

A Socio-Ecological Systems Approach Disaster Resilience for Small Island

Durratun Nashihah^{1*}, Imam Hanafi², Firdausi Dhulhijjahyani²

¹Faculty of Social and Political Sciences, University of Merdeka Malang, Indonesia

²Faculty of Public Administration, University of Brawijaya, Malang, Indonesia

Correspondences*:

Address: Jl. Terusan Raya Dieng 62-64, Malang, East Java, Indonesia

e-mail: durratunn12@gmail.com

Abstract

Bawean is a small island where it is the pulse point of the Indonesian Archipelago which is located in the middle of the archipelago and right on the equator. The objectives of this study are Analyzing socio-ecological systems, resilience as a concept is crucial, especially in the context of robustness, vulnerability, and sustainability. This research method includes: (1) Research Question is a stage where the author explains the core problems that will be studied in this paper; (2) Quality Assessment, is a stage carried out by researchers to identify potential literature related to the title presented; (3) Data Extraction, is a stage carried out to select the literature used and examine more deeply related to the observed object; (4) Data Synthesis and Analysis, knowing interpretations related to A Socio-Ecological Systems Approach Disaster Resilience for Small Islands and to detect follow-up to performance findings. The conclusion in this discussion refers to three topics related to social resilience, namely related processes that pay particular attention to human resilience in order to improve human capacity to recover from disasters in the shortest amount of time, related to ecological resilience, where ecological resilience is the maximum amount of energy or disturbance that a system can tolerate before experiencing a shift in its stability domain, and related to economic resilience, where it relates International organizations, academics, and policymakers are starting to appreciate the importance of community resilience.

Keywords: Disaster Resilience for Small Islands, Socio-Ecological



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Introduction

Resilience has gained increasing attention over the past few years as a key idea in catastrophe preparedness, emergency response, and crisis recovery (Zhang, 2022). Communities need a networked social support system that combines individual readiness and response with community resilience to withstand and recover from public health emergencies (Norris et al., 2008). Tangible and intangible components of community resilience are present (Cohen et al., 2013). As a result, measuring community resilience requires either monitoring local economic and social capital indicators or gathering locals' perspectives (Sherrieb et al., 2010). How resilient a community is viewed by the general public reflects public trust in the town's ability to withstand disasters and recover from them (Zhang & Shay, 2019).

In the wake of a common calamity, community members can examine the community's weaknesses and strengths, take additional steps to strengthen their adaptive skills, and thereby build a more resilient community (Pfefferbaum & Klomp, 2013). Social capital and psychological coherence, leadership credibility, community efficacy overall, place connection, and social trust within the community are the five main variables that can be used to evaluate perceived community resilience (Cohen et al., 2013; Leykin et al., 2013).

Analyzing catastrophic resilience from a socio-ecological point of view could be helpful in determining how naturally resilient a small island is to such disruptions. The robustness of a socio-ecological system was investigated using the Taihu Lake watershed in China, where the lake was viewed as a system (Li et al., 2014). Resilience is an important term to understand when assessing socio-ecological systems, especially when considering robustness, vulnerability, and sustainability (Li et al., 2014). As a result, the area of research into resilience has been rapidly growing (Carpenter et al., 2001).

Small, isolated islands are prone to hazards, which is one of their most distinctive characteristics (Lewis, 2009 ; Pelling and Uitto, 2001 ; Rampengan et al., 2014). Due to their size and isolation, these islands are more susceptible to a wider variety of threats, both internal and external (Rampengan et al., 2014). The consequences of disasters on small island developing states have been the subject of numerous studies, which have shown that small islands are more vulnerable than other regions (Briguglio, 1995; Nurse et al., 2015; Pelling and Uitto, 2001 ; Rampengan et al., 2014).

The island of Bawean, which is one of Indonesia's islands, is situated in the region of East Java Province's Gresik Regency. The Indonesian Archipelago's heartbeat, Bawean, is a tiny island that sits directly on the equator in the midst of the archipelago. Bawean Island appears to be a virgin girl always driven to better herself in order to overcome her sluggishness in the middle of the pace of progress brought about by the growth of regional autonomy. The potential of natural resources has therefore started to be rampantly activated. For instance, in agriculture, 6,043 ha of rice fields with an average yield of 3.5 tons per hectare are planted with rice. Cassava, sweet potatoes, soybean corn, peanuts, and other palawijaya are also available. Palm sugar, vegetables, bananas, durian, breadfruit, and red fruit are more produce items.

Cob fish, grouper, kite fish, and benggol fish, which can be converted into pindang fish, are among the fish that are used as game in the fishing industry. Products made from pindang fish on the island of Bawean once enjoyed strong competition. So that this pindang fish product can enter the markets of important Javan cities like Surabaya, Jakarta, Bandung, and even enter Singapore's export market through the Tanjung Pinang port. Bawean pindang fish is made in the traditional manner, however there is no question about the quality. Fish from Bawean can live for up to two months. The fame that this Bawean pindang once enjoyed is now simply a depressing tale. Since the 1980s, Bawean Island's fish farming industry has struggled, and as a result, some business owners have shut their doors from ongoing losses.

Seaweed is a marine crop that is currently the subject of intense development in Jatidawang Bay. What is wanted as a raw material for cosmetics for export to Japan. Additionally, some Bawean Island residents engage in livestock activities for economic support. especially as Bawean Island is a rather ideal location for cattle raising. The coconut plantation industry is also being developed by the Bawean community. There are undoubtedly coconut trees in practically every resident's yard. Additionally, people in some areas weave pandanus, which is used to make mats, wall hangings, school bags, and other items. Malaysia and Singapore are the target markets for these products. Another intriguing development is that the residents of Bawean Island have started to engage in marble mining to boost their income, particularly in Sangkapura District. It's unfortunate that mining still use outdated technology. His work continues to involve the use of labor from places outside than the island.

The purpose of this study is where for island peoples, islands do not only mean territorial locus, but cultural locus and personal locus, because it has a self-concept and meaning as a space of existence. Every island community always identifies and conceives itself in a socio-ecological.

Literature Review

Studies on resilience have been influenced by research on vulnerability. Others contend that these two ideas are not wholly diametrically opposed. Many scientific fields have ties between vulnerability and resilience (Klein et al., 2003; Manyena, 2006), and both have become important in the realm of disaster work (Gaillard, 2010 ; Klein et al., 2003 ; Manyena, 2006 ; Usamah et al., 2014) The opposite, the flip side, or the antonym of resilience are terms that have been used to describe vulnerability (Folke et al., 2002; Gallopn, 2006; Usamah et al., 2014). According to Manyena (2006), the link between vulnerability and resilience will actually depend on how the two concepts are defined. When a system is resilient, it is

presumed that it must be less vulnerable than a non-resilient system, however this is not always symmetrical (Gallopín, 2006). The Vulnerable: Can They Be Resilient? Usamah et al. (2014) conducted extensive study on the informal settlements in the Philippines in response to this question (Usamah et al., 2014). They investigated if vulnerability and resilience could coexist and whether weaker individuals could become stronger. The main finding of the study was that communities continued to have faith in their capacity to endure challenges brought on by erratic land tenure, inadequate housing, financial limits, and geographic vulnerability (Usamah et al., 2014).

Researchers that study complex adaptive systems refer to social resilience as the capacity of individuals, groups, and institutions to adapt and learn in a way that maintains system function in the face of change or in response to a disturbance (Maclean et al., 2013). When a system passes through more than one domain of stability, this resilience with many domains includes a behavior that is dynamic and more general, allowing for alternate stable states for a system. Ecological resilience is the maximum amount of energy or disturbance that a system can tolerate before experiencing a shift in its stability domain (Matsinos, 2008).

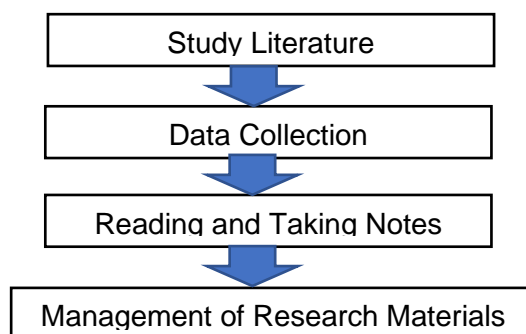
Then, economic resilience argues that failure-reducing mitigation measures could be employed to achieve this goal by limiting financial losses brought on by disasters (Rose, 2007). Static economic resilience has a significant potential to directly and inexpensively reduce disaster loss, but this aspect of resilience has frequently been overlooked in favor of the dynamic definition, which examines how quickly the economy can recover, and has also predominated engineering-based studies on the subject. Consequently, the idea of dynamic resilience is more difficult to understand and more expensive from an economic perspective (Rose, 2007).

The development of a resilient community necessitates both institutional and individual efforts, even though previous research primarily approached community resilience at a systematic level, focusing on the adaptive capacities of a community and how networked social, economic, and physical resources can help build up these capacities (Pfefferbaum, Pfefferbaum, & Van Horn, 2015; Walker et al., 2006). Community resilience is the ability of a community to endure and recover from a common catastrophe by integrating individual response and readiness with a networked social support structure (Norris et al., 2008). Resilience can appear as a crucial factor in how people decide to use resources and information, offer support, care for the welfare of others, and the extent to which they share knowledge as a way to help others in a time of crisis.

Building community resilience requires an understanding of how members of the community view their ability to respond to crises together (Spialek & Houston, 2019). Community members can recognize problems, take additional steps to increase their adaptive capacities, and so create a more resilient community as they assess the community's weaknesses and strengths in the wake of a common catastrophe (Pfefferbaum & Klomp, 2013). Five key factors can be used to assess perceived community resilience: social capital and psychological coherence, leadership credibility, community efficacy as a whole, place attachment, and social trust within the community (Cohen et al., 2013; Leykin et al., 2013).

Method

In the study entitled A Socio Ecological Systems Approach Disaster Resilience for Small Islands, this research will use the literature study method. The literature study method according to (Kartiniingsih, 2015) is a method that consists of a series of activities related to data collection, reading and recording to managing research materials.



Source: Kartiningsih, 2015

Figure 1. Stage Study Literature

Kartiningsih also stated that the literature study method is carried out by all researchers with the same goal, namely looking for a basis or foundation for obtaining and building a mindset, frame of mind to hypotheses or temporary conjectures of research. The research will be carried out by collecting data from official sources and papers related to the purpose of the research carried out.

This research method includes: 1) Research Question is a stage where the author explains the core problems that will be studied in this paper. This stage is carried out by conducting a deeper literature study of A Socio Ecological Systems Approach Disaster Resilience for Small Islands. 2) Quality Assessment, is a stage carried out by researchers to identify potential literature related to the title presented. This stage is carried out using related literature that is considered to have the potential to support data to literature that is not in line with existing data such as community resilience, social, environmental, and others. 3) Data Extraction, is a stage carried out to select the literature used and examine more deeply related to the observed object. This stage is carried out by selecting the literature that corresponds to the results of the observation, then select the appropriate literature. 4) Data Synthesis and Analysis, knowing interpretations related to A Socio Ecological Systems Approach Disaster Resilience for Small Islands and to detect follow-up to performance findings.

Then the purpose of this research in the last stage is to conduct a study of the data that has been obtained from the literature by comparing the statements written by the researcher with the results we find. This stage will determine whether the data obtained is comparable or not to the literature used, while the literature used can not be comparable to the existing data.

Result and Discussion

Community resilience in the face of global catastrophes shows potential for enabling individuals and their communities to overcome obstacles and devise radical mitigation measures (Robertson et al., 2021). Our study focused on tiny islands' disaster resilience using a socio-ecological systems approach.

a) Social Resilience

In order to improve people's capacity to recover from disasters as quickly as possible, a related approach gives special consideration to human resilience. This strategy acknowledges the fact that communities have shown some resilience throughout time. Local adaptation tactics, community culture, tradition, knowledge, and experience are the cornerstones for constructing resilience (Manyena, 2006). One of the East Javan islands, Bawean Island is situated in the Gresik regency's north. This island, which is a part of Gresik regency and contains two subdistricts, is crucial to preserving the independence of the Republic of Indonesia. The population of the two islands continue to suffer a number of difficulties, both internally in light of their relative distance from the seat of administration

and outside. This implies that the social resilience of this archipelago is susceptible to a range of changes in the environment, security politics, economy, and sociocultural norms.

The Bawean people have a reputation for being nomadic or migrating to other islands and other parts of the world. Java, West Kalimantan, Bangka and Belitung, and Batam are the archipelagic regions that the Bawean people migrate to. In the meantime, Australia, Singapore, Malaysia, Brunei Darussalam, Vietnam, and the Bawean people migrate to these nations. For the most part, Baweans migrate to Malaysia and Singapore. These two nations have almost 70% of the Bawean population. Typically, people come back to Bawean during the summer or during the month of Ramadan. It makes sense that transportation to Bawean is often congested and full during Ramadan since not only students and those studying in Java but also Bawean migrants who have lived in Malaysia and Singapore also return to Bawean.

Likewise, the social people of Bawean Island have a high social spirit and are good among others. This is in accordance with the interview of the Government Section as follows:

"The social conditions are always helpful, usually if you lower the boat, you can gotong royong so yes the sense of humanity is high"

The statement above explains that the social conditions of the people of Bawean Island uphold kinship between each other. The same opinion was also expressed by the Village Apparatus as follows:

Alhamdulillah, "the community here is still classified as harmonious and compact and the family is still quite close. The daily social conditions of the people of Bawean island can be said to be quite harmonious, social, and enthusiastic in helping each other both in terms of difficulties and things that are happy, such as examples of organizing events and others."

From the aforementioned interview, it can be seen that the Bawean community has a strong sense of community, supports one another, and exhibits a high level of empathy and collaboration. This group is also highly energetic and upholds a strong sense of family. The soul manifests on its own, unaided by anyone.

b) Ecological Resilience

When a system crosses more than one domain of stability, this resilience with many domains contains a behavior that is dynamic and more general, enabling it to reach alternate stable states. Ecological resilience is the highest amount of energy or disturbance that a system can withstand before changing its stability domain (Matsinos, 2008). It considers a number of stable states in addition to the system's overall resilience to shocks that may cause domain-shifting movements. Ecology places more importance on several stable states than on a single global equilibrium. Multiple stable states are also more common in natural systems (Matsinos, 2008).

The people of Bawean island where the people have a hard work spirit in fulfilling daily life.

"The natural resources are plenty, the supporters are there, and the work ethic is still high. However, the facilities and human resources are weak, therefore it is required to increase the village's and other connected organizations' assistance. The budget is taken from the APBDes earlier from the village fund from what funds need to be in the future in that manner is evident from the relevant agencies, for example,

from the sub-district and from the fisheries service, if from the village the village invites people who are competent."

The aforementioned assertion can be taken to mean that the Bawean Island population still values hard labor and that their natural resources are plentiful. The coastal community of Dekatagung Village's problem, however, is that it still lacks adequate human resources and needs direction from both the village and the sub-district or other relevant organizations.

"Thank God, the people here are also hardworking; they may only be quite mediocre, for example, but they are still willing to try hard work and to work side by side with each other for their livelihoods."

It may be inferred from this that the residents of Bawean Island have a spirit of hard work even though the fruits of their labor are only used meticulously to fulfill their requirements. Despite this, they continue to strive for hard work and are prepared to collaborate in order to do so.

c) Economic Resilience

Economic resilience advocates developing mitigation measures that lessen the likelihood of failure in order to decrease financial losses brought on by disasters (Rose, 2007). Researchers in this subject usually point out the difficulties encountered when collecting resilience data to include in models (Cutter et al., 2008). Economic resilience is actually the optimization of the resources that are available at any given time, as opposed to repair and rebuilding, which tends to be dynamic and affect the timing and direction of the economy (Rose, 2007).

Community on Bawean Island where residents work hard to fulfill their daily needs. According to the Secretary of the Sangkapura Sub-interviews, District's this is accurate:

"Yes, there are supporters here. The spirit is strong, the natural resources are plenty, and the passion for work is still high. However, there are also facilities and human resource weaknesses, so more supervision from the village and related organizations is required. The budget is taken from the APBDes earlier from the village fund from what finances need to be in the future in this manner, according to the relevant agencies, for instance from the sub-district and the fisheries service, if the village invites competent individuals".

The abundance of natural resources and the continued high level of excitement for the work at hand provide support; the only weaknesses are the need for additional human resources and components from the community as well as from appropriate organizations. It is evident from the necessary agencies, for instance, from the sub-district and the fisheries office, if from that village invites the qualified individuals. The APBDes use village funds from whichever sources are necessary to create the budget.

From the aforementioned statement, it may be inferred that the Bawean Island still has a high level of enthusiasm for employment and vast natural resources. However, the coastal community of Dekatagung village has several drawbacks, specifically that its human resources are still insufficient and that it needs guidance from both the village and the district or other relevant organizations.

According to the results of the aforementioned interview, the coastal communities in Dekatagung village have a high level of excitement for carrying out their everyday lives. Fishermen, farmers, laborers, and other locals in Dekatagung do the majority of the community's job. In the same way that fisherman typically depart early in the morning and

return in the afternoon before returning, so is the same with the farming community. In fact, the condition of the people on the coast does not make them lethargic and even quite energetic and enthusiastic in working every day.

Conclusion

International organizations, academics, and policymakers are starting to appreciate the importance of community resilience. The World Health Organization has urged its member governments to foster welcoming communities as a key priority for public health (WHO Regional Office for Europe, 2013). According to the U.S. Department of Health and Human Services, one of the National Health Security Strategy's two key objectives is to build community resilience (Morton & Lurie, 2013). The findings of this debate pertain to three connected topics of social resilience, namely related to In a related process, human resilience is given particular focus in order to enhance human capacity to recover from disasters in the shortest amount of time, followed by ecological resilience, which is defined as the maximum amount of energy or disturbance that a system can tolerate before experiencing a shift in its stability domain, and economic resilience, where it relates to the ability of a system to withstand shocks to its stability. Economic resilience advocates developing mitigation measures that lessen the likelihood of failure in order to decrease financial losses brought on by disasters.

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