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Community Empowerment in Disaster Mitigation Through Dissemination of Research Results in Salua Village, Kulawi District, Sigi Regency

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Abstract. *A dissemination program for research findings on settlement history, local knowledge, and disaster dynamics in Salua Village, Kulawi District, Sigi Regency, was implemented to strengthen community capacity in disaster mitigation efforts. This activity involved the village government, the Village Consultative Body (BPD), community leaders, women's leaders, and the Disaster Preparedness Group (KSB). Through dissemination and focused discussions (FGDs), findings emerged that village vulnerability is not only caused by ecological factors, but also by the weak role of formal institutions such as the Regional Disaster Management Agency (BPBD) and the forestry service in addressing forest destruction in upstream areas. Furthermore, the unclear function of the KSB also hampers the effectiveness of mitigation at the village level. Local community knowledge including migration history, settlement patterns, language, and experiences with floods and landslides serves as a crucial source of information in formulating community-based mitigation strategies. This program has yielded several outcomes, including increased risk awareness, the creation of participatory risk mapping, identification of the roles of local actors, and recommendations for strengthening village institutions through strengthening the Village-Based Village Council (KSB), implementing customary sanctions, and integrating local knowledge into village disaster documents.*

Keywords: *Disaster Mitigation, Research Dissemination, Local Knowledge, Community, Salua Village*

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INTRODUCTION

Sigi Regency is one of the regions with a high level of disaster vulnerability in Central Sulawesi. Its location on an active fault line and geomorphological conditions consisting of valleys and mountains make this region frequently subject to flash floods, landslides, earthquakes, and liquefaction (Ramya et al., 2023). Salua Village in Kulawi District is one example of a village facing recurring ecological pressures. In recent years, flooding has become increasingly frequent and is understood by residents to be a consequence of changes in forest cover in the upstream area, both due to illegal logging and uncontrolled land clearing. This finding aligns with recent reports confirming that forest degradation in the upstream watershed area accelerates the increase in hydrometeorological risks (Trinata et al., 2025; Yudono et al., 2023). Despite this situation, the Salua community actually possesses rich local knowledge related to migration history, settlement patterns, spatial adaptation, and experiences in dealing with disasters (Huang, 2018; Morrison, 2016; Sang & Baars, 2025; Tajudeen et al., 2022). This knowledge is stored in oral narratives about the origins of the place, movement patterns, and forms of ecological adaptation.

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Recent research shows that such local knowledge plays a crucial role in community-based adaptation and mitigation strategies in disaster-prone areas (Dorji et al., 2024; Lawyer et al., 2023). However, as revealed in the minutes of a discussion at the Salua Village office, several structural barriers exist that reduce the effectiveness of disaster mitigation at the local level. First, the role of the Sigi Regency Regional Disaster Management Agency (BPBD) is considered very minimal, both in rapid response and in providing assistance with risk reduction at the village level. This lack of institutional support creates a gap between community needs and government programs (Rahman et al., 2017; Bläse et al., 2025; Goodman, 2000). Similar findings are also found in many parts of Indonesia, where formal institutional capacity is unable to address the specific needs of grassroots communities (Rayawan et al., 2025; Dasgupta & Beard, 2007). Second, the forestry service fails to follow up on cases of illegal logging reported by residents. This deforestation practice directly increases the risk of flash floods. The absence of sanctions against perpetrators demonstrates weak forestry governance and indicates that ecological monitoring mechanisms are not yet effective. Therefore, it is recommended that land evaluations be conducted as frequently as possible (Meijaard et al., 2021).

Third, the village Disaster Preparedness Group (KSB) has an unclear function. In discussions at the Salua Village office, residents questioned whether the KSB's role is to monitor rivers, conduct risk assessments, or simply administer aid when disasters occur. This unclear mandate reflects a national issue related to village preparedness institutions, which are often not supported by adequate training, standard operating procedures, or technical assistance (Mukarromah & Pranoto, 2024; Seddiky et al., 2020).

Fourth, the Salua Village community demonstrates a high dependence on natural resources. The fertility of the soil and the ease of obtaining food from local crops such as sweet potatoes, bananas, and various other tubers have led residents to choose to remain or settle in vulnerable areas (Almekinders et al., 2019; Low et al., 2020; Tedesco et al., 2023). From an ecological anthropology perspective, people's attachment to their living space and natural resources is a determining factor in their decision to remain in place, despite relatively high disaster risks (Van et al., 2011). This demonstrates that mitigation strategies must consider the socio-ecological dimension, not just technical approaches. Through dissemination of research findings, this program aims to: (1) Present scientific findings regarding the socio-ecological conditions of Salua Village as a basis for understanding risk; (2) Strengthen community understanding of disasters through dialogue between local knowledge and academics; and Develop recommendations for community-based mitigation institutions, specifically clarifying the role of the KSB, strengthening coordination with relevant agencies, and integrating local knowledge into village planning. Of course, from this goal, it is hoped that these efforts will build a disaster mitigation ecosystem that is more inclusive, responsive, and rooted in the authentic experiences of the community.

METHODS

This community service program implemented a combination of qualitative methods and a participatory approach designed to ensure that the results truly reflect the needs and knowledge of the Salua Village community. Four main methods were used: dissemination of research results, focused discussions (FGDs), a participatory approach, and qualitative analysis.

Dissemination of Research Results

Dissemination activities were conducted as an initial step to open a dialogue between the community service team and the community. At this stage, the team presented the results of previous research on settlement history, ecological dynamics, forest cover conditions, and disaster risk maps in Salua Village. Dissemination was conducted through village meetings involving the Village Head, the Village Consultative Body (BPD), women's leaders, traditional leaders, and representatives of youth groups. Dissemination was chosen because it is an effective way to convey scientific information to the community in a simple and easy-to-understand manner, while connecting academic knowledge with local experiences. As stated by Bakti et al. (2023), a sound dissemination process can increase community capacity to understand risks and

encourage participation in mitigation. Furthermore, dissemination also serves as a two-way knowledge transfer, as the community provides responses, clarifications, and oral knowledge (tutura) that can enrich the findings.

Focus Group Discussions (FGDs)

FGDs were used to delve deeper into disaster experiences, risk perceptions, flood history, and residents' views on the role of relevant institutions, such as the Regional Disaster Management Agency (BPBD), the forestry service, and the Disaster Preparedness Group (KSB). The FGDs involved different social groups to ensure diverse perspectives, including women's groups, traditional elders, farming communities, and youth representatives. FGDs were chosen because this method is considered capable of generating rich data on collective perspectives and social dynamics within the community (Afiyanti, n.d.). FGDs are particularly effective in disaster contexts because they allow participants to connect disaster memories with current ecological conditions and identify institutional barriers more openly. In this program, FGD minutes served as one of the primary data sources for analyzing the socio-ecological conditions of Salua Village.

Participatory Approach

A participatory approach serves as the program's main framework, positioning the community as both the holder of local knowledge and the primary actor in formulating disaster mitigation plans. This approach ensures that the community is not merely a recipient of information, but actively participates in determining risk priorities, interpreting disaster history, and formulating strategies most relevant to their needs. The use of participatory methods is particularly important in areas with strong local knowledge, such as Salua Village. Recent research has shown that a participatory approach increases community ownership of the mitigation program and strengthens its sustainability (Bakti et al., 2023). Through this approach, the community is encouraged to share experiences about vulnerable locations, adaptive culture, and land use patterns related to disaster risk.

Qualitative Analysis

All data obtained through dissemination, focus group discussions (FGDs), informal interviews, and field observations were analyzed using qualitative analysis techniques. The analysis involved data reduction, theme categorization, analysis of relationships between themes, and drawing conclusions. This technique follows the interactive analysis model introduced by Marsiglia & Booth (2015), but adapted to the context of community service. Qualitative analysis is highly relevant for interpreting community narratives, both regarding disaster history and the dynamics of local institutions. Recent disaster research shows that thematic analysis is effective in uncovering the interactions between social, cultural, and environmental factors that shape community vulnerability and resilience. The analysis results are then used to formulate recommendations that can be implemented by the village government and local institutions in Salua Village.

RESULTS AND DISCUSSION

Unequal Role of Formal Institutions in Disaster Mitigation

Discussions with the village government and community revealed an imbalance in the role of formal institutions in disaster mitigation efforts in Salua Village. The Salua Village Head emphasized that the contribution of the Sigi Regency Regional Disaster Management Agency (BPBD) is still considered far from expected, particularly in responding to the recurring flooding problem in recent years. The BPBD is seen as not actively involved in prevention activities, risk monitoring, or preparedness assistance, which should be the primary function of the agency at the regional level. The minimal presence of the BPBD at the village level makes the community feel they must bear the burden of the increasing disaster risk alone. The problem of the imbalance in the role of institutions is increasingly apparent in the case of illegal logging in the upstream area of Salua Village. The Village Head recounted that he once personally arrested a logger who

was one of the causes of the increased flood risk and confiscated the perpetrator's sensor device to report it to the Forestry Service. However, no further action was taken by the relevant agency. The lack of sanctions, guidance, or legal proceedings against the perpetrator has caused the community to increasingly lose trust in the role of formal institutions in preserving forests and reducing ecological risks. The lack of follow-up also highlights the weakness of coordination and law enforcement mechanisms in the forestry sector (Overdevest & Zeitlin, 2018; Johansson & Keskitalo, 2014). The Head of the Village Consultative Body (BPD) reinforced the village head's statement by highlighting the unclear function of the Disaster Preparedness Group (KSB) in Salua Village. According to him, the KSB lacks a clear division of duties: whether it is responsible for river monitoring, conducting risk assessments, providing disaster education to residents, or simply being involved in distributing aid when a disaster occurs.

This unclear function not only confuses the community but also weakens the KSB's effectiveness as the frontline of mitigation efforts at the village level. Without clear standard operating guidelines (SOPs) and technical support from the Regional Disaster Management Agency (BPBD) and related agencies, the KSB struggles to carry out its functions optimally. This situation undoubtedly reflects the minimal substantive state presence at the local level, particularly in terms of protecting communities from disaster risks. This absence is not only related to the lack of formal programs, but also the absence of a coordination system and enforcement of regulations that should protect upstream areas from exploitation. In the Salua context, communities ultimately rely on local knowledge, collective experience, and customary mechanisms to understand risks and determine actions in the event of a disaster. When formal institutions fail to fulfill their institutional functions, a tension arises between the state and local communities. On the one hand, communities need structural and technical support that only government institutions can provide (Fredericksen & London, 2000; Wagner et al., 2003). On the other hand, they are forced to rely on their own resilience, whether through local ecological knowledge, social networks, or adaptive habits passed down through generations. This situation demonstrates that effective disaster mitigation efforts cannot rely on a single actor but require strong synergy between formal institutions and the community. Without such synergy, the imbalance in roles will continue to create new vulnerabilities for communities living in disaster-prone areas like Salua Village.

Local Knowledge of Settlement History and Disaster Risk

Local knowledge, or local ecological knowledge, plays a crucial role in understanding community adaptation patterns to disaster risks. For the people of Salua Village, this knowledge not only serves as a record of the past but also serves as the basis for daily practices, settlement location selection, and survival strategies. This local knowledge is passed down through oral traditions, "tutura," passed down across generations and serves as a primary source for shaping the community's understanding of the environment and risks. Discussions with community leaders, women's figures, and the Village Consultative Body (BPD), revealed several historical aspects that explain how the community builds relationships with their living space and how they understand disaster risks, including the following:

Salua as a Transit Point

According to traditional elders and community leaders, Salua Village was not originally a permanent settlement (Sirajuddin, 2020; Ashahadu, 2018; Mehring et al., 2011). The area served as a transit point for people traveling from Kulawi to Palu City. Given the long distance and challenging geographical conditions, Salua served as a strategic location for resting before continuing their journey. It was not until the 1980s that people began to settle permanently in the area now known as Salua. The transition from a transit area to a settled village demonstrates a change in how communities utilize space, particularly when they discover potentially fertile land suitable for farming (Bhandari, 2013; Li et al., 2016). This experience demonstrates how community settlement decisions are based on their connection to nature and assessment of environmental carrying capacity. These local narratives are important because they shape

community understanding of safe locations, available resources, and potential environmental risks.

Traces of Floods in Collective Memory

Collective memory of disasters is a crucial component of the local knowledge of the Salua community. One example recounted by a female leader is the massive flood of 1977 that destroyed the old market located in the lower part of the village. Interestingly, there were no casualties in the event because at the time, the community was still living on higher ground. This memory serves as a risk marker that serves as a reference for the community in assessing the safety of settlement locations. The flood also shaped the understanding that lower areas are vulnerable, leading people at that time to consciously choose to settle on higher ground (Jha et al., 2011; Colten, 2006; Coates, 2015; Few, 2003). This adaptation pattern demonstrates the importance of local knowledge as an early warning system based on real-life experiences. For communities living in disaster-prone areas, this collective memory serves as an "ecological archive" that determines survival strategies.

Sedentary Patterns of the Kulawi Community

The Head of the Village Consultative Body (BPD) explained that the Kulawi community generally does not have a nomadic tradition. They tend to clear land, establish gardens, and then settle for long periods. Their mobility is limited, and they only move within village boundaries. When disasters such as landslides or floods occur, the community does not abandon the village but simply moves to a point deemed safer within the same area. This settlement pattern demonstrates the ecological and emotional ties between the community and their living space. The village is understood not only as a place to live, but also as a source of livelihood, social identity, and ancestral heritage (Nursanty et al., 2023; Su et al., 2016; Daskon, 2010; Gao & Wu, 2017). For example, when one side of the village experiences a landslide, the community will move to the unaffected side, rather than abandoning Salua. This adaptive choice demonstrates that disaster mitigation for the community does not involve permanent relocation, but rather through spatial adjustments within the village. This pattern also demonstrates that the Kulawi community has a deep understanding of spatial structure, soil characteristics, safe locations, and vulnerable areas. This understanding is the result of years of observation, which is then passed down to the next generation through stories, experiences, and daily practices. Overall, the Salua community's local knowledge of settlement history and disaster risk demonstrates that this community has long developed experience-based adaptation mechanisms. These include the use of speech as an ecological archive, the selection of safe locations based on disaster memories, and strong settlement patterns as a manifestation of ecological ties to living spaces. This knowledge is crucial for linking with modern disaster mitigation strategies, ensuring that risk reduction efforts are not solely based on technical approaches but also rely on local wisdom that has proven effective in maintaining the community's sustainability (Ali et al., 2021; Bang, 2024; Kusumasari & Alam, 2012).

Ecological Entanglement: Why Communities Remain Resilient

Discussions with community leaders revealed that one of the most dominant factors motivating the Salua community to remain in their area, despite facing the threat of recurring disasters, is their ecological attachment to their environment. This attachment is rooted in the reciprocal relationship between the community and the land they have managed for decades. The community views nature not only as a physical space, but also as a source of livelihood that provides certainty, identity, and sustainability (Datta, 2015; Glasson et al., 2010). Community leaders explained that food availability is a primary reason for the community's survival. The land in Salua is known for its fertility and ability to support a variety of crops that can grow year-round without requiring intensive care. Crops such as sweet potatoes, bananas, taro, and various other tuber crops are staple foods that are easy to grow on family plots. In fact, some crops planted in the 1990s are said to remain productive today. This continuity of food production creates a sense of security and the belief that as long as they have land, they will not be short of food.

Beyond food availability, the community's attachment to their living space is also formed through emotional, social, and cultural relationships. Land is seen not only as an economic resource but also as an ancestral heritage with historical and spiritual value. Many families in Salua have lived there for generations, making the land part of the community's identity. A sense of ownership and attachment to the land, passed down through generations, makes people very reluctant to leave the village, even when disaster strikes. In this context, the decision not to relocate is not only a practical choice but also a culturally based adaptation strategy. When landslides or floods occur, people don't consider leaving Salua permanently. Instead, they relocate to safer parts of Salua Village, while remaining within the boundaries of the space they understand and control. Local understanding of the location of vulnerable land, the direction of water flow, the strength of the soil, and places considered safe form the basis of this strategy.

This ecological bond demonstrates that for the Salua people, disaster risk is not strong enough to erase the values and benefits they derive from living in the village. For them, disaster risk is a part of life that can be managed through local knowledge, mutual cooperation, and spatial adaptation. Conversely, leaving the village means losing a secure food source, strong social networks, and a cultural identity that has been embedded for decades. This situation thus explains why relocation has never been an option for the community, even when disasters recur from time to time. For them, leaving Salua means abandoning a part of themselves something far greater than the physical risks they face. Therefore, disaster mitigation strategies designed from outside the village need to recognize that the community considers not only technical aspects but also much more complex ecological, social, and cultural dimensions.

Community-Based Mitigation Formulation

The process of formulating community-based mitigation in Salua Village was carried out by combining academic research data with local community experiences gained through focus group discussions (FGDs). This approach positions the community as the primary subject in disaster mitigation, not simply the recipient of policies. This is crucial considering that communities live directly with the risks and are the first actors to respond to any disaster. Based on field findings, a number of mitigation strategies were formulated, taking into account the socio-ecological context and the community's actual capacity.

Strengthening the Disaster Preparedness Group (KSB) through Technical Training and the Development of Disaster Standard Operating Procedures (SOPs)

One of the key findings from the FGDs was the unclear function of the Disaster Preparedness Group (KSB), which prevented this institution from functioning optimally. Therefore, strengthening the capacity of the KSB was a priority. This strengthening was carried out through: (1) River monitoring training, so that the KSB could conduct regular monitoring of changes in water discharge and upstream conditions, especially during the rainy season; (2) Development of disaster standard operating procedures, which include early warning procedures, evacuation, and cross-agency coordination; (3) Risk assessment training, including an introduction to natural indicators frequently used by the community and scientific indicators. This institutional strengthening is expected to create a clearer and more coordinated risk response structure, so that the KSB no longer functions solely in aid distribution but truly carries out a mitigation role.

Implementation of Customary Sanctions for Forest Destruction

One of the main factors triggering flooding in Salua Village is illegal logging in the upstream area. Given that the response from formal institutions such as the forestry service is often slow or even non-existent, the community proposed the implementation of customary sanctions for perpetrators of forest destruction. Customary sanctions are considered faster, more effective, and more socially powerful because they are based on cultural values and communal norms. The implementation of customary sanctions can strengthen the local monitoring system and serve as a preventative measure to ensure that residents and newcomers do not indiscriminately cut

down trees in the upstream area. Integrating local wisdom with formal regulations is a relevant strategy for restoring the village's ecological balance.

Participatory Risk Mapping Based on Community Experience

Risk mapping is proposed as a strategic step to identify areas prone to flooding, landslides, and other potential hazards. This mapping is conducted in a participatory manner, involving community leaders, women, youth, and the West Java Provincial Government (KSB). Community participation is crucial because they possess in-depth knowledge of: (1) Locations of past flooding; (2) Landslide-prone areas based on soil changes; (3) Waterways and river flows during the rainy season; (4) Safe points frequently used during spontaneous evacuations. Community-based risk mapping produces maps that are not only technical but also rich in socio-ecological data derived from real-life community experiences.

Cross-Agency Collaboration and Strengthening Risk Reduction Networks

Disaster mitigation cannot be carried out by a single institution. Therefore, cross-agency collaboration is formulated as a crucial strategy. This collaboration involves: (1) The Forestry Service, for upstream monitoring and logging control; (2) The Sigi Regency Regional Disaster Management Agency (BPBD), for technical assistance, development of evacuation SOPs, and facilitation of disaster training; (3) The village government, as the driving force for internal coordination and village decision-making; (4) The local community, as the primary actor implementing mitigation activities. This collaboration is expected to address the imbalance in government roles and strengthen the community's position in risk management.

Integrating Local Knowledge into Village Contingency Plan Documents

Local knowledge such as oral history, collective memories of the 1977 flood, settlement patterns, and community adaptation narratives need to be integrated into formal village documents such as the Contingency Plan (RenKon) and the Village Disaster Management Plan. This integration is important because: (1) It ensures that disaster documents are not merely normative but also reflect community realities; (2) It recognizes the importance of local experiences as part of official mitigation strategies; (3) It bridges scientific approaches with proven local wisdom. Therefore, the Salua Village Planning and Development Plan (Rencana Kon) not only contains technical procedures but also considers the social, cultural, and ecological historical dimensions of the village.

The Role of Dissemination in Building Collective Awareness

Dissemination of research results plays a fundamental role in integrating academic data such as risk maps, ecological history, and forest cover analysis with the voices and knowledge of residents. This process not only broadens community understanding of the risks they face but also fosters collective awareness of the importance of disaster mitigation. The intersection of scientific perspectives and residents' everyday experiences strengthens community-based mitigation, as the strategies formulated are derived from a complementary combination of empirical knowledge and scientific data. Thus, communities not only understand the risks but also feel they have an active role in risk reduction efforts in their area.

CONCLUSION

A community service program, through the dissemination of research findings in Salua Village, provided a clear picture of the village's socio-ecological dynamics and the structural challenges facing disaster mitigation efforts. The dissemination served not only as a means of conveying scientific information but also as a space for dialogue, connecting academic perspectives with local community knowledge. This process revealed that the Salua community possesses rich ecological knowledge, particularly regarding migration history, changing settlement patterns, collective memories of flooding, and adaptation strategies to a constantly changing environment. This local knowledge serves as crucial social capital for disaster risk reduction. However, the program also revealed significant weaknesses in the role of formal

institutions, such as the Regional Disaster Management Agency (BPBD), the Forestry Service, and the Village-based Social Welfare Agency (KSB), which are supposed to protect the community at the village level. The lack of coordination, the absence of follow-up on environmental violations, and the unclear role of the KSB indicate that the disaster mitigation system in Salua Village is ineffective. This imbalance in roles has led the community to rely more on internal mechanisms and customary practices to address risks. Through this activity, various community-based recommendations were successfully formulated. The recommendations emphasize the importance of: (1) Strengthening KSB institutions, through technical training, developing disaster standard operating procedures (SOPs), and increasing capacity in risk monitoring; (2) Enforcing environmental regulations, including the implementation of customary sanctions, to prevent forest destruction, which is a major trigger for flooding; (3) Participatory risk mapping, so that communities can identify safe and vulnerable zones based on real-world experiences; (4) Cross-agency collaboration to ensure that disaster mitigation is not solely the responsibility of the village, but is a joint effort between the local government, the forestry sector, and the community; (5) Integrating local knowledge into village disaster documents, especially Contingency Plans, so that community knowledge forms the basis of formal mitigation strategies. This program will not only provide benefits in the form of increased community understanding of disaster risks but also strengthen community capacity to design mitigation strategies appropriate to their socio-ecological conditions. Research dissemination has proven to be a crucial bridge in building collective awareness and producing more grounded, inclusive, and sustainable recommendations. It is hoped that the results of this program will serve as the basis for developing a community-based disaster mitigation model that can be replicated in other villages with similar characteristics. Involving the community as key actors, integrating local wisdom, and strengthening formal institutions are strategic steps to build a more resilient and responsive mitigation ecosystem to the ever-increasing challenges of disasters.

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