Influence of Natural Disasters on Social Conditions in Village Communities in Indonesia

Abstract

Natural disasters have a negative impact on various aspects of life. Through natural disasters, the order of life in an area will be disrupted. The social condition of society is one component that has a negative impact. Therefore, this research aims to determine the negative impact of natural disasters on the social aspects of society. The data used in this research comes from 2021 Podes data and the 2022 and 2023 Social Resilience Index. The method used in this research is multiple linear regression. The results of this research indicate that natural disasters have a negative impact on social aspects. Of the three independent variables in this study, it is known that volcanic eruptions have the deepest significant negative impacts, both 1 year after the event and 2 years after the event. Through this research, it is known that the social aspects of society will be negatively impacted by natural disasters. For this reason, an extra role is needed from the government to carry out evacuations when a disaster occurs, and also carry out mitigation from the start in order to minimize negative impacts.

Key word: Mitigate, volcanic eruptions, Disaster Risk ,Disaster Management

I. Introduction

Social factors play a significant role in shaping and directing people's lives(A. Alam, 2022; Bandura, 2006; Haslam et al., 2021). Along with human growth and development, social aspects have become the main foundation in determining how individuals interact, develop, and adapt to their surrounding environment. The importance of social factors is evident in all aspects of daily life. This can be seen in how society forms norms, values, and systems that regulate relationships between individuals. For example, the social standards prevailing in a community can significantly influence individual behavior. More than that, social factors also influence group dynamics, communication patterns, and how conflicts are resolved in society(Bercovitch, 2019; Morrison-Smith & Ruiz, 2020; Tørring et al., 2019).

Social factors can also be seen in developing a person's social identity(Godinić & Obrenovic, 2020; Muldoon et al., 2019; Scheepers & Ellemers, 2019). Individuals not only form their identities from personal characteristics but also from their interactions with the surrounding environment. The values, beliefs, and behaviors they have are often influenced by the culture and social environment in which they live. In addition, social factors also have a significant impact in influencing individuals' access to resources and opportunities. Social inequalities can arise due to differences in economics, education, or social status, affecting access to health services, employment, and education(Alcaraz et al., 2020; Cogburn, 2019; Raghupathi & Raghupathi, 2020).

The social conditions of a society are often vulnerable to threats from internal and external factors(Nerubasska et al., 2020; Ojala et al., 2021; Shokry et al., 2022). In the social structure of society, disturbances can arise from within the community itself or originate from external factors, such as economic pressure, political change, or internal conflict between groups. These internal

threats can result in instability that affects relationships between individuals and overall social dynamics. In addition, social conditions can also be affected by disturbances from environmental factors, including climate change. When drastic weather changes occur, such as floods, droughts, or other natural disasters, people's living arrangements can be seriously disrupted(Benevolenza & DeRigne, 2019; Islam & Khan, 2020; Kelman, 2020).

Natural disasters often cause infrastructure damage, loss of resources, and disruption of people's daily living patterns, which can affect social interactions, well-being, and economic stability.(Raihan, 2023; Spoon et al., 2020; Wassie, 2020).Climate change can also give rise to more significant social conflict, especially regarding access to increasingly limited resources, such as water and agricultural land. This can trigger competition and tension between individuals or groups of society, even at a more comprehensive level, such as conflicts between countries.

As a country located in the Pacific Ring of Fire, Indonesia is often the center of attention due to several natural disasters that occur periodically. Among the natural disasters that often hit Indonesia, earthquakes, volcanic eruptions, and drought are some of them that usually have a considerable impact.

Earthquakes are one of the natural disasters that often occur in Indonesia because of its geographic location at the meeting point of tectonic plates. Earthquakes often cause severe damage to infrastructure and loss of life. Volcanic eruptions are also a serious threat, especially in areas with active volcanoes such as Mount Merapi and Mount Sinabung. This eruption can result in hot clouds, lava, and ashfall,potentially damaging the environment and threatening nearby residents' safety. Apart from that, Indonesia also experiences drought problems, which often impact the agricultural sector and the availability of clean water. A long dry season can cause a shortage of water supply for irrigation of crops and people's daily needs.

These natural disasters show how important mitigation and emergency management efforts are in dealing with emergencies. The government and society must prepare, preventively and responsively, by developing resilient infrastructure, strengthening early warning systems, and providing assistance and support for disaster victims.

Rural areas are often vulnerable to natural disasters(Hallegatte et al., 2020; Sarker et al., 2019). This is caused by several factors, one of which is the topography or geographical characteristics of the area. In general, villages tend to have a large land area with a wide geographic diversity, from lowlands to mountain slopes. This diverse topography can cause various types of natural disasters. For example, rural areas on mountain slopes are vulnerable to landslides due to unstable ground pressure. Changes in rainfall or earthquake activity could be the main trigger for landslides in the area. Apart from that, places in the lowlands can experience flooding during the rainy season due to inadequate drainage systems or rivers overflowing due to high rainfall. Not only that, rural areas often experience drought, especially during the dry season. Sizeable agricultural land in rural areas depends on rainfall as the primarywater source. When the dry season arrives, water shortages can cause crop failure and difficulty accessing clean water for daily needs.

Natural disasters in rural areas pose challenges due to limited access to emergency services, inadequate infrastructure, and limited emergency resources. Therefore, the government and local communities need to develop effective disaster mitigation strategies and build community resilience to natural disasters by considering the geographical characteristics of rural areas. These efforts include providing an early warning system, disaster risk mapping, and building disaster-resistant infrastructure to reduce the impact caused by natural disasters in rural areas.

Many studies have examined the impact of natural disasters on financial losses (Abbas Khan et al., 2019; A. S. A. F. Alam et al., 2020; Ali et al., 2020; Panwar & Sen, 2019).However, there is still limited research that examines the social impact. Therefore, this research aims to analyze the effects of natural disasters on social resilience in rural areas. It is suspected that natural disasters significantly negatively influence social aspects of society, especially in rural areas.

II. Data and Methodology

This research uses natural disaster data from the 2021 Village Potential (Podes) data collection, sourced from the Central Statistics Agency. The natural disaster data analyzed in this research are earthquakes, volcanic eruptions, and drought. This research also uses Social Resilience Index (IKS) data for 2022 and 2023 obtained from the Ministry of Villages, Development of Disadvantaged Regions and Transmigration. The indicators used in calculating IKS are as follows:

List 1 : Social Resilience Indicators					
1.	Access to Health Facilities	13.	Access to Skills Center/Courses	25.	Conflict
2.	Doctor	14.	Availability of Community Reading Gardens/Village Libraries	26.	People with Social Welfare Problems
3.	Midwife	15.	Mutual Cooperation Habit	27.	Access Special Schools
4.	Other Health Workers	16.	Frequency of Mutual Cooperation	28.	Electrical Access
5.	BPJS membership	17.	Existence of Public Space	29.	Cell Phone Signal
6.	Access to Poskesdes	18.	Sports Activities Group	30.	Internet Network
7.	Posyandu activities	19.	Sports Activities	31.	Citizen Internet Access
8.	Access to SD/MI	20.	Religious Diversity	32.	Toilet Access
9.	Access to SMP/MTS	21.	KeragamanBahasa	33.	Rubbish
10.	Access to high school/vocational school	22.	Language Diversity	34.	Drinking water
11.	Availability of PAUD	23.	Communication Diversity	35.	Bathing & Washing Water
12.	Availability of PKBM/ABC Package	24.	Patrol	36.	Conflict

Social resilience indicators are collected through surveys completed by the village government. Social resilience indicators have several derivative questions that can describe the social conditions of society. Social forestry indicators are integrated into an index that can integrate achievements in the social dimension.

The matching data between 2021 natural disaster data and IKS data showed that the number of observations was 2,892 villages in 2022 and 2,820 villages in 2023. The number of village samples was spread across all provinces in Indonesia and divided into categories of village progress levels. This research uses multiple regression analysis (OLS). The dependent variable in this research is the Social Resilience Index (IKS), while the variables used are the number of earthquakes, volcanic eruptions, and drought (land).

III. Results and Discussion

From the regression results, information is generally obtained that natural disasters harm the social resilience index. Natural disasters often significantly negatively impact various social aspects in a society. One of the most visible impacts is mental and psychosocial health. Conditions of stress, anxiety, trauma, and depression often increase sharply after a natural disaster occurs. Individuals who are victims or witnesses of disasters often experience fear of loss, concern about the future, and difficulty adapting to rapid changes after a disaster. This can affect overall mental well-being and requires ongoing support efforts from the community and mental health facilities.

Apart from that, natural disasters can also disrupt social networks and togetherness in society. Losing family members, neighbors, and close friends can affect social relationships. Sometimes, natural disasters separate people from their community networks, resulting in isolation and loneliness. In addition, basic needs such as shelter, clean water, and food become scarce after a disaster, which can trigger competition and conflict among communities to obtain limited resources.

Table 1. The Impact of Natural Disasters in 2020 on the Social Resilience Index in 2022

Natural Disasters (2020)	Coefficient	Significance
Earthquake	-0.0085531	0.000
Erupting volcano	-0.0181675	0.064
Drought (Land)	-0.0087538	0.141
Constant	0.7480031	0.000

Note: Dependent Variable: Social Resilience Index
Independent Variable: Earthquake, Volcano Eruption, and Drought (Land)

Based on Table 1, it is informed that earthquakes and volcanic eruptions in 2020 had a negative and significant effect on the social resilience index in 2022. Volcanic eruptions had the most resounding negative impact compared to other research variables.

Table 2. The Impact of Natural Disasters in 2021 on the Social Resilience Index in 2022

Natural Disasters (2021)	Coefficient	Significance
Earthquake	-0.0085589	0.000
Erupting volcano	-0.0520880	0.000
Drought (Land)	-0.0131623	0.097
Constant	0.7472388	0.000

Note: Dependent Variable: Social Resilience Index
Independent Variable: Earthquake, Volcano Eruption, and Drought (Land)

Based on Table 2, it is informed that earthquakes, volcanic eruptions, and drought (land) in 2020 have had a negative and significant effect on the social resilience index in 2022. Volcanic eruptions have the most resounding negative impact compared to other research variables.

Table 3 shows that the majority of research observations were in developing villages. This result is under the distribution of village conditions currently in Indonesia. There are 6.40 percentwho have independent status, 21.89 percent who have an advanced level, 50.62 percent who have a developing situation, 15.35 percent who have underdeveloped status, and 5.74 percent who have very underdeveloped status.

Table 3. Number of Observation Villages According to Development Classification in 2022

Development Village Index Status (2022)	Frequency	Percent
Independent	185	6.40
Proceed	633	21.89
Develop	1,464	50.62
Left behind	444	15.35
Very Left behind	166	5.74
Total	2.892	100.00

Table 4. The Impact of Natural Disasters in 2020 on the Social Resilience Index in 2023

Natural Disasters (2020)	Coefficient	Significance
Earthquake	-0.0095753	0.000
Erupting volcano	-0.0172796	0.000
Drought (Land)	-0.0116607	0.048
Constant	0.7605128	0.000

Note: Dependent Variable: Social Resilience Index
Independent Variable: Earthquake, Volcano Eruption, and Drought (Land)

Based on Table 4, it is informed that earthquakes, volcanic eruptions, and drought (land) in 2020 have had a negative and significant effect on the social resilience index in 2022. Volcanic eruptions have the most resounding negative impact compared to other research variables.

Table 5. The Impact of Natural Disasters in 2021 on the Social Resilience Index in 2023

Natural Disasters (2021)	Coefficient	Significance
Earthquake	-0.0097142	0.000
Erupting volcano	-0.0370195	0.000
Drought (Land)	-0.0211696	0.011
Constant	0.7597123	0.000

Note: Dependent Variable: Social Resilience Index
Independent Variable: Earthquake, Volcano Eruption, and Drought (Land)

Based on Table 5, it is informed that earthquakes, volcanic eruptions, and drought (land) in 2020 have had a negative and significant effect on the social resilience index in 2022. Volcanic eruptions have the most resounding negative impact compared to other research variables.

Table 6. Number of Observation Villages According to Development Classification in 2023

Development Village Index Status (2023)	Frequency	Percent
Independent	368	13.05
Proceed	731	25.92
Develop	1,277	45.28
Left behind	297	10.53
Very Left behind	147	5.21
Total	2,820	100.00

Based on Table 6, it is informed that the majority of research observations were in developing villages. This result follows the distribution of village conditions currently in Indonesia. 13.05

percenthave an independent status, 25.92 percent have an advanced level, 45.28 percent have a developing situation, 10.53 percent have an underdeveloped status, and 5.21 percent have a very underdeveloped status.

Based on the regression results above, almost all variables significantly negatively influence the social resilience index. Of the three independent variables in this study, it is known that volcanic eruptions have the most resounding significant adverse impacts one year and two years later. Volcanic eruptions in rural areas have a major impact on the lives of rural communities. This is because all social and economic activities of village communities tend to be located around where they live, so that when volcanic eruptions occur, village communities are automatically unable to carry out all activities.

The results align with several previous studies which stated that natural disasters negatively impact society's social conditions(Kaniasty, 2020; Rosselló et al., 2020). For this reason, an extra role is needed from the government to carry out evacuations when a disaster occurs and mitigate from the start to minimize negative impacts.

A natural disaster is an event that can have a negative impact on the social conditions of society. When natural disasters occur, communities often face major challenges in maintaining the stability of daily life. One of the main impacts is the disruption of social structures, where communities may experience separation and destruction. In addition, natural disasters can create social inequality among members of society. More vulnerable groups may experience extra difficulties in coping with the impact of a disaster, such as the poor, the elderly or people with disabilities. Recovering from natural disasters can also be more difficult for those who lack resources and social support.

In this context, psychosocial aspects are also an important concern. People affected by natural disasters can experience mental and emotional stress due to losing their homes, families or livelihoods. Social support and mental health services are crucial in helping individuals and communities recover from the trauma caused by natural disasters. Furthermore, natural disasters can also cause changes in society's social norms and values. In an effort to survive and adapt, people are often faced with difficult decisions that can affect their social dynamics. Therefore, understanding the social impact of natural disasters is not only important in designing relief and recovery programs, but also for building better social resilience in the future.

IV. Conclusion

Natural disasters have a negative impact on various aspects of life, including aspects of social resilience. Social aspects that have been formed sometimes have to disappear due to natural disasters. So areas affected by natural disasters need to be rebuilt so that they can be made available again and can be used by the community. It takes a relatively long time to reorganize various aspects affected by natural disasters. Through this research, it is known that natural disasters have a negative impact on social aspects of society. Apart from that, the impact of natural disasters can still be felt up to 2 years after the disaster occurs. For this reason, the government's role is needed to accelerate recovery from the impact of natural disasters as soon as possible. On the other hand, disaster mitigation is needed so that the negative impacts of natural disasters can be minimized. Future research is expected to be able to aggregate all dimensions so that they can be seen comprehensively.

References

Abbas Khan, K., Zaman, K., Shoukry, A. M., Sharkawy, A., Gani, S., Sasmoko, Ahmad, J., Khan, A., & Hishan, S. S. (2019). Natural disasters and economic losses: controlling external migration, energy and environmental resources, water demand, and financial development for global prosperity. *Environmental Science and Pollution Research*, *26*, 14287–14299.

Alam, A. (2022). Investigating sustainable education and positive psychology interventions in schools towards achievement of sustainable happiness and wellbeing for 21st century pedagogy and curriculum. *ECS Transactions*, *107*(1), 19481.

Alam, A. S. A. F., Begum, H., Masud, M. M., Al-Amin, A. Q., & Leal Filho, W. (2020). Agriculture insurance for disaster risk reduction: A case study of Malaysia. *International Journal of Disaster Risk Reduction*, *47*, 101626.

Alcaraz, K. I., Wiedt, T. L., Daniels, E. C., Yabroff, K. R., Guerra, C. E., & Wender, R. C. (2020). Understanding and addressing social determinants to advance cancer health equity in the United States: a blueprint for practice, research, and policy. *CA: A Cancer Journal for Clinicians*, *70*(1), 31–46.

Ali, R., Kuriqi, A., & Kisi, O. (2020). Human–environment natural disasters interconnection in China: a review. *Climate*, *8*(4), 48.

Bandura, A. (2006). Toward a psychology of human agency. *Perspectives on Psychological Science*, *1*(2), 164–180.

Benevolenza, M. A., & DeRigne, L. (2019). The impact of climate change and natural disasters on vulnerable populations: A systematic review of literature. *Journal of Human Behavior in the Social Environment*, *29*(2), 266–281.

Bercovitch, J. (2019). *Social conflicts and third parties: Strategies of conflict resolution*. Routledge.

Cogburn, C. D. (2019). Culture, race, and health: implications for racial inequities and population health. *The Milbank Quarterly*, *97*(3), 736–761.

Godinić, D., & Obrenovic, B. (2020). *Effects of economic uncertainty on mental health in the COVID-19 pandemic context: social identity disturbance, job uncertainty and psychological wellbeing model*.

Hallegatte, S., Vogt-Schilb, A., Rozenberg, J., Bangalore, M., & Beaudet, C. (2020). From poverty to disaster and back: A review of the literature. *Economics of Disasters and Climate Change*, *4*, 223–247.

Haslam, C., Haslam, S. A., Jetten, J., Cruwys, T., & Steffens, N. K. (2021). Life change, social identity, and health. *Annual Review of Psychology*, *72*, 635–661.

Islam, M. R., & Khan, N. A. (2020). Threats, vulnerability, resilience and displacement among the climate change and natural disaster-affected people in South-East Asia: an overview. *Climate Change Mitigation and Sustainable Development*, 111–138.

Kaniasty, K. (2020). Social support, interpersonal, and community dynamics following disasters caused by natural hazards. *Current Opinion in Psychology*, *32*, 105–109.

Kelman, I. (2020). *Disaster by choice: How our actions turn natural hazards into catastrophes*. Oxford University Press.

Morrison-Smith, S., & Ruiz, J. (2020). Challenges and barriers in virtual teams: a literature review. *SN Applied Sciences*, *2*, 1–33.

Muldoon, O. T., Haslam, S. A., Haslam, C., Cruwys, T., Kearns, M., & Jetten, J. (2019). The social

psychology of responses to trauma: Social identity pathways associated with divergent traumatic responses. *European Review of Social Psychology*, *30*(1), 311–348.

Nerubasska, A., Palshkov, K., & Maksymchuk, B. (2020). A systemic philosophical analysis of the contemporary society and the human: new potential. *Postmodern Openings*, *11*(4), 275–292.

Ojala, M., Cunsolo, A., Ogunbode, C. A., & Middleton, J. (2021). Anxiety, worry, and grief in a time of environmental and climate crisis: A narrative review. *Annual Review of Environment and Resources*, *46*, 35–58.

Panwar, V., & Sen, S. (2019). Economic impact of natural disasters: An empirical re-examination. *Margin: The Journal of Applied Economic Research*, *13*(1), 109–139.

Raghupathi, V., & Raghupathi, W. (2020). The influence of education on health: an empirical assessment of OECD countries for the period 1995–2015. *Archives of Public Health*, *78*(1), 1–18.

Raihan, A. (2023). A review of the global climate change impacts, adaptation strategies, and mitigation options in the socio-economic and environmental sectors. *Journal of Environmental Science and Economics*, *2*(3), 36–58.

Rosselló, J., Becken, S., & Santana-Gallego, M. (2020). The effects of natural disasters on international tourism: A global analysis. *Tourism Management*, *79*, 104080.

Sarker, M. N. I., Wu, M., Alam, G. M. M., & Shouse, R. C. (2019). Livelihood vulnerability of riverine-island dwellers in the face of natural disasters in Bangladesh. *Sustainability*, *11*(6), 1623.

Scheepers, D., & Ellemers, N. (2019). Social identity theory. *Social Psychology in Action: Evidence-Based Interventions from Theory to Practice*, 129–143.

Shokry, G., Anguelovski, I., Connolly, J. J. T., Maroko, A., & Pearsall, H. (2022). "They didn't see it coming": Green resilience planning and vulnerability to future climate gentrification. *Housing Policy Debate*, *32*(1), 211–245.

Spoon, J., Hunter, C. E., Gerkey, D., Chhetri, R. B., Rai, A., Basnet, U., & Dewan, A. (2020). Anatomy of disaster recoveries: Tangible and intangible short-term recovery dynamics following the 2015 Nepal earthquakes. *International Journal of Disaster Risk Reduction*, *51*, 101879.

Tørring, B., Gittell, J. H., Laursen, M., Rasmussen, B. S., & Sørensen, E. E. (2019). Communication and relationship dynamics in surgical teams in the operating room: an ethnographic study. *BMC Health Services Research*, *19*, 1–16.

Wassie, S. B. (2020). Natural resource degradation tendencies in Ethiopia: a review. *Environmental Systems Research*, *9*(1), 1–29.