the rivers in Sampang District are seasonal rivers, meaning that water is available during the rainy season, which is used to irrigate the rice fields of the surrounding community. The watershed in Sampang District ranges from 0.7 to 22 km where the longest river is the Sodung river with a length of 22 Km and the shortest is the Kalah river with a length of 0.7 Km. The flow pattern of the river follows the braided, anastomotic, and chicken claw flow patterns, which are fixed, temporary and periodic[8]

Local Wisdom

Anthropologists like Robert Chamber [9], Saleh M Ali [10], P. Blaikie [11] agree that community members or people have knowledge that is used to interpret the elements of the natural environment and manage them into their source of life. They give different terms for such knowledge. Some call local knowledge, indigenous knowledge [12], local wisdom [13], traditional wisdom [14], and traditional knowledge[15]. However, whatever it is called, in general, this knowledge is developed through experimental learning about a reality. The process goes through observation and experimentation over a long period of time, so that its development is not as fast as the development of modern knowledge.

The local wisdom of indigenous community is not only about the knowledge and understanding of indigenous community about humans and how good relations between humans, but also about knowledge, understanding, and customs about humans, nature, and the unseen. All of these local wisdoms are lived up, practiced, taught, and passed on from one generation to another [16]. Local wisdom represents an epistemological conceptual idea living in society, growing, and developing continuously in people's consciousness, functions in regulating people's lives from those related to sacred to profane life [17].

Local Wisdom for Mitigation and Adaptation to Disaster among Sampang People

The local knowledge system says that humans (microcosm) and nature (macrocosm) have a harmonious relationship, an understanding based on the perspective of heterogeneity (diversity). Therefore, in the local knowledge system there is no recognized single truth, but it is only relative and contextual truth. Truth can only be obtained through a holistic approach, an approach that values diversity. In the context of the relationship between humans and nature, there is a 'functional relationship' but not in the sense of

exploitation but its utilization is done by establishing harmonious relationship between man and nature. Therefore, in maintaining its relationship with nature, humans constantly learn through observation and experiment in utilizing economic resources in their environment. Local knowledge usually shows an ecological wisdom [18] allowing the balance of the ecosystem to be maintained well. The same thing was stated by Budi Santoso that in fact the pluralistic society of Indonesia is rich in ecological wisdom which has served as a reference in fostering a reciprocal relationship with the environment in a sustainable way [19]. The same thing was also said by Sani and Hijjang that in general, local indigenous people who live in a certain area have a very high form of wisdom towards their environment [20]. Sillitoe who uses the concept of indigenous knowledge emphasizes that knowledge refers to an interdisciplinary notion that can include the minds of indigenous people and how to organize the environment as a whole system [12]. Indigenous knowledge constitutes an essential component in indigenous culture which forms part of a cultural system as a whole which includes ceremonial ritual objects, artistic designs, songs, dances, oral traditions, patterns of subsistence, land, arrangement of sources of income in certain environments. Indigenous knowledge is very crucial to ensure the sustainability of indigenous cultures and an important channel that allows indigenous people to adapt to modern changes that have penetrated their community [21].

Traditional knowledge constitutes an asset that can be managed for building a community-based disaster management system, especially at the disaster mitigation stage. Traditional knowledge and intelligence are formed as a result of the long-term interactions between community and their physical environment. The formation of traditional intelligence allows people to recognize and read natural signs related to the Sampang Madura flood disaster. Because the people understand their environment quite well, then the disaster management with reference to the characteristics of the people interaction with the local environment can be done more effectively. In connection with these objectives, existing traditional knowledge and intelligence needs to be explored and communicated so that it is understood by the future generations. In the socio-cultural context, the traditional knowledge and intelligence are assets that must be preserved continuously besides it can implemented in a disaster management system. Traditional knowledge and intelligence shows the existence of a social and cultural system in Indonesia that is closely related to the environment so that it provides specific characteristics.

The capability of the Sampang Madurese people in reading natural signs is shown in the annual flood incidence in this city. If the northern Sampang area is cloudy, then it will rain in the area, and their areas will be flooded.

Madurese people have very strong kinship system. Madurese people kinship is so open and wide. The concept of kinship in Madura is termed as beleh (karabet), taretan dibi'. Madurese people maintain kinship in such a way that the tradition of visiting each other among relatives is still very strong today. In the context of this flood disaster, the residents of Sampang Madura rely heavily on information from their relatives who come from the northern area of Madura to prepare for a disaster.

Information from taretan is very reliable to anticipate floods in the Sampang Madura area. The concept of taretan in Madurese community is not only understood in the sense of siblings (nuclear family), but is much broader than this meaning, so that there are terms taretan sapopoh, taretan dupopoh, and taretan tellopopoh, meanwhile to mention someone who still has blood relation even though the relation is very distant, they are "obliged" to mutually support, protect, and defend each other. This shows that the concept of brotherhood (solidarity) in the Madura tradition, which among other things is derived from the concept of taneyan lanjeng is so broad (extended family), thus showing that the brotherhood in the tradition of the Madurese people is very friendly (gemenschaft). The concept of gemenschaft is getting clearer with the existence of the terms bung-sabung rosok, songosong lombung, and rampa' naong beringin Korong. These terms describe the strong kinship system in Madura community. The expression bung-sabung rosok literally means that our ribs are joined together. This expression shows that kinship is regarded honorably in the Madura social tradition. The expression of song osong lombung literally means working together in lifting the barn. Barn in the context of Madura community is used as a storage area for food stocks of maize

and rice. This concept strengthens the view of solidarity and the spirit of mutual assistance for the Madurese people. In the context of the disaster, this expression is very relevant to be implemented in flood disaster condition. The expression of rampa' naong beringin korong means the tradition of gathering with fellow brothers (apol kompol sataretanan).

In the context of disaster the Madurese people have an expression of Mellak matana gerreng that is very relevant for humanity and empathy values. This expression is used with the intention of warning someone to help anyone who needs help, and also don't act as if you don't see, pretend that you don't know. This expression shows that the Madura people have a high social sensitivity. The expression Nanem cabbi molong cabbi is also full of social values and justice. This expression means whoever sows his seed will reap the rewards. This shows the moral value regarding the reward for every action taken. Good deeds will be rewarded with sympathy and respect and vice versa.

Madurese local wisdom related to respect and obedience to teachers, parents and leaders is "Buppa' bebu' guru rato". This expression is often used by the Madurese people to emphasize respect for parents, teachers, and leaders. In the context of the flood disaster, the Sampang Madurese people strongly believe in the role of prayer and Islamic scholars in dealing with floods. In several Sampang areas, the ritual of praying together and rosulan is still carried out at the beginning of the rainy season as an expression of gratitude for the arrival of the rainy season. In the view of the Madurese Sampang people, rain is really a gift and God blessing to be grateful for. This ritual also denotes an expression of prayer for safety during the rainy season.

The Sampang Madurese people built houses completed with designs to reduce the impact of disasters and can survive at home without having to evacuate or leave their homes. The people designed the roof of the house as a place to live temporarily during the flood.

Mitigation and Adaptation

Sampang Madurese people take mitigation and adaptation measures to reduce natural disasters due to flooding. Mitigation represents all efforts made to anticipate or minimize the impacts resulting from a disaster. However, the effective efforts that can be made before the disaster occurs have not been completed properly. These actions are actually awfully important to minimize the number of victims in disaster-prone areas. The mitigation paradigm in disaster management is intended as an effort to introduce disaster mitigation in prone areas and prepare independent communities. In addition, mitigation is also defined as an effort to build up the capacity of community living in disaster-prone areas to anticipate or minimize the disaster impacts. One of the mitigation types that can be done is changing the unstable behavior of the people through settlement planning, building needs, building structures in accordance with flood disaster condition, and spatial planning with a disaster impact mitigation perspective. Furthermore, the people must have and develop awareness on the impacts of disasters. Therefore, it is expected that the people will not only become target, but they will also become a helper for themselves and for the other people in the environment during disaster hazard. The people's awareness is a form of social awareness including early notification systems, disaster anticipation, disaster response, and post-disaster management capabilities. This type of awareness is one of the social capitals for the development of the mitigation stage in the life of every individual in society.

4. Conclusion

The Sampang Madurese people take disaster mitigation measures based on local wisdom. This wisdom is created because of the local conditions they have faced thus far. They are always looking for the best way to do this in anticipation of and adaptation to the disaster condition. They do this over time from generation to generation. Local people's habits are transformed into local wisdom. Different wisdoms for different locations will have different natural problems. The flood disaster has forged the local people as an independent people. This type of local wisdom of the Sampang Madurese people for flood mitigation and adaptation. The type of local wisdom of the Sampang Madurese people in coping with flood disasters is divided into 2 parts, which is their knowledge in recognizing (predicting) potential disasters (such as natural condition when it is cloudy in the northern areas of Sampang, including Robatal, Ketapang, and

Karangpenang) and their ways to act against disasters (such as relying on information from their relatives in northern Sampang area to prepare for flooding in their areas.) It is also related to traditional Madurese expressions of kinship, mutual cooperation, and solidarity. All of these components strengthen their ties and knowledge on the flood disaster they are facing. Apart from all kinds of local wisdom that they have, the spirit of the ancestors is getting stronger as said in their principles that they will always respect and honor their parents, teachers, Islamic scholars, and leaders.

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