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Tsunami Disaster Mitigation Based on Eco-Action and Community Participation in Katapiang Village, Pariaman

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ABSTRACT

Katapiang Village faces a high risk of tsunami disaster, given its location on the Indo-Australian and Eurasian plate subduction zones. The majority of Katapiang Village residents depend on the fisheries and agriculture sectors, which makes them vulnerable to the impacts of tsunamis, especially if infrastructure and livelihoods are damaged. Although the government has attempted physical mitigation such as evacuation routes, public and official awareness of the importance of environmental conservation as part of disaster mitigation is still low. One solution offered is an ecosystem-based approach, such as planting mangroves that can function as natural protection against tsunamis. This study aims to examine tsunami disaster mitigation efforts in Katapiang Village, Padang Pariaman Regency, through an eco-action approach and community participation. This study uses a literature study method, with data sources in the form of journals, activity reports, news articles, and documents from local organizations such as JEMARI Sakato and publications from the Regional Disaster Management Agency (BPBD). Eco-action-based mitigation through planting and maintaining mangrove forests is considered potential to strengthen coastal protection against tsunamis, while increasing environmental awareness and economic empowerment of residents. The combination of ecological and participatory approaches is considered relevant and necessary as a locally based adaptive strategy in building the resilience of Nagari Katapiang to disasters.
Keywords: Disaster Mitigation, Tsunami, Eco-Action, Community Participation, Nagari Katapiang

ABSTRAK

Nagari Katapiang menghadapi risiko tinggi terhadap bencana tsunami, mengingat lokasinya yang berada di jalur subduksi lempeng Indo-Australia dan Eurasia. Mayoritas penduduk Nagari Katapiang bergantung pada sektor perikanan dan pertanian, yang membuat mereka rentan terhadap dampak tsunami, terutama bila infrastruktur dan mata pencaharian rusak. Meskipun pemerintah telah mengupayakan mitigasi fisik seperti jalur evakuasi, kesadaran masyarakat dan aparat mengenai pentingnya pelestarian lingkungan sebagai bagian dari mitigasi bencana masih rendah. Salah satu solusi yang ditawarkan adalah pendekatan berbasis ekosistem, seperti penanaman mangrove yang dapat berfungsi sebagai pelindung alami terhadap tsunami. Penelitian ini bertujuan untuk mengkaji upaya mitigasi bencana tsunami di Nagari Katapiang, Kabupaten Padang Pariaman, melalui pendekatan eco-action dan partisipasi masyarakat. Penelitian ini menggunakan metode studi literatur, dengan sumber data berupa jurnal, laporan kegiatan, artikel berita, serta dokumen organisasi lokal seperti JEMARI Sakato dan publikasi dari Badan Penanggulangan Bencana Daerah (BPBD). Mitigasi berbasis eco-action melalui penanaman dan perawatan hutan mangrove dinilai potensial untuk memperkuat perlindungan pesisir terhadap tsunami, sekaligus meningkatkan kesadaran lingkungan dan pemberdayaan ekonomi warga. Kombinasi antara pendekatan ekologis dan partisipatif ini dinilai relevan dan diperlukan sebagai strategi adaptif berbasis lokal dalam membangun ketangguhan Nagari Katapiang

terhadap bencana.
Kata Kunci: Mitigasi Bencana, Tsunami, Eco-Action, Partisipasi Masyarakat, Nagari Katapiang

1. Introduction

Katapiang Village is located on the coast of Pariaman City, West Sumatra, and is one of the areas at high risk of tsunami disasters[1]. Based on data from the Meteorology, Climatology, and Geophysics Agency (BMKG), the coast of West Sumatra, including Pariaman City, is located on the subduction path of the Indo-Australian and Eurasian plates which have the potential to trigger major earthquakes with a magnitude above 8.0 SR[2]. In the last 100 years, this area has experienced several tsunami events. In 2010, a major tsunami event caused by an earthquake in Mentawai killed more than 400 people and left thousands homeless[3]. If examined further, most of the residents of Katapiang Village depend on the fisheries, agriculture, and trade sectors for their livelihoods. According to data from the Central Statistics Agency (BPS) of Pariaman City in 2023, around 60% of the population works in the agriculture and fisheries sectors, while the rest are engaged in the trade, services, and small industry sectors[4]. Communities' dependence on coastal resources makes them increasingly vulnerable to the impacts of tsunamis, especially if there is post-disaster damage to infrastructure and livelihoods.

To address this, the government has made several mitigation efforts, such as building evacuation routes and installing early warning systems[5]. However, public awareness of disaster mitigation is still relatively low. A survey conducted by BNPB in 2022 showed that only 35% of people in the coastal area of Pariaman knew the tsunami evacuation route and self-rescue procedures during an earthquake. In addition, less than 40% of households have a family evacuation plan, indicating the need to improve education and training in disaster preparedness[6]. One approach that can be applied to increase community resilience is the Eco-Action concept, which is an approach based on environmental conservation as part of disaster mitigation. Based on a study conducted by Andalas University (UNAND), coastal vegetation such as mangroves and sea pines can reduce the height of tsunami waves by 30-50% before reaching land. However, data from the Pariaman City Environmental Service in 2023 showed that the area of mangrove forests in the coastal area of Pariaman had decreased by 25% in the last decade, so efforts are needed to rehabilitate coastal ecosystems to increase natural protection from tsunamis.

Therefore, through a participatory approach, active community involvement in disaster mitigation is a key factor in the success of this program[7]. Universities such as the University of North Sumatra (USU) and Andalas University (UNAND) can contribute by conducting research and assisting communities in implementing environmental-based mitigation strategies. By combining the concept of Eco-Action and community participation, this program aims to increase awareness, preparedness, and resilience of the Katapiang Nagari community in facing potential tsunami disasters in the future.

The main partner problem is Katapiang Village, which is located on the coast of Pariaman City, has a high risk of tsunami disasters. However, amidst this threat, the awareness of the community and village government officials about the importance of environmental conservation as part of disaster mitigation is still

[1] Arsyad N, et al. Sosialisasi peningkatan kapasitas kesiapsiagaan bencana gempa dan tsunami. Community Dev J: J Pengabdian Masyarakat. 2023;4(6):12299-12302.

[2] Resti F. Mitigasi bencana melalui program desa tangguh bencana oleh BPBD Kabupaten Padang Pariaman. [PhD Thesis]. Universitas Andalas; 2022.

[3] Prarikeslan W, et al. Simulasi gelombang tsunami di pesisir pantai Nagari Katapiang berdasarkan skenario gempa di perairan barat Mentawai. J Clim Change Soc. 2024;2

[4] Bulan PS, Mubarak A. The role of the environmental agency in sustainable waste management in shrimp ponds at Padang Pariaman Beach. TOFEDU: The Future of Educ J. 2025;4(2):430-438.

[5] Priantoro AU, et al. Peningkatan pemahaman ancaman bencana di Kabupaten Subang pada Saka SAR Kabupaten Subang melalui edukasi mitigasi bencana. J Relawan Pengabdian Masyarakat REDI. 2024;2(1):1-6.

[6] Gusti HA, Putri RE, Despica R. Analisis daya dukung lingkungan untuk pengembangan wilayah di Kota Pariaman. Indones Res J Educ. 2024;4(3):1336-1342.

[7] Azni S, Suyuthie H. Pengaruh promosi Instagram terhadap keputusan berkunjung wisatawan ke Apar Mangrove Park Kota Pariaman. J Ekonomi, Manaj Pariwisata dan Perhotelan. 2024;3(1):31-38.

relatively low. A well-maintained environment, especially coastal ecosystems such as mangroves and coastal vegetation, has an important role in reducing the impact of tsunamis.

This situation is exacerbated by the low level of public knowledge in understanding how the environment c an be a natural fortress in dealing with disasters. According to data from the Pariaman City Environmental Service in 2023, the area of mangrove forests in coastal areas has decreased by 25% in the last decade, due to land conversion for settlements, agriculture, and other activities. Tree felling along the coastline is often carried out without considering the long-term impacts, including increased risk of abrasion and reduced natural protection against tsunami waves. Unfortunately, understanding the benefits of coastal ecosystems in disaster mitigation is still not a priority among the community[8].

Not only the community, village government officials also still face limitations in understanding and implementing environmental conservation strategies as part of disaster mitigation. Existing mitigation programs focus more on physical development such as evacuation routes and installation of warning signs, but pay less attention to ecosystem-based approaches. The lack of training and assistance regarding the concept of environmental-based mitigation means that the programs being implemented have not touched on the root of the problem, namely the sustainability of coastal ecosystems which are increasingly threatened.

In addition, coordination between the village government and educational institutions and environmental organizations is still not optimal. Universities such as the University of North Sumatra (USU) and Andalas University (UNAND) have the capacity to research and provide assistance to communities related to environmental conservation, but the synergy between academics and village government officials has not been well established. This has resulted in many scientific recommendations on ecosystem-based mitigation not being widely implemented in Katapiang Village.

This condition is further exacerbated by the low level of public education regarding the long-term impacts of environmental degradation. A 2022 BNPB survey showed that less than 40% of people on the coast of Pariaman understand the role of coastal vegetation in reducing disaster risk. Awareness of the importance of planting and caring for trees such as mangroves and sea pines is still very low, while exploitation of natural resources continues without strict regulations.

A more participatory and sustainable approach is needed to improve the understanding of the community and village government officials regarding the importance of environmental conservation. By prioritizing the Eco-Action concept, namely concrete actions in protecting the environment that actively involve the community, it is hoped that collective awareness can be formed (11). This approach must be combined with broader education, ongoing training, and strengthening cooperation with universities and related institutions. Through this effort, it is hoped that Katapiang Village will not only be able to increase tsunami preparedness, but also maintain the balance of the coastal ecosystem as a legacy for future generations. By building an understanding that environmental conservation is part of disaster mitigation, the community and village government can be better prepared to face the threat of a tsunami in a sustainable manner and based on local wisdom.

Based on the background mentioned above, the following problems can be formulated:

1. How is disaster mitigation in Nagari Katapiang Pariaman?
2. How is community participation in Nagari Katapiang in disaster mitigation?
3. Is disaster mitigation based on eco action and community participation needed by the community in Nagari Katapiang?

2. Method

The method used in this study is the literature review method. Literature review is a method that relies on written sources or scientific documentation as the main material in the analysis. This study does not involve experiments or field data collection, but rather processes and analyzes theories, findings, and opinions from various relevant literature. According to Zed, literature study is an activity carried out to obtain theoretical, referential, and methodological information from various relevant literature. Literature study uses secondary data in its research process. The secondary data in question are books, journals, theses, dissertations, previous research reports, and scientific articles[9]. This method does not conduct direct observation or interviews and focuses on comparison, synthesis and analysis of previous theories and findings. In this study, the discussion is how to mitigate the tsunami disaster based on eco-action and

[8] Susanto A, Purwaningrum S, Prabowo AS. Pemetaan lokasi evakuasi bencana alam tsunami dengan virtual reality 360 derajat. Infotekmesin. 2024;15(1):182-186.

[9] Mestika Zed, Metode Penelitian Kepustakaan (Jakarta: Yayasan Pustaka Obor Indonesia, 2008), hlm. 4–5.

community participation in Nagari Katapiang, Pariaman. So the researcher conducted a literature study related to the research theme using sources of books, journals and previous research.

3. Result and Discussion

3.1. Conceptual

A. Disaster Mitigation

Disaster mitigation is a series of efforts carried out systematically to reduce the risk and negative impacts of disasters on humans, the environment, and property. These efforts include preventive measures before a disaster occurs, such as building disaster-resistant infrastructure, proper spatial planning, and drafting regulations that support risk reduction. According to Law No. 24 of 2007, mitigation can be carried out through physical development or increasing community awareness and capacity[10].

Experts such as Carter and Alexander also emphasize the importance of integrating mitigation into the disaster management cycle as a long-term step oriented towards prevention and reducing vulnerability. In addition to the technical approach, disaster mitigation also includes educational and social aspects. Wisner et al. emphasize that mitigation does not only focus on natural hazards themselves, but also on community vulnerability that makes the impact of disasters worse. Therefore, an effective mitigation strategy must involve community empowerment, preparedness training, and increasing access to disaster risk information. Thus, mitigation is not only the responsibility of the government, but also requires active participation from all levels of society to create sustainable resilience to disasters.

Disaster mitigation is divided into two main types, namely structural mitigation and non-structural mitigation. Both complement each other in efforts to reduce disaster risk as a whole.

1) Structural Mitigation

Structural mitigation is physical or technical measures aimed at reducing the direct impact of a disaster through the development of disaster-resistant infrastructure. Examples of structural mitigation include: (1) Construction of embankments or breakwaters in coastal areas to reduce the impact of tsunamis or abrasion. (2) Construction of earthquake-resistant buildings with construction according to safety standards. (3) Creation of evacuation routes and temporary evacuation sites (shelters). (4) Early warning systems, such as tsunami or flood sirens. (5) This mitigation is usually carried out by the government or technical institutions using an engineering approach.

2) Non-Structural Mitigation

Non-structural mitigation involves policies, regulations, and social activities to increase community capacity in dealing with disasters. This type of mitigation emphasizes strengthening knowledge, awareness, and community participation. Examples include: (1) Education and socialization about disasters to the community and schools. (2) Preparation of community-based disaster risk maps (such as HVCA). (3) Planting protective vegetation such as mangroves on the coast (eco-action). (4) Formation of Disaster Preparedness Groups (KSB) and routine evacuation drills. (5) Spatial planning regulations that regulate disaster-prone zones. Non-structural mitigation is cheaper, easier to implement, and highly dependent on community involvement. Therefore, a combination of these two types of mitigation is very important in creating a disaster-resilient community.

B. Eco-Action

Eco-action is a series of real actions carried out consciously by individuals or groups as a form of concern for the environment. This action includes various environmentally friendly activities such as waste management, reforestation, energy conservation, and education about the importance of nature conservation.

According to Lee, eco-action is the active participation of the community, especially the younger generation, in various activities that support environmental sustainability by combining ecological knowledge and sustainable behavior. Eco-action is not only oriented towards physical action, but also towards changing mindsets and attitudes towards environmental issues[11]. UNESCO emphasizes that eco-action is an integral part of education for sustainable development (ESD), which aims to foster awareness, responsibility, and the capacity to act in facing global environmental challenges.

Thus, eco-action plays an important role in forming a culture of environmental care in society, especially through education and direct involvement in ecological activities. In the context of

[10] Undang-Undang Republik Indonesia Nomor 24 Tahun 2007 tentang Penanggulangan Bencana, Pasal 9.

[11] T. H. Lee, "A Structural Model to Examine How Destination Image, Attitude, and Motivation Affect the Future Behavior of Tourists," Leisure Sciences 31, no. 3 (2009): 215–36.

education, the integration of eco-action in schools or higher education institutions can also shape the character of students who are environmentally aware and responsible for the sustainability of the earth.
Eco-action is a term that refers to environmental-based actions or initiatives carried out to maintain, restore, or improve the quality of ecosystems by involving active community participation. In the context of disaster mitigation, eco-action plays an important role as a non-structural approach that not only aims to reduce the impact of disasters, but also creates environmental sustainability. This approach emphasizes the importance of balance between humans and nature, as well as the use of local resources to strengthen resilience to disaster threats.
Eco-action becomes very relevant in disaster-prone areas, such as coastal areas that are threatened by tsunamis, abrasion, and tidal floods. One real example is the planting and preservation of mangrove forests along the coastline. Mangrove vegetation has been proven to be able to absorb the energy of ocean waves, withstand abrasion, and become a natural buffer zone that protects settlements from the direct impact of disasters. In addition, other eco-actions include forest conservation in upstream areas to prevent landslides and floods, the creation of water catchment parks in urban areas to reduce puddles, and environmentally friendly agriculture that reduces the risk of drought and soil degradation.
Examples of eco-action implementation in Indonesia can be found in several areas such as Demak, Central Java, where coastal communities work together with NGOs to plant mangroves as part of a community-based disaster risk reduction program.

C. Community Participation

Community participation is the active involvement of individuals or groups in the decision-making process, planning, implementation, and evaluation of an activity related to the public or community interest. This participation reflects a sense of ownership of the program or policy being implemented, and shows a partnership between the community and the government or organization. According to Cohen and Uphoff, community participation includes involvement in decision-making, implementation, utilization of results, and program evaluation[12]. Meanwhile, Mikkelsen stated that community participation is not just physical involvement, but also includes the process of dialogue, exchange of ideas, and empowerment[13]. With participation, the community is not only an object of development, but also becomes a subject that is empowered and responsible for the success of social, economic, and environmental programs.
Community participation is a key element in sustainable disaster mitigation, especially in coastal areas that have high levels of vulnerability to disasters such as tsunamis, abrasion, tidal flooding, and tropical storms. According to Cohen and Uphoff (1980), community participation includes citizen involvement in planning, implementing, utilizing results, and evaluating a program or policy. In the context of disasters, this participation includes active community involvement in the process of identifying risks, formulating mitigation plans, implementing risk reduction activities, and post-disaster recovery efforts.
In coastal areas, community participation is very important because they are the first parties affected and also the main actors in disaster risk reduction. Concrete examples of community participation in coastal disaster mitigation include the formation of Disaster Preparedness Groups (KSB), involvement in tsunami evacuation simulations, planting protective vegetation such as mangroves, and compiling community-based disaster-prone maps. In addition, the community can also play a role in education and dissemination of disaster information through local media, village forums, and traditional activities.
The importance of community participation is also emphasized in the Disaster Resilient Village/Sub-district (DESTANA) approach developed by BNPB, where the basic principle of resilience is local involvement and ownership of mitigation efforts. This participation not only strengthens community capacity in dealing with disasters, but also creates a sense of collective responsibility and community independence in maintaining the safety of their area.
Community participation in disaster mitigation has become one of the main approaches in disaster management policies in Indonesia. As a country prone to various types of natural disasters such as earthquakes, tsunamis, volcanic eruptions, and floods, Indonesia encourages active community

[12] John M. Cohen dan Norman T. Uphoff, Rural Development Participation: Concepts and Measures for Project Design, Implementation, and Evaluation (Ithaca, NY: Cornell University Rural Development Committee, 1977), menurut kutipan dalam European Journal of Social Sciences 11, no. 1 (2009)

[13] Bernt Mikkelsen, Methods for Development Work and Research: A New Guide for Practitioners (London: Sage, 2003), hlm. 54

involvement in reducing disaster risks through community-based programs. One real example can be found in a case study in Timbulsloko Village, Demak Regency, Central Java, which experienced serious impacts due to abrasion and tidal flooding.

The Timbulsloko community, in collaboration with non-governmental organizations and the local government, formed a community group that actively planted and maintained mangrove vegetation as coastal protection. In addition to physical activities, residents are also involved in mapping vulnerable areas, evacuation training, and drafting local regulations (perdes) to protect coastal ecosystems. This effort is a real example of the implementation of eco-action-based mitigation, where environmental recovery is carried out in line with community empowerment.

Another case study comes from Sirenja Village, Donggala Regency, Central Sulawesi, which was affected by the 2018 earthquake and tsunami. After the disaster, villagers formed a Disaster Preparedness Group (KSB) that developed a local early warning system, created evacuation routes based on participatory maps, and conducted regular evacuation simulations. In the process, community leaders, youth groups, and women took an active role in planning and implementing mitigation. These two case studies show that community participation not only contributes to the effectiveness of disaster mitigation, but also strengthens social cohesion and resilience of local communities. A participatory approach provides space for communities to become subjects, not just objects, in efforts to protect against disaster risks.

D. Legal Basis for Disaster Mitigation (Tsunami) in Padang City

The supreme legal basis governing disaster management in Indonesia is Law Number 24 of 2007 concerning Disaster Management. This law affirms that the central and regional governments have responsibility for implementing disaster management, from the pre-disaster phase (mitigation and preparedness), through emergency response, and post-disaster. In the context of tsunami mitigation, this law mandates the importance of preventive efforts such as disaster risk mapping, public education, and the development of an effective early warning system.

As a derivative of this law, Government Regulation (PP) Number 21 of 2008 concerning Disaster Management was issued. This PP clarifies the roles and responsibilities of each party within the disaster management system[14]. One key point is the obligation of regions to establish Regional Disaster Management Agencies (BPBD) and develop contingency plans and disaster risk maps. Furthermore, the central government also established the National Disaster Management Agency (BNPB) through Presidential Regulation Number 8 of 2008, which acts as the national coordinator[15].

At the regional level, Padang City has several regulations that serve as the operational basis for disaster mitigation. One of the main ones is Padang City Regional Regulation (Perda) Number 3 of 2008 concerning Disaster Management, which served as the basis for the establishment of the Padang City Regional Disaster Management Agency (BPBD)[16]. This regulation emphasizes the importance of integrating disaster management into regional development plans and community involvement in mitigation. Furthermore, Regional Regulation Number 4 of 2012 concerning the Padang City Spatial Plan (RTRW) for 2010–2030 also incorporates tsunami mitigation considerations into city spatial planning. Certain articles stipulate tsunami-prone zones and development restrictions in coastal areas[17].

To support technical implementation on the ground, the Padang City Government has also issued several Mayoral Regulations (Perwal), such as Perwal No. 14 of 2010 concerning the tsunami early warning system and Perwal No. 25 of 2011 concerning standard procedures for disaster management. These Perwals regulate evacuation procedures, emergency communication systems, and the determination of safe routes. With this legal framework, Padang City has a strong enough basis for implementing tsunami disaster mitigation.

3.2. Disaster Mitigation that has been carried out in Katapiang Village

[14] Pemerintah Republik Indonesia, Peraturan Pemerintah Nomor 21 Tahun 2008 tentang Penyelenggaraan Penanggulangan Bencana, Pasal 5 dan Pasal 27, ditetapkan 28 Februari 2008

15 residen Republik Indonesia, Peraturan Presiden Nomor 8 Tahun 2008 tentang Pembentukan Badan Nasional Penanggulangan Bencana (BNPB), 26 Januari 2008.

16 Publikasi dalam Jurnal Ilmu Administrasi Vol. 9 No. 2.Desember 2020.

[17] Eka Putra Buhari dan Samodra Wibawa, *Proses perumusan peraturan daerah tentang penanggulangan bencana di Kota Padang* (tesis S2, Universitas Gadjah Mada, 2010).

Katapiang Village is one of the areas in Batang Anai District, Padang Pariaman Regency, which has a fairly high level of disaster vulnerability, especially to earthquakes and tsunamis. Given its location on the west coast of Sumatra, disaster mitigation strategies are an important aspect in village development. Based on observations and field data, disaster mitigation in Katapiang Village has been carried out systematically through a community-based participatory approach.

One of the concrete steps taken is the formation of a Disaster Preparedness Group (KSB) at the village level, which plays an active role in education, socialization, and disaster management training. KSB collaborates with various parties, such as BPBD, non-governmental organizations (such as JEMARI Sakato), and Pertamina CSR in organizing Hazard, Vulnerability, and Capacity Assessment (HVCA) simulations. This activity aims to identify potential risks, analyze vulnerabilities, and map local community capacities.

In addition, the implementation of the Disaster Resilient Village (DESTANA) program is a form of strengthening village institutions in dealing with disasters. This program actively involves the community in preparing emergency response plans, mapping vulnerable zones, and providing evacuation routes. In the education sector, schools in Nagari Katapiang have also formed School Disaster Preparedness Groups (KSBS) and implemented the Disaster Safe Education Unit (SPAB) approach. From all the mitigation activities that have been carried out, it is clear that Nagari Katapiang has shown a strong commitment to building a disaster-aware culture. This community participation-based strategy not only strengthens preparedness, but also increases local capacity to deal with and minimize the impact of disasters in a sustainable manner.

Mitigation efforts in Nagari Katapiang still face a number of obstacles. Some of the shortcomings found in the field include the lack of maintenance of evacuation facilities, budget constraints, and the unequal understanding of disaster procedures among the community, especially among children and vulnerable groups. In addition, community involvement in planting protective vegetation such as mangroves is still limited, even though an eco-action-based approach has the potential to be a cheap and sustainable solution.

Disaster mitigation in Nagari Katapiang is a shared responsibility involving various actors, both from government and community elements. Institutionally, the Pariaman City Government through the Regional Disaster Management Agency (BPBD) has a primary role in planning, coordinating, and implementing disaster mitigation programs throughout the administrative area, including Nagari Katapiang. BPBD is tasked with providing evacuation facilities, tsunami evacuation routes, and providing disaster training and simulations to residents.

At the local level, the Nagari Katapiang Government is an important actor in the implementation of community-based disaster policies. Through the Village Head and Village Institutions, such as the Village Consultative Body (BPN) and the Disaster Preparedness Group (KSB), disaster mitigation is carried out in a participatory manner. KSB functions as a driver of preparedness and a liaison between the community and technical institutions.

In addition to the government, several non-governmental organizations (NGOs) also contribute to supporting mitigation programs, such as JEMARI Sakato which is active in training activities, creating risk maps, and assisting communities in environmental-based programs.

No less important, the Katapiang Village community itself has a central role, especially in implementing participatory-based mitigation, such as participating in evacuation simulations, planting and caring for protective vegetation (such as mangroves), and disseminating disaster information. Community involvement is very important in determining the success of mitigation, because they are the first to be affected and must be able to respond quickly when a disaster occurs.

3.3. Community participation in Kapatiang Village in Disaster Mitigation

The participation of the Katapiang Village community in disaster mitigation efforts shows active involvement that is collective and continuous. In this context, the community does not only play a role as a beneficiary, but also becomes the main actor in every stage of disaster risk reduction. This is reflected in the involvement of residents in risk mapping activities, evacuation simulations, and decision-making in village forums.

One real form of this participation is the formation of the Disaster Preparedness Group (KSB) at the village level, where group members come from various elements of society such as traditional leaders, youth, women, and local business actors. KSB works directly in the process of preparing emergency response plan documents, implementing mitigation training, and disseminating information on disaster preparedness. This activity is facilitated by the local organization JEMARI Sakato in collaboration with CSR Pertamina AFT and BPBD Padang Pariaman (Jemari Sakato, 2024).

In addition, the community is also involved in the HVCA (Hazard, Vulnerability, and Capacity Assessment) simulation using Participatory Rural Appraisal (PRA) methods such as the Seasonal Calendar and Venn Diagram. Through this method, residents directly identify potential threats and vulnerabilities in their environment, and formulate mitigation strategies based on local resources. This approach not only increases risk awareness but also strengthens the community's social capacity to manage disasters independently and sustainably. Overall, community participation in Nagari Katapiang has become a key element in creating an inclusive, adaptive, and locally-based disaster mitigation system. Cross-sector collaboration involving the government, NGOs, and civil society has formed a disaster awareness culture that is rooted in the daily lives of the village residents.

Community participation is a key element in an effective disaster mitigation system. If community participation is not realized, then mitigation efforts will lose their main strength, namely the direct involvement of the most affected parties. Without community involvement, mitigation activities will be top-down and less relevant to local conditions, because the community is not involved in the process of risk identification, strategic planning, or solution implementation.

The absence of community participation can lead to low levels of community awareness and preparedness. This has the potential to increase the impact of a disaster, because residents do not know the evacuation routes, do not understand the early warning system, and do not have the skills to save themselves or help others when a disaster occurs. In addition, mitigation facilities such as shelters, evacuation signs, or protective vegetation (such as mangroves) will not be well maintained because there is no sense of ownership from the community. As a result, mitigation infrastructure becomes ineffective and prone to damage.

Furthermore, the absence of participation can also lead to community dependence on government or external assistance after a disaster. This is contrary to the principles of community empowerment and independence which are at the heart of sustainable disaster risk reduction. Therefore, without community participation, the main objectives of disaster mitigation—namely minimizing risk and building local resilience—will not be optimally achieved.

The success of a disaster mitigation program is highly dependent on the extent to which the community is actively involved in each stage. To maximize community participation in Nagari Katapiang, well-coordinated multi-party cooperation is needed. The parties that play an important role in this regard include:

1. Local Government and BPBD of Pariaman City
   The local government, especially the Regional Disaster Management Agency (BPBD), plays a central role in formulating policies, procuring mitigation facilities, and organizing disaster education. BPBD can also encourage the formation of a more active and inclusive Disaster Preparedness Group (KSB) in Nagari Katapiang. The approach taken must be participatory and oriented towards empowering residents.
2. Nagari Government and Local Figures
   The Village Head, village apparatus, traditional leaders, and religious leaders play an important role in raising public awareness. They have social and cultural closeness to residents, so they are able to facilitate disaster dialogue and build a sense of collective responsibility for mitigation efforts.
3. Non-Governmental Organizations (NGOs)
   Organizations such as JEMARI Sakato and other environmental NGOs can provide technical assistance, training, and assistance in the preparation of participatory risk maps and eco-action-based mitigation programs, such as mangrove planting. NGOs are also able to bridge communities with external resources, including donors.
4. Educational Institutions and Academics
   Local universities, teachers, and students can contribute to disaster education, strengthening community capacity, and research relevant to mitigation needs at the village level. Collaboration between educational institutions and the community can produce contextual innovations and strategies.
5. Youth and Women Groups
   Youth and women are groups that have great potential as agents of change in society. Through involvement in training, environmental programs, and risk communication, they can become drivers of inclusive and sustainable mitigation activities.
6. Local and Digital Media
   Local media, including community radio, village social media groups, and digital pamphlets, can be utilized to disseminate disaster information quickly and effectively. This expands the reach of education to all levels of society.

With the support of various parties, the participation of the Katapiang community in disaster mitigation can not only be increased, but can also become part of the local culture that is inherent in everyday life.

3.4. Eco-Action Based Disaster Mitigation and Community Participation in Katapiang Village

Katapiang Village as a coastal area in Padang Pariaman Regency has a high level of vulnerability to hydrometeorological disasters, such as coastal abrasion, tidal flooding, and tsunamis. In this context, environmental-based mitigation or eco-action is a strategic alternative that is sustainable and based on local carrying capacity. One form of eco-action that is very relevant to be implemented in Katapiang is planting and maintaining mangrove forests, which function as a natural fortress against sea waves and as a carbon absorber that can improve the quality of the coastal environment.

Mangroves not only function ecologically, but also open up space for active community involvement in coastal area management. Community participation can be maximized through mutual cooperation activities for planting, maintaining seedlings, conservation education in schools, to developing an economy based on ecotourism and processed mangrove products. Thus, this approach not only reduces the risk of disaster but also encourages the economic independence of residents through sustainable utilization.

The implementation of eco-action in Katapiang Village will be very much in line with the participatory approach that has been developed through the DESTANA program and the Disaster Preparedness Group (KSB). Community involvement in HVCA simulations, PRA activities, and village forums prove that Katapiang residents have strong potential in carrying out community and environmental-based mitigation actions. Therefore, eco-action-based mitigation through mangrove planting integrated with community empowerment can be a strategic and contextual choice to strengthen the resilience of Katapiang Village to disaster threats.

In Nagari Katapiang itself, the eco-action approach has great potential to be implemented considering that this area is a coastal area that has the potential for mangrove ecosystems and a high level of community participation in disaster programs. Thus, eco-action is not only an environmental conservation strategy, but also a real form of sustainable and participatory disaster mitigation.

In order for the eco-action program as part of the disaster mitigation strategy in Nagari Katapiang to be successful and sustainable, planned steps are needed, involving various parties, and deeply rooted in community participation. Eco-action—which includes environmental-based activities such as mangrove planting, sustainable coastal management, and ecosystem rehabilitation—must be supported by a collaborative approach and based on local values.

First, increasing community environmental education and awareness is an important foundation. Socialization about the importance of mangroves as natural protection from tsunamis and abrasion needs to be carried out routinely, using media that is easily understood by all levels of society, including children and the elderly. Activities such as training, field schools, and environmental-based disaster simulations can be effective means of instilling awareness.

Second, strengthening the capacity of local community groups, such as the Disaster Preparedness Group (KSB), farmer groups, and youth organizations, needs to be facilitated through technical training in mangrove planting and maintenance, nature-based mitigation techniques (eco-DRR), and community-based program management. These groups can also be involved as implementers and monitors of eco-action activities.

Third, there needs to be local policy support such as village regulations that encourage environmental conservation and citizen involvement in mitigation activities. The village government can provide incentives or awards for residents or groups who are active in protecting coastal areas.

Fourth, multi-party partnerships are needed, including cooperation between the village, BPBD Kota Pariaman, non-governmental organizations such as JEMARI Sakato, and universities. This collaboration can strengthen the technical, funding, and sustainability aspects of the program.

Fifth, regular monitoring and evaluation must be carried out to assess the effectiveness of the program, detect field obstacles, and make improvements to the strategy. Involving residents in the evaluation process will also increase their sense of ownership of the program.

By consistently implementing the steps above, eco-action can be a disaster mitigation strategy that not only protects the environment, but also empowers the Katapiang community socially and economically.

The right for the creator/rights holder to benefit economically from his work. Economic rights have a time limit for protection. The economic rights of a copyright will remain in the hands of the creator or copyright holder as long as the creator or copyright holder has not transferred all economic rights of the creator or copyright holder. Economic rights that have been transferred by the creator or copyright holder, in whole or in part, cannot be transferred a second time from the same creator or copyright holder.

1) Moral Rights
An inseparable right between the creator and his copyrighted work forever. Where it can be interpreted as the personal aspect of the creator and the integrity of the work, such as the right to be recognized as the creator and prevent harmful changes to the work. Moral rights are the rights that are eternally attached to the Creator to:[18] a. Continue to include or not include his name on the copy in connection with the public use of his Creation; b. Use his alias name or disguise; c. Change the title and subtitles of the Creation; d. Change his Creation in accordance with propriety in society; and e. Maintain his rights in the event of distortion of the Creation, mutilation of the Creation, modification of the Creation, or anything that is detrimental to its honor or reputation.

Exclusive Rights is defined as a right that is only owned by the Creator, Copyright Holder or Copyright Owner who has full freedom in himself to exercise his Copyright, while anyone or other party outside the consent of the Creator, Copyright Holder or Copyright owner concerned is prohibited from exercising the Copyright in question freely.[19] It is also contained in Article 18 of the Copyright Law if the period of the creation of books etc., namely "Creations of books, and all other written works, songs, music with or without text transferred in the agreement of sale and termination and transfer indefinitely, the Copyright transfers back to the Creator when the agreement reaches a period of 25 (twenty-five) years.[20]

3.5. Procedure for the Transfer of Book Copyright to Heirs

The Copyright Law states that copyright can be transferred or transferred, either in whole or in part. Regarding copyright for rights holders or creators, it can provide a transfer of all or part of their copyright to another person by the process of inheritance, will, grant or in other ways in accordance with laws and regulations.[21] In other words, it can be concluded if, the proof of copyright is the rights that are automatically owned as well as the ownership of objects and property rights so that in copyright there are conditions in its ownership and also its transfer.

Copyright transfer procedure, the following are the general steps in the copyright transfer procedure to heirs:[22] If the author of a book passes away, the economic rights to the book (such as sales royalties, translation licenses, and film adaptations) will be transferred to the heirs, such as children or spouse, after they prove their status as heirs and (if necessary) register the transfer with the DJKI.

1. Prepare a deed of inheritance: heirs need to prepare a deed of inheritance, which serves as legal proof of ownership of the transferred copyright. This document can be prepared by a notary or authorized official, such as a court, for example, a letter of appointment of heirs from a religious court.
2. Include supporting documents: documents that must be included include the creator's death certificate, will, and other related documents.
3. Registration with the DJKI: heirs as copyright owners are required to register the transfer of rights with the Directorate General of Intellectual Property (DJKI).
4. Announcement in the State Gazette of Copyright: every transfer of copyright must be announced in the State Gazette of Copyright for legal certainty for third parties.

The inheritance or transfer of book copyright can be done in an unwritten way and can also be done in writing which should be made in the form of an authentic deed (made by a notary). If it is done in an unwritten way, it can cause complications, so the heirs unite their preconceptions and raise and stipulate by writing which establishes one of them to be the legal representative of all the heirs. The granting of book copyright through grants should be carried out openly and in writing with the aim that the wide audience can know about it and there is a handle for grant recipients.[23]

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[18] Bp Lawyers, 2024, Copyright Transfer by Inheritance, Is It Okay or Not?, accessed on June 04, 2025. https://bplawyers.co.id/2024/07/19/pengalihan-hak-cipta-dengan-cara-diwariskan-boleh-atau-tidak/#:~:text=Berdasarkan%20ketentuan%20Pasal%2016%20Undang,seluruh%20maupun%20sebagian%20karena%20pewarisan.

[19] *Op. Cit*., Law Number 28 of 2014 concerning Copyright, Article 40.

[20] ibid, Article 18.

[21] ibid, Article 3.

[22] ILS LAW FIRM, Procedure for Inheriting Copyright to Heirs, accessed on July 29, 2025, https://www.ilslawfirm.co.id/prosedur-mewariskan-hak-cipta-ke-ahliwaris/#:~:text=Conclusion,in accordance with applicable legal provisions.

[23] Eddhie Paptono and Noor Hidayah Hanum, Juridical Aspects of the Legal Position of Heirs in Copyright Inheritance, Accessed on June 03, 2025, https://download.garuda.kemdikbud.go.id/article.php?article=1156586&val=5333&title=ASPEK%20YURIDIS%20POSITION%20HUKUM%20AHLI%20HEIRS%20IN%20INHERITANCE%20RIGHTS%20CIPTA.

The provisions of the Regulation in terms of inheritance in the Civil Code consist of 2 ways, namely:

1) Article 832 of the Civil Code: The "*Ab Intestato"* Inheritance System is that ab intestato (without a will) inheritance occurs if a person dies without leaving a valid will. In this case, the distribution of heritage assets will be carried out based on the applicable law, especially the provisions in the Civil Code. According to the rule of law, those who are entitled to inheritance are only blood relatives, either legally or out of wedlock, and the husband and wife who live the longest. The blood relationship as heirs is divided into four groups, namely the first, second, third, and fourth heirs. Regarding this group of heirs, it will be further explained in the discussion on how to divide the rights of heirs according to the Ab Intestato method contained in the Civil Code, namely: a. Group one: The heirs of this group are their children and descendants, as well as a surviving husband or wife. Second Group: The heirs of this group are the elders and siblings. Third Group: The heirs of this group are the grandparents, both on the father's and mother's sides. Then the Fourth Class: The heirs of this group are relatives in the side line (uncle, aunt, cousin) up to the sixth degree.
2) Article 875 of the Civil Code: Inheritance system according to a will (*testament*).[24] "A will or testament is a deed that contains a person's statement about what he wants, happened after his death that can be revoked by him". *Erfstelling* or appointment of inheritance, Article 954 of the Civil Code determines that, a will of appointment is a will in which the person who bequeaths to one or more gives the property that he will leave behind if he dies, either in whole or in part, such as half, third. Will Grant or *Legaat*, in Article 975 of the Civil Code, stipulates that a will grant is a special determination of a will where the bequeath to one or more gives some of his goods of a certain type.[25]

The legal basis used in the implementation of Inheritance in Book Copyright based on inheritance is the Inheritance Law based on the Civil Code which regulates the position of a person's property after he or she dies by transferring the property to the rightful owner. Therefore, the transfer of Book Copyright that occurs as a result of this inheritance is able to transfer the whole related to Exclusive Rights where the Exclusive Rights consist of Moral Rights and Economic Rights of the Creator. However, for the Moral Rights that have been received by the heirs, of course, they can only manage as they should by not changing the characteristics of the Creator.

The provisions contained in Article 16 paragraph (2) of the Copyright Law where it is stated that copyright can be transferred and can be owned by the creator either in part or in whole, because:[26]

1) Inheritance;
2) Grant;
3) Waqf;
4) Testament;
5) Written agreement; or
6) Other reasons that are justified in accordance with the provisions of laws and regulations.

It is stated in Article 5 of the Copyright Law that states:[27]

1) Moral rights are rights that are eternally attached to the Creator.
2) Moral rights as referred to in paragraph (1) cannot be transferred as long as the Creator is still alive, but the exercise of these rights can be transferred by will or other causes in accordance with the provisions of laws and regulations after the Creator dies.
3) In the event of a transfer of the exercise of moral rights as intended in paragraph (2), the recipient may release or reject the exercise of his rights on the condition that the release or refusal of the exercise of these rights is stated in writing.

Economic Rights are the exclusive right of the Creator or Copyright Holder to obtain economic benefits for the Work.[28] The copyright of a book owned by the author, who after the death of the creator, belongs to his heirs or belongs to the beneficiary of the will, and the copyright cannot be confiscated, unless the right is acquired unlawfully. This provision applies to copyrights that have been declared as well as copyrights that have not been or have not been announced.[29] Procedure for Inheriting Copyright The

[24] *Op. Cit*., Civil Code Article 832.

[25] Advocacy (03), 2011, Inheritance Process through *Ab Intestato* and *Ad Testamento (Testament),* Retrieved June 03, 2025, https://advokasi03.blogspot.com/2011/12/proses-pewarisan-melalui-ab-intestato.html?m.

[26] *Op. cit*., Law Number 28 of 2014 concerning Copyright, Article 16 (2).

[27] *ibid*, Article 5.

[28] *ibid*, Article 8.

[29] A lot. Nurachmad, 2012, All about Indonesian IPR, Jogjakarta: Buku Biru, page 31.

following are the general steps in the process of inheriting copyright to the heirs:[30] Creating an Inheritance Deed: The heirs need to create an inheritance deed as authentic proof of inherited copyright ownership. This inheritance deed can be made through a notary or an authorized official/agency such as the Court, for example a Letter of Determination of Heirs from a Religious Court. Attaching Supporting Documents: The documents that need to be attached include the creator's death certificate, inheritance certificate, and other relevant documents. Registration at DJKI: Heirs as copyright owners are required to register the transfer of copyright to the Directorate General of Intellectual Property (DJKI) by attaching documents about the transfer of rights. Announcement in the Official Copyright Gazette: Any copyright transfer must be announced in the official copyright gazette to provide legal certainty to third parties.

The transfer of the copyright of the book through inheritance can be done if the Creator after the creator of the book dies, leaves behind the property and has an heir. If the inheritance is in the form of Book Copyright, then the Copyright can be inherited to the heirs because the Copyright has economic rights to the work. If the transfer of the copyright of the book has been completely handed over to another party, for example to the heirs and then there is a person who intentionally or unintentionally with the consent of the Creator has violated the moral rights of the Creator, then the Creator and his heirs can make a claim against that party. If a book creator has passed away and left the book copyright, the book copyright will belong to the heirs or beneficiaries of the will. The copyright of this book may be seized if it is obtained unlawfully if it violates the law and this provision applies to copyrights that have been declared or that have not been announced. However, if the Creator of the book does not leave the heirs by himself, all his property becomes the property of the state. This is in accordance with the provisions contained in the Civil Code and the Copyright Law.[31]

4. Conclusion

The eco-action program as a disaster mitigation approach in coastal areas such as Nagari Katapiang has great potential to reduce disaster risks while increasing social and ecological resilience of the community. The success of this program is highly dependent on the active involvement of the community in every stage, from planning, implementation, to maintenance of environmental activities such as mangrove planting and coastal area management.

To make the program a success, a comprehensive and sustainable strategy is needed. Education and increasing public awareness are crucial initial steps, followed by strengthening the capacity of local institutions such as KSB and coastal community groups. Support from village government policies, multi-party partnerships, and monitoring and evaluation systems involving residents will strengthen the effectiveness and sustainability of the program. Thus, eco-action is not only a physical activity, but also builds a strong disaster awareness culture among the Katapiang community.

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