COMMUNITY-BASED DISASTER RISK REDUCTION IN PATAKBANTENG VILLAGE: LESSONS FROM CHRISTCHURCH, SIRNAJAYA, AND BARANGAY BANABA

Kholifatus Saadah

Universitas Jenderal Soedirman

kholifatus.saadah@unsoed.ac.id

Christiano Disa Pradana

Universitas Jenderal Soedirman

christiano.pradana@mhs.unsoed.ac.id

Abstrak

Bencana alam adalah peristiwa yang tidak dapat dihindari. Selain itu, bencana alam melampaui batas negara, sehingga solusi yang diperlukan harus bersifat transnasional. Oleh karena itu, beberapa mekanisme harus diterapkan untuk menangani peristiwa-peristiwa yang tidak terhindarkan ini guna mencegah korban jiwa yang luas. Untuk mengurangi risiko yang ditimbulkan oleh bencana alam, *United Nations Office for Disaster Risk Reduction* (UNDRR) mengeluarkan Kerangka Kerja Sendai (Sendai Framework) untuk Pengurangan Risiko Bencana (2015-2030). Meskipun Sendai Framework dirancang secara internasional, implementasinya harus melibatkan tingkat lokal, seperti daerah perkotaan dan pedesaan. Hal ini langsung terkait dengan dampak yang dialami, yang seringkali dihadapi dan ditanggung oleh tingkat terendah. Artikel ini akan membahas peran komunitas pedesaan dalam memenuhi empat prioritas Sendai Framework. Pengurangan Risiko Bencana Berbasis Komunitas (CBDRR) telah diterapkan di beberapa wilayah, termasuk Christchurch, Selandia Baru, Desa Sirnajaya di Jawa Barat, Indonesia, dan Barangay Naraba, Filipina. Berdasarkan pengalaman ketiga wilayah tersebut, penulis ingin menentukan apakah Desa Patakbanteng di Wonosobo, Jawa Tengah, telah memiliki poin-poin yang tercantum dalam CBDRR. Hal ini terkait langsung dengan lokasi Desa Patakbanteng yang berada di daerah rawan longsor. Penulis memilih CBDRR karena dampak bencana akan dirasakan di tingkat lokal. Temuan dari ketiga lokasi menunjukkan bahwa mengintegrasikan prinsip-prinsip Sendai ke dalam tata kelola desa, mobilisasi sumber daya lokal, dan sistem pengetahuan tradisional sangat penting untuk memperkuat ketahanan. Artikel ini juga menjelaskan pentingnya desa sebagai wilayah yang tidak hanya menjadi penerima kerangka kerja

internasional, tetapi juga memainkan peran krusial dalam memastikan implementasi yang sukses dari kerangka kerja tersebut.

Abstract

Natural disasters are unavoidable events. Moreover, they transcend national boundaries, so the solutions should be transnational. Therefore, several mechanisms must be put in place to address these inevitable events to prevent widespread casualties. To mitigate the risks posed by natural disasters, the United Nations Office for Disaster Risk Reduction (UNDRR) issued the Sendai Framework for Disaster Risk Reduction (2015-2030). While the Sendai Framework is designed internationally, its implementation must involve local levels, such as urban and rural areas. This is directly related to the impacts experienced, which are often faced and borne by the lowest levels. This paper will discuss the role of rural communities in meeting the four priorities of the Sendai Framework. Community-based disaster risk reduction (CBDRR) has been implemented in several areas, including Christchurch, New Zealand, Sirnajaya Village in West Java, Indonesia, and Barangay Naraba, Philippines. Based on the experiences of these three regions, the author wanted to determine whether Patakbanteng Village in Wonosobo, Central Java, already had the points listed in the CBDRR. This is directly related to Patakbanteng Village's location in a landslide-prone area. The author chose CBDRR because the impact of disasters will be felt at the local level. Findings from the three locations suggest that embedding Sendai principles into village governance, local resource mobilization, and indigenous knowledge systems is critical to strengthening resilience. This paper also explains the importance of villages as areas that are not only recipients of international frameworks but also play a crucial role in ensuring the successful implementation of these frameworks.

INTRODUCTION

SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION AND ITS 7 TARGETS

The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted by the United Nations member states on March 18, 2015, in Sendai, Japan. The city was still recovering from the Great East Japan Earthquake and Tsunami at the time of adoption. It was presented the same year as Agenda 2030 and was the first in a series of historic global agreements during the year.[1] The structure represents a qualitative shift from mere coping with disaster impacts to effectively managing and reducing the underlying risks leading to them, from a reactive to a preventive strategy.[2] This makes the Sendai Framework more ambitious than its predecessor, the Hyogo Framework for Action 2005-2015, as it continues the work of the goals of disaster risk mitigation. This framework succeeded the Hyogo Framework for Action (2005-2015) and provides member states with a comprehensive package of measures aimed at protecting development achievements from the increasing risk of disasters. The Sendai Framework's objective is to substantially reduce disaster risk and losses incurred thereby in lives, livelihoods, health, economic, physical, social, cultural, and environmental assets of individuals, businesses, communities, and countries. It is a paradigm shift in approach, from reactive management of disasters when and if they occur to proactive management of the risk of disasters with a focus on prevention and preparedness among nations.

The Sendai Framework identifies its four priorities for action that later are framed as seven targets for member states. This framework's system highly values enhancing understanding of disaster risk and

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[1] Kusumowardoyo, Chrysant L., and Kristian Tamtomo. 2021. "Reflections on implementing the Sendai Framework in the Asia-Pacific: beyond adding disability inclusion to disaster risk reduction." *Disasters* 46 (4): 857-878. doi:https://doi.org/10.1111/disa.12507.

[2] Poterie, Arielle Tozier de la, and Marie-Ange Baudoin. 2015. "From Yokohama to Sendai: Approaches to Participation in International Disaster Risk Reduction Frameworks." *International Journal of Disaster Risk Science* 6 (2): 128-139. doi:https://doi.org/10.1007/s13753-015-0053-6.

improving risk governance for reducing both existing and emerging risks. This requires recurrent access to and gathering of disaggregated data, increased capacity for contextual risk analysis and prediction, and good political will in order to guarantee all development programming and incoming investments are risk-informed.[3] The seven targets are results-focused, with goals to reduce human and material losses caused by disasters, for example, fatalities, number of people affected, economic losses, infrastructure damage, and interference with basic services.

From this framework, seven targets were agreed upon as goals and also became the basis for indicators of fulfilment in disaster mitigation.[4] Seven global targets are set in the Sendai Framework for Disaster Risk Reduction (2015-2030) also to guide actions to substantially lower disaster risk and losses. The targets are developed for global measurement and supplemented by national indicators:

1. Target (a): Substantially Reduce Global Disaster Mortality This target aims to significantly lower the world rate of disaster fatalities. The aim is particularly to lower the world average mortality rate per 100,000 between 2020-2030 over the years 2005-2015.
2. Target (b): Significantly lower the number of people affected globally This target addresses a notable decline in the percentage of people impacted by disasters all over the world. It seeks to decrease the world average number per 100,000 impacted individuals during the period 2020-2030 relative to the period 2005-2015.
3. Target (c): Substantially Reduce Direct Disaster Economic Loss The aim here is to cut drastically direct economic losses from

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[3] Mizutori, Mami. 2020. "Reflections on the SenDai Framework for Disaster Risk Reduction: five years since its adoption." International Journal of Disaster Risk Science 11 (2): 147-151. doi:https://doi.org/10.1007/s13753-020-00261-2.

[4] Human Rights Documents. 2018. "Sendai Framework for Disaster Risk Reduction 2015-2030." Human Rights Documents online. doi:https://doi.org/10.1163/2210-7975_hrd-9813-2015016.

disasters compared to the world Gross Domestic Product (GDP) by 2030.

4. Target (d): Drastically Reduce Damage to Critical Infrastructure and Basic Services This target aims to considerably reduce disaster damage to infrastructure and disruption to critical services, including health and education facilities. It aims to make them more resilient by 2030.

5. Target (e): Considerably Reduce the Number of Countries with National and Local Disaster Risk Reduction Strategies This target is focused on significantly increasing the number of countries that have national and local disaster risk reduction plans by 2020.

6. Target (f): Considerably Raise International Cooperation to Developing Countries This target is focused on considerably enhancing international cooperation to developing countries. This is to be achieved through adequate and sustainable support supplementing their efforts at the national level toward implementing the Framework by 2030.

7. Target (g): Sustainably Increase the Availability of and Access to Multi-Hazard Early Warning Systems and Disaster Risk Information The final target is to significantly increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments for people by 2030.

These seven global objectives collectively provide a comprehensive framework for monitoring and achieving progress towards disaster risk reduction based on mitigating the human and economic impacts of disasters, strengthening national and international capacity, and improving information and early warnings. Monitoring the Sendai Framework implementation must be ensured by following losses over a sufficient period to assess the effectiveness of disaster risk reduction interventions.[5] The model proposes comparing 2005-2015 disaster losses to 2015-2030 disaster losses as a measure of progress. To facilitate global reporting on

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[5] Allen, Katrina M. 2006. "Community-based disaster preparedness and climate adaptation: local capacity-building in the Philippines." Disasters 30 (1): 81 - 101. doi:https://doi.org/10.1111/j.1467-9523.2006.00308.x.

the seven targets and 38 indicators, the UN Office for Disaster Risk Reduction (UNDRR) launched the online Sendai Framework Monitor (SFM) system on March 1, 2018. UNDRR also modified its DesInventar database to address the data requirements of the targets and provided training and technical support to member states[6]. 113 nations had reported partially for 2017 as of September 2019, and 104 nations had started reporting for 2018. These included 51% of the Least Developed Countries (LDCs), 66% of the Land-Locked Developing Countries (LLDCs), and 21% of the Small Island Developing States (SIDS), which is impressive given the paucity of resources.[7] It is now most countries that have begun reporting on Target (a) (people killed and missing) and Target (b) (number of people impacted), although fewer have reported on economic and infrastructure damages due to issues in data collection.[8] Several countries have also conducted analyses on how their national DRR plans correspond to the Sendai Framework, of which 101 countries had a national strategy by September 2019.

UNDRR aims to assist 150 countries in creating national DRR plans and enhance the average alignment score to 0.75 by 2021. One of the most significant lessons is to shift away from hazard-by-hazard reduction of risk to a well-coherent, coordinated strategy recognizing the systemic nature of risk, including climate risk.[9] Disaster risk reduction will not succeed unless

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[6] Matsuoka, Yuki, and Erick Gonzales Rocha. 2021. "The role of non-government stakeholders in implementing the Sendai Framework: A view from the voluntary commitments online platform." *Progress in Disaster Science* 9: 100142. doi:https://doi.org/10.1016/j.pdisas.2021.100142.

[7] Mizutori, Mami. 2020. "Reflections on the SenDai Framework for Disaster Risk Reduction: five years since its adoption." *International Journal of Disaster Risk Science* 11 (2): 147-151. doi:https://doi.org/10.1007/s13753-020-00261-2.

[8] Dickinson, Chloe, Amina Aitsi-Selmi, Pedro Basabe, Chadia Wannous, and Virginia Murray. 2016. "Global Community of Disaster Risk Reduction Scientists and decision makers endorse a science and technology partnership to support the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030." *International Journal of Disaster Risk Science* 7 (1): 108-109. doi:https://doi.org/10.1007/s13753-016-0080-y.

[9] Yokomatsu, Muneta, and Stefan Hochrainer-Stigler. 2020. *Disaster Risk Reduction and Resilience .* Singapore: Springer.

there is coherence with climate change adaptation and integrated development goals. Such an integrated strategy can reduce transaction costs and enhance resilience. UNDRR and other UN agencies are calling for national DRR strategies to be harmonized with climate change policy at every level. The biggest challenge is still the lack of sufficient and direct financial support for the Sendai Framework, with bilateral and multilateral support of only USD 1.5 billion as of September 2019 from 15 countries receiving assistance for DRR. Enhanced financing strategy, including mobilization of internal resources, is essential to achieve the objectives of the framework and protect gains towards the Sustainable Development Goals.[10]

Relying on a few fundamental guiding principles, Sendai Framework underscores the shared responsibility, noting that disaster risk reduction is a shared cause and needs active participation by governments, civil society, the private sector, and other actors. It demands an 'all-of-society' engagement strategy ensuring participation of all elements of society, including women, children, persons with disabilities, and indigenous peoples, in decision-making. It also embraces the 'building back better' principle in disaster aftermath reconstruction to enhance resilience and emphasizes risk-informed development, which involves integrating disaster risk reduction into mainstream sustainable development policy and planning.

The framework sets four priority areas for action to achieve its ambitious goals.[11][12]The first priority is 'Understanding Disaster Risk' and includes the development of multi-hazard risk assessments, disaggregated data gathering, and promoting mass risk awareness and education. The second is 'Strengthening Disaster Risk Governance to Manage Disaster Risk,' focusing on developing and enhancing national and local disaster risk reduction policies, strategies, and institutions. The third priority, 'Investing in Disaster Risk Reduction for Resilience,' entails private and public investment in structural and non-structural measures, development of early

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[10] (Poterie and Baudoin 2015)

[11] (Dickinson, et al. 2016)

[12] (Matsuoka and Rocha 2021)

warning systems, and the use of ecosystem-based approaches. The fourth is 'Building Capacity for Disaster Preparedness towards Effective Response and to 'Build Back Better' in Recovery, Rehabilitation and Reconstruction,' which is a larger call for improving preparedness for effective response, strengthening recovery processes, and taking disaster risk reduction principles into all recovery efforts.

Presenting the goals articulated under the Sendai Framework necessitates a paradigm shift in practice beyond conventional Disaster Risk Management (DRM) practices. It must adopt a systems-thinking and integrated approach to disaster resilience that is tightly entrenched in development activities. For example, such collaborations as the Zurich Flood Resilience Alliance illustrate how measuring and increasing community flood resilience can reduce the underlying drivers of increasing disaster risk directly, hence conforming to Sendai's broader objectives. This integrated and forward-looking approach is needed in order to encourage resilience and ensure sustainable development against emerging global risk threats.

THE ROLE OF COMMUNITY IN DISASTER RISK REDUCTION PLAN

The Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 encourages broader, people-centered disaster risk reduction, moving from traditional, centralized response ways of thinking to a multi-hazard and multi-sectoral strategy. It specifically urges developing nations to develop their national capacities and resources, and it gives priority to collaborative approaches such as citizen science and Community-Based Disaster Risk Reduction (CBDRR) as principal choices for efficient disaster management in conjunction with local partners[13][14] (Liu et al., 2016;

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[13] Liu, Yi, Kunlong Yin, Lixia Chen, Wei Wang, and Yiliang Liu. 2016. "A community-based disaster risk reduction system in Wanzhou, China." *International Journal of Disaster Risk Reduction* 19: 379-389. doi:https://doi.org/10.1016/j.ijdrr.2016.09.009.

[14] Wolff, Erich. 2021. "The promise of a "people-centred" approach to floods: Types of participation in the global literature of citizen science and community-based flood risk reduction in the context of the Sendai Framework." *Progress in Disaster Science* 10: 100171. doi:https://doi.org/10.1016/j.pdisas.2021.100171.

Wolff, 2021). Implementation of the Sendai Framework is therefore inextricably bound with CBDRR since community resilience is foundational to achieving its goals of dealing with the underlying causes of risk, such as rising exposure to hazard, and enhancing overall well-being. This requires a shift in practice towards a more integrated and systems-based disaster resilience approach which is inherently bound with development intervention.

CBDRR measures have a significant contribution towards the SFDRR objectives, namely in responding to vulnerable populations like residents of slum communities who are disproportionately affected by floods of disaster.[15][16]One such instance is citizen science, which incorporates individuals onboard as 'sensors' or data collectors, providing inexpensive and geographically scattered data that can calibrate probabilistic flood models, hence filling the gaps of traditional data sources. While concerns regarding accuracy do arise, the potential for plenty of data is widely recognized. Besides gathering data, these participatory methods create community awareness, improve local literacy for science, strengthen local networks, and raise participation in decision-making. Initiatives such as the Zurich Flood Resilience Alliance (ZFRA), which tracks and builds flood resilience across 118 communities in nine nations, demonstrate how these techniques are directly linked to Sendai goals.[17] Similarly, a flood monitoring scheme under the RISE program showed how the community can facilitate greater local advocacy for infrastructural upgrade by providing credible data on flood heights, creating pride and encouraging continued involvement.

Despite these benefits, one of the key challenges to reaching an entirely people-centered process is that the majority of community-led initiatives remain unusual or initiated by external parties rather than the communities themselves. Such initiatives more frequently than not only engage citizens as data collectors for top-down policy-making, and seldom

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[15] (Allen 2006)

[16] (Dickinson, et al. 2016)

[17] (Wolff 2021)

in the conceptualizing or analyzing stages.[18] This, therefore, heightens the call to investigate further how social, cultural, and political capital may be mobilized to facilitate greater roles for communities in managing disasters.[19] Next-generation responses must aim for more inclusive and participatory processes whereby communities are recruited as interpreters, analysts, and decision-makers. Lastly, even while CBDRR serves as a principal gateway to the People-Centered Agenda of the SFDRR, only when higher and more authentic community involvement is promoted at all levels of disaster risk reduction will its entire transformative potential be unleashed.

The Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 calls for a broader, people-centric preventive strategy to disaster risk, moving away from applying traditional, centralized strategies towards response, to a multi-hazard and multi-sectoral strategy.[20] It unequivocally calls for developing nations to draw upon national capacities and resources, stressing community-based activities such as citizen science and Community-Based Disaster Risk Reduction (CBDRR) as important choices for effective disaster management in collaboration with local stakeholders. Use of the Sendai Framework is therefore in direct concordance with CBDRR, with community-level resilience being central to a successful response to addressing the underlying causes of risk, such as growing exposure to hazard, and overall well-being. This requires a fundamental shift in practice towards more integrated and systemic disaster resilience action that is inextricably linked with action for development.

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[18] Stewart, I.S. 2024. "Advancing disaster risk communications." *Earth-Science Reviews* 240. doi:104677. https://doi.org/10.1016/j.earscirev.2024.104677.

[19] Scolobig, Anna, Tim Prior, Dagmar Schröter, Jonas Jörin, and Anthony Patt. 2015. "Towards people-centred approaches for effective disaster risk management: Balancing rhetoric with reality." *International Journal of Disaster Risk Reduction,* 12: 202-212. doi:https://doi.org/10.1016/j.ijdrr.2015.01.006.

[20] Maly, Elizabeth, and Anawat Suppasri. 2020. "The Sendai Framework for Disaster Risk Reduction at Five: Lessons from the 2011 Great East Japan Earthquake and Tsunami." *International Journal of Disaster Risk Science* 11 (2): 167-178. doi:https://doi.org/10.1007/s13753-020-00268-9.

Although these benefits are in place, one of the largest issues with reaching a truly people-driven strategy is that most community-operated projects are rare or performed by external entities rather than the communities themselves. Typically, such initiatives primarily engage citizens as collectors of information to inform centralized decision-making but not in conceptualization or analysis. This suggests a need to further study how social, cultural, and political capital may enable enhanced roles for communities to address disasters. Future endeavors must pursue more open and inclusive processes in which communities are utilized as interpreters, analysts, and decision-makers. Lastly, while CBDRR is a central path to the SFDRR's people-centered agenda, the latter can only be fully realized when increased and sincere participation by the community is facilitated in all stages of disaster risk reduction.[21]

The Sendai Framework for Disaster Risk Reduction 2015-2030 is a significant step forward in global disaster management policy, toward a more preventative and participatory model[22] (Maly & Suppasri, 2020). One of the fundamental principles of this strategy is the 'all-of-society' engagement principle, essentially reinterpreting responsibility for building resilience. Acknowledging national governments as being the principal responsible institutions for disaster risk reduction (DRR), the strategy makes it crystal clear that this makes it a shared responsibility. This mandate requires active and effective participation of all concerned parties, including civil society organizations, the private sector, academia, and more importantly, communities themselves. This strategy understands that sustainable and effective DRR cannot be conducted by government mandating top-down but instead requires a highly collaborative environment where society itself contributes its knowledge, resources, and capacity. The United Nations Office for Disaster Risk Reduction (UNDRR) actively promotes this partnership approach, making it clear that

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[21] Gupta, Anil K., Shweta Bhardwaj, Manish K. Goyal, and Akhilesh Gupta. 2024. "Disaster Risk Reduction through Climate Adaptive Development: Strategies and Road Ahead." In *Disaster Resilience and Green Growth*, by Anil Kumar Gupta, Akhilesh Gupta and Pritha Acharya, 631-648. Singapore: Springer.

[22] (Maly and Suppasri 2020)

community involvement is not really an additional step in the process but a fundamental component of its overall strategy for achieving success.[23]

To achieve this ambitious vision, Sendai Framework places a strong emphasis on the roles played by science and technology in disaster risk knowledge as well as disaster risk response.[24] The initial phase of rollout was marked by a concerted effort to establish an international scientific consensus, as evidenced in the UNISDR Science and Technology Conference (UNISDR Science and Technology Conference on the Implementation of the SENDAI Framework for Disaster Risk Reduction 2015-2030, 2015). This groundbreaking conference brought together over 750 diverse stakeholders ranging from senior scientists to leading policymakers, corporate leaders, and practitioners active at the field level to facilitate an active and multidisciplinary sharing of perspectives on the challenges and opportunities for disaster risk reduction. This high-level engagement was not merely a forum for discussion but a deliberate attempt to create an actionable plan of work, concluding with the launching of cornerstone instruments like the UNISDR Science and Technology Partnership and the UNISDR Science and Technology Road Map to 2030. The Road Map offers an extensive guide map of foreseen impacts against the Sendai Framework's four priorities with key activities promoting the bridging of the too-often recurring gap between science breakthroughs, policy formulation, and ground realities.

But while these broad-level roadmaps provide broad direction that is required, the ultimate success of the Sendai Framework also rests on their ground-level implementation in those locales where the 'all-of-society' principle is most effectively fleshed out. One of the key mechanisms for this ground-level involvement is the Sendai Framework Voluntary Commitments (VCs) platform which allows non-government stakeholders

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[23] (Matsuoka and Rocha 2021)

[24] Shaw, Rajib, and Sakiko Kanbara. 2022. "Science, Technology, Innovation and Sendai Framework for Disaster Risk Reduction." In *Society 5.0, Digital Transformation and Disasters: Past, Present, Future*, by Sakiko Kanbara, Rajib Shaw, Naonori Kato, Hiroyuki Miyazaki and Akira Morita, 15-23. Singapore: Springer. doi:https://doi.org/10.1007/978-981-19-5646-1_2.

to bring attention to their initiatives and formally opt-in to pledge their efforts to the framework's goals.[25] A survey of these VCs finds that community-based Disaster Risk Reduction (DRR) is a recurring and overarching concern, testifying to an agreement that effective risk reduction must begin at the grassroots of the people most affected by disasters. The Philippines, for example, has the luxury of the presence of a large proportion of such VCs that are particularly well-known for their intense engagement with indigenous communities and focus on the participation of the poor, the marginalized, as well as the disabled. This in-practice application shows how the framework's broad, inclusive measures—moving beyond economic, structural, social, and technological domains—are taken from abstracted principles to concrete actions that prevent and limit hazard exposure, decrease vulnerability, and ultimately build community resilience bottom-up.

Sendai Framework for Disaster Risk Reduction (SFDRR) does acknowledge the importance of community in achieving its objectives, even though how it approaches doing this is a shift in emphasis from prior frameworks. While it articulates the need for 'people-centered' disaster risk reduction (DRR) and addressing 'all of society,' the framework's wording does shift towards being more top-down.[26] The SFDRR particularly emphasizes the use of indigenous, traditional, and local knowledge and practices to guide science in evaluating disaster risk and in planning and policy-making, subject to the condition that the aforementioned knowledge needs to be localized and contextualized. It also particularly calls for more collaboration among people at the local level in exchanging disaster risk information, usually through efforts made by community-based organizations and non-government organizations. Further, the framework calls for strengthening local governments, civil society, communities, and indigenous peoples with regulation and finance instruments to operate and collaborate at the local level on managing disaster risks. SFDRR also contains a special section on the 'Role of Stakeholders,' highlighting the need to engage women, children, youth, people with disabilities, older

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[25] (Matsuoka and Rocha 2021)

[26] (Maly and Suppasri 2020)

persons, indigenous peoples, and migrants, among other civil society stakeholders.

COMMUNITY RESILIENCE IN THE DISASTER RISK REDUCTION

Community involvement in a disaster recovery process provides a picture of community resilience, which encourages community activities in the post-disaster recovery process. Community resilience itself is defined as the ability of a community to cope with disruption and to link their experience and networks with an ability to enact adaptive capacity.[27][28] Adaptive capacity is important not only for responding to existing events but also for future use if similar events are likely to occur. Responding during an incident is crucial in community resilience because it can reduce the amount of damage and casualties if a disaster occurs in the future. Cretney[29] also explains in his writing that community resilience will foster trust in the recovery process.

Community resilience can emerge from training or education provided to local communities. However, the presence of volunteers during an incident also plays a role in shaping community resilience. Emergent volunteers, or groups that suddenly emerged, are often categorized as unpredictable, even outsiders.[30] However, the role of emergent groups that emerge in response to disasters cannot be ignored. While emergent groups are expected to be those with a background in disaster management, not everyone in the affected area is trained. Moreover, those willing to volunteer may come from other areas who are willing to provide voluntary assistance based on community solidarity.[31] The involvement of these emergent groups should be recognized by the government and official

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[27] (Gupta, et al. 2024)

[28] (Cretney 2016)

[29] (Cretney 2016)

[30] Nissen, Sylvia, Sally Carlton, and Jennifer H K Wong. 2022. "Gaining 'authority to operate': Student-led emergent volunteers and established response agencies in the Canterbury earthquakes." *DIsasters* 3 (6): 832-852. doi:10.1111/disa.12496 .

[31] (Nissen, Carlton and Wong 2022)

bodies in disaster recovery,[32] but some perspectives also consider other factors beyond good civic engagement. This is the government's tendency to exploit emergent groups to save costs and abdicate responsibilities. This situation should be avoided, that disaster recovery itself should also involve the community without any party being given inappropriate responsibilities.

METHOD

This article uses qualitative approach that aimed at understanding how community-based disaster risk reduction (CBDRR) process reflect the priorities in the Sendai Framework for Disaster Risk Reduction, especially the fourth priorities. The author focuses on comparing the three cases: Christchurch, Barangay Banaba and Sirnajaya, then assessing the relevance and applicability to Patakbanteng Village whom had the similar situation. For the data collection, primary data were obtained through semi-structured interviews with three informants representing different community segments in Patakbanteng: youth, students, and family units. These interviews aimed to identify the level of awareness, participation, and preparedness within the community regarding disaster risk management. Secondary data were drawn from academic literature, reports, and institutional publications from UNDRR, ADPC, and local government websites that document CBDRR practices in the selected case studies. For the analytical framework, the authors use the data triangulation between the desk research and the semi-structured interviews.

RESULT AND DISCUSSION

LESSON FROM CHRISTCHURCH, SIRNAJAYA AND BARANGAY BANABA

New Zealand is one of the countries located within the seismic or tectonic spectrum, as it lies at the convergence of the Pacific and Australian Plates. On 22 February 2011, a 6.3-magnitude earthquake struck Christchurch and nearby Lyttleton, causing severe damage and significant

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[32] (Nissen, Carlton and Wong 2022)

loss of life.[33] Many observers believe that this major earthquake was a continuation of the larger seismic event that occurred in September 2010.[3435] Although considered an aftershock, the 2011 earthquake resulted in far greater casualties than the one in 2010. This was primarily because the February quake struck during the lunch hour, with its epicenter located approximately 10 kilometers southeast of Christchurch's central business district.[36] The proximity to the city's commercial hub, combined with the timing when many people were outdoors or in office buildings, led to widespread casualties as numerous structures collapsed. Several victims were trapped in public buses hit by falling debris, while others were caught on upper floors during the tremor. Local television networks broadcast scenes of rescue teams retrieving bodies from the rubble, some alive, others deceased.[37] In response, Prime Minister John Key immediately declared a national state of emergency and imposed a nationwide curfew.[38] The declaration also led to the suspension of all flights to and from Christchurch.

The New Zealand government, under Prime Minister John Key, immediately deployed the military and established an official body, the Canterbury Earthquake Recovery Authority (CERA), to coordinate post-disaster recovery efforts.[39] However, recovery in Christchurch was not

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[33] Tonga, Manatu. 2023. *Christchurch earthquake kills 185.* 16 February. Accessed September 20, 2025. https://nzhistory.govt.nz/page/christchurch-earthquake-kills-185.

[34] BBC. 2011. *New Zealand earthquake: 65 dead in Christchurch.* 22 February. Accessed September 20, 2025. https://www.bbc.com/news/world-asia-pacific-12533291.

[35] Quinn, Ben, and Mark Tann. 2011. *New Zealand earthquake strikes Christchurch, killing at least 65 people.* 22 2. Accessed 9 20, 2025. https://www.theguardian.com/world/2011/feb/22/new-zealand-earthquake-christchurch.

[36] (Tonga 2023)

[37] (Quinn and Tann 2011)

[38] BBC. 2011. *New Zealand: Hundreds missing after Christchurch quake.* 23 February. Accessed September 20, 2025. https://www.bbc.com/news/world-asia-pacific-12555890.

[39] Francis, Tinu Rose, Suzanne Wilkinson, Sandeeka Mannakkara, and Alice Chang-Richards. 2018. "Post-disaster reconstruction in Christchurch: a "build back better" perspective." *International journal of disaster resilience in the built environment* 9 (3): 239-248. doi:https://doi.org/10.1108/IJDRBE-01-2017-0009.

driven solely by governmental initiatives; it also involved active participation from local communities, many of which emerged spontaneously to support the response and rebuilding process. Among the key community groups engaged were the Student Volunteer Army (SVA), Māori communities, and various church-based organizations. The SVA was not a new initiative; it had first been formed after the Darfield earthquake in September 2010.[40] Founded by Sam Johnson, then a university student, the movement originated through a Facebook page he created titled "Student volunteer-base for earthquake clean-up." Johnson explained that his motivation stemmed from frustration with the government's directive urging citizens to remain at home and refrain from taking action.[41] The initiative quickly attracted thousands of volunteers, particularly in coastal areas, who helped remove debris left by the quake, an effort that eventually drew the attention of Civil Defence authorities.[42]

Although the government was initially unable to fully control or restrict the actions of students and volunteers in both the September 2010 and February 2011 earthquakes, the widespread and positive media coverage of these groups led officials to adopt a more accommodating stance, recognizing them as legitimate partners rather than outsiders. In addition to student-led initiatives, farmers also organized themselves into what became known as the "Farmy Army." This group mobilized tractors and heavy equipment to clear debris from affected neighbourhoods (Mathewson 2011). Meanwhile, farming families, particularly women, baked bread and provided clean water to those in need. The foundation of these activities was deeply rooted in neighbourhood solidarity among communities directly impacted by the earthquake.

A similar condition can be observed in Barangay Banaba, a village located in Rizal, the Philippines. This area lies within the Marikina Valley, adjacent to both the Marikina and Nangka Rivers. The region has

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[40] (Nissen, Carlton and Wong 2022)

[41] 1News. 2025. *Newsmakers: Student Army founder reflects on leading from the front.* 19 April. Accessed September 20, 2025. https://www.1news.co.nz/2025/04/19/newsmakers-student-army-founder-reflects-on-leading-from-the-front/.

[42] (Nissen, Carlton and Wong 2022)

experienced multiple natural disasters, particularly typhoons followed by flash floods.[43] Such vulnerability is largely attributed to the Philippines' geographical position along the Pacific Ring of Fire and the Typhoon Belt, making it highly prone to natural hazards such as typhoons, floods, and volcanic eruptions. One of the most devastating disasters that recently struck Barangay Banaba was Typhoon Vamco, locally known as Typhoon Ulysses.[44]

Recognizing these persistent risks, the community has not remained passive. Various efforts have been implemented to minimize both material and human losses in the event of disasters. Among these initiatives is the establishment of Buklod Tao, a community-based organization founded in 1994.[45] Buklod Tao provides local residents with opportunities to develop knowledge and preparedness for disaster risk management while also collaborating with multiple stakeholders through research, funding, and technical assistance. Officially, Buklod Tao partners with the Center for Disaster Preparedness (CDP), a non-governmental organization responsible for developing the Banaba Disaster Risk Reduction program[46] (Tan et al., 2013). Within its operational framework, Buklod Tao implements a specific mechanism known as "The Pandora."

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[43] Malindog-Uy, Anna. 2020. *Philippines: Moving Forward After Ulysses.* 20 November. Accessed October 4, 2025. https://theaseanpost.com/article/philippines-moving-forward-after-ulysses.

[44] BBC. 2020. *Typhoon Vamco:Dozens dead as Philippines hit by powerful storm. Retrieved 4 October 2025.* 13 November. Accessed October 4, 2025. https://www.bbc.com/news/world-asia-54934373.

[45] Pineda, Maria Victoria G. 2012. "Exploring the potentials of a community-based disaster risk management system (CBDRMS), the Philippine experience." *International Journal of innovation, management and technology* 3 (6): 708-712.

[46] Tan, Debbie Valerie T, Enrico Luis P. Reyes, Jan Carmel P. Ricasio, and Jerald Vincent Y. Uy. 2013. "CREATING A COMMUNITY BASED DISASTER RISK MANAGEMENT SYSTEM." *the Research Congress 2013 De La Salle University Manila.* Manila. 1-7.
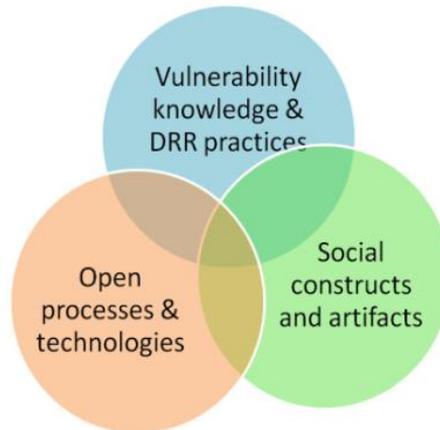
(Source: Pineda, 2012)

According to UN Women, during the occurrence of Typhoon Vamco, women and youth members of Buklod Tao played a vital role in disaster response by providing safe shelters and regularly distributing food supplies to affected residents.[47] Referring to the Integrating Gender into Community-Based Disaster Risk Management Training Manual published by the ADPC Center, women in the organization are trained to broadcast alerts persuasively and to assist in managing their living environments during disasters. Furthermore, Buklod Tao operates a Community-Based Early Warning System (CBEWS) that involves several action points, including local river monitoring using simple gauges[48] (Project Upturn, 2021). This activity entails direct observation of water levels in nearby rivers. When the water level reaches a critical point, community members conduct house-to-house alerts, an informal warning system that provides early notification, particularly for households located near the riverbanks[49]

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[47] UN Women. 2020. *UN Women Leads Humanitarian Response to Typhoon Ulysses in Luzon, Philippines.* 25 November. Accessed Ocotber 4, 2025. https://asiapacific.unwomen.org/en/news-and-events/stories/2020/11/un-women-leads-humanitarian-response-to-typhoon-ulysses-in-luzon-philippines .

[48] Project Upturn. 2021. *Community-based Early Warning System.* https://upturn.omlopezcenter.org/Solutions/Details?id=428.

[49] Seng, Loh Kang. 2014. "Typhoon Ondoy and the translation of disaster expertise in Barangay Banaba, Marikina Valley." *Philippine Studies: Historical and Ethnographic Viewpoints* 62 (2): 205-231. doi: https://doi.org/10.13185/2244-1638.4033.

(Seng, 2014). In addition to these informal mechanisms, Buklod Tao is also equipped with essential tools such as megaphones and bells to issue urgent warnings when necessary. Once disasters occur, the organization utilizes self-made boats and designated evacuation centres located close to high-risk areas.[50] Notably, Buklod Tao's rescuers often arrive on-site more quickly than formal government rescue teams. This high level of preparedness has proven instrumental in reducing casualties during disaster events, especially considering that Barangay Banaba is a community that constantly faces recurrent natural hazards.

The events in Christchurch and Barangay Banaba illustrate how community groups can learn from disasters and build preparedness for future crises. While both Christchurch and Barangay Banaba developed their initiatives in response to disasters that had already occurred, the case of Sirnajaya Village in Indonesia presents a different trajectory—one rooted in pre-disaster preparedness. Sirnajaya Village is located in Sukamakmur District, Bogor Regency, West Java.[51] The area lies within a hilly landscape surrounding Situ Rawa Gede, characterized by elongated ridges and slopes. The majority of residents in Sirnajaya earn their livelihood as coffee farmers.

Although coffee cultivation serves as both a primary economic activity and a basis for local tourism, it has also contributed to gradual land degradation. Satellite observations from Google Earth reveal visible soil erosion in the vicinity of Situ Rawa Gede.[52] Recognizing the increasing risk of landslides, several community-based groups, both academic and

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[50] Romero, Purple. 2013. *Providing A Safe Haven for Rescue Squads Families when Disaster Strikes.* 27 June. Accessed September 20, 2025. https://nextcity.org/informalcity/entry/providing-a-safe-haven-for-rescue-squads-families-when-disaster-strikes.

[51] Tijari, Ahmad, Hafid Abbas, and Jaenal Mutakim. 2024. "MEMPERKUAT KEBERLANJUTAN MASYARAKAT DESA SIRNA JAYA, BOGOR: PELATIHAN KESIAGAAN BENCANA UNTUK KELOMPOK POKDARWIS RAWA GEDE." *Jurnal Pengabdian Pendidikan Masyarakat* 34-43.

[52] Adhitia, Iit, Wahyu Gendam Prakoso, Irfan Marwanza, Muhammad Agus Karmadi, Singgih Irianto, Trisilo Hadi, and Solihin. 2023. "Pendampingan Teknis Desa Sirnajaya dalam Menghadapi Risiko Bencana Tanah Longsor." *Jurnal Abdi Masyarakat Indonesia* 5 (1): 10-23. doi:https://doi.org/10.25105/jamin.v5i1.16047 .

voluntary, have begun conducting educational programs and outreach activities aimed at raising awareness among residents. These initiatives focus on disaster preparedness and environmental management, highlighting the proactive role of local communities in mitigating potential hazards before they escalate into disasters. According to the official website of Sirnajaya Village, local residents—together with the Danramil (local military command), SAR teams, the Indonesian Red Cross (PMI), the Indonesian National Armed Forces (TNI), and the Regional Disaster Management Agency (BPBD), have conducted training sessions and established the Relawan Mandiri Tanggap Bencana (Mantab), or Independent Disaster Response Volunteers. The establishment of the Mantab team aims to equip volunteers with essential knowledge and skills in disaster management and life-saving operations.[53]

Within the framework of the Sendai Framework for Disaster Risk Reduction, such preparedness initiatives are integral to strengthening Community-Based Disaster Risk Reduction (CBDRR). Training programs of this nature enable local residents to better understand the risks inherent to their environment and to take proactive measures to mitigate potential impacts. Beyond government-led efforts, community preparedness in Sirnajaya is also supported by academic engagement. For instance, Universitas Pakuan, in collaboration with the village-owned enterprise BumDes Sinar Makmur, has conducted a community service program focusing on the development of a landslide vulnerability zoning map for Sirnajaya Village.[54] This mapping initiative allows residents to independently identify and assess high-risk zones, providing critical guidance for land-use planning, agricultural expansion, and the construction of housing or infrastructure. Through such collaborative and participatory approaches, Sirnajaya exemplifies how academic institutions

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[53] Supriadi, Enda. 2025. *Penutupan Pelatihan Relawan Kesiapsiagaan Bencana di Warungkiara Kab Sukabumi.* 18 June. Accessed October 4, 2025. https://sirnajaya.desa.id/artikel/2025/06/18/penutupan-pelatihan-relawan-kesiapsiagaan-bencana-di-warungkiara-kab-sukabumi.

[54] (Adhitia, et al. 2023)

and local communities can jointly operationalize the principles of the Sendai Framework at the grassroots level.

From the explanation above, it can be concluded that communities play a highly significant role in the process of disaster risk management. Referring to the Sendai Framework, this aligns particularly with its fourth priority: "Building Capacity for Disaster Preparedness towards Effective Response and to 'Build Back Better' in Recovery, Rehabilitation and Reconstruction." The preparedness demonstrated in Barangay Banaba and Christchurch reflects an ideal application of this principle, where readiness directly contributes to effective post-disaster recovery. Although the approaches differ; Christchurch relying more on spontaneous voluntary actions, while Barangay Banaba emphasizes institutionalized community mechanisms, both have achieved meaningful outcomes in disaster response and recovery. Similarly, the initiatives in Desa Sirnajaya illustrate how preparedness can be cultivated through collaboration among various stakeholders. Hence, the fourth priority serves as an appropriate framework to understand and strengthen community-based disaster risk reduction practices.

PATAKBANTENG SITUATION

Efficiency in disaster management is not measured necessarily by the speed of responsiveness of the state apparatus, but rather by the preparedness and resilience of the communities involved at the frontline of disasters. Local communities are the frontline responders, with the initial relief and the foundation for long-term rehabilitation processes. It can be charted by means of qualitative interview with three informants representing different segments from Patakbanteng Village, Gibran Ahmad Maulana as representative of the youth in the community, Azka As-shidiqi Achmad as representative of the student, and Mrs. Maesaroh as representative of family unit, to find out the strengths, weaknesses and potential of the community to build disaster resilience, especially in the higher altitude village surrounded by mountains.

One of the fascinating findings is the diversity of preparedness program understanding at the community level characterized by a duality in the presence of formalized initiatives and the utilization of informal

social capital. Gibran, for example, indicated that there is a regular program run annually in his community. This demonstrates an essential phenomenon where the community leverages accessible social capital; groups with corresponding capabilities such as navigation and first aid essentially function as de facto rapid response units. This is corroborated by Mrs. Maesaroh who, although never having witnessed it directly, has heard about it. Moreover, she refers to the existence of a formal system through 'representatives in TAGANA (Taruna Siaga Bencana)' at the local village level, which is the bridge between government agencies and the community. Conversely, Azka is convinced that 'to his knowledge, there are no' particular programs or units in his neighborhood. This difference in perception could be interpreted as meaning that preparedness programs are still not equitably distributed or their socialization is yet to penetrate all segments of society.

As the discussion turned around the level of personal understanding, a distinct trend of information gap began to take shape. Azka wrote that disaster mitigation knowledge is not on a level where 'only a few know it, such as the educated ones.' This indicates the high level of interconnection between school education and literacy in disasters. This is also indicated by Gibran and Mrs. Maesaroh, both of whom list school as their primary source of information. Gibran described how his expertise was due to 'standard safety induction which had been taught at school,' while Mrs. Maesaroh testified that she knew 'basic safety induction because there was disaster response training included in the school programs.' Such findings place schools in a very strategic position. But the biggest hurdle is Mrs. Maesaroh's discovery that 'at the family level, there is a lack of understanding of disaster mitigation.' This is demonstrated to be a 'break in the chain' of knowledge transfer from individual students to the family unit, indicating the necessity for a more holistic education programs involving the parents.

This lack of knowledge later compounds the spectrum of community response to disasters, ranging from self-preservation instincts to awareness of causality. Gibran provided a description of a reasonable and tiered response: the initial response if affected is 'self-preservation,' but in the non-

affected scenario, the response turns into 'sympathetic aid' combined with vigilance based on the level of threat. This is an indication of mature risk perception. Mrs. Maesaroh also responded with 'rescue' as the first reaction. The interesting one is the second, more reflective cognitive step, that of 'trying to find out the cause of the disaster, e.g., landslides as a result of deforestation.' This is a leap from reactive disposition to causal thinking, the foundation for long-term mitigation thinking. The insight that disasters might be human-made is a necessary asset for the mobilization of preventive action in the future.

Collectively, these various perspectives enable an overarching strand to be fashioned. Community resilience resides in the complementarity between organized programmes and unfettered social capital. But its effectiveness is still hampered by an enormous knowledge shortfall, where formal education in school is still the pillar but not yet internalized at home. Its rational reaction mechanism and growing sensitivity to the causative drivers of catastrophes form an enormous potential yet to be unleashed. Therefore, future efforts aimed at consolidating the role of the community must focus on the establishment of educational programs that directly target family units, in addition to consolidating the connection between formal institutions and informal social groups. In this way, the community will be able to transform from merely being an object of disaster management into a subject that is able to build the sustainability of its environment.

CONCLUSION

Examining the comparison among the three cases, it becomes evident that the implementation of Community-Based Disaster Risk Reduction (CBDRR) within the Sendai Framework encompasses multiple alternative mechanisms. Overall, such implementation is shaped by three interrelated components: community participation, institutional coordination, and knowledge integration. The cases discussed above illustrate how the first and fourth priorities of the Sendai Framework can be effectively realized at the grassroots level. In principle, this localized implementation produces more tangible outcomes for communities, as it operates without the constraints of lengthy bureaucratic chains of command.

The case of Christchurch serves as a concrete example of how community solidarity and emergent voluntarism can evolve into an organized recovery mechanism. Originating from the Student Volunteer Army (SVA), which began as a Facebook-based initiative, and supported by groups of farmers equipped with heavy machinery to remove debris, these collective efforts exemplify bottom-up disaster response in action. Although initially facing some challenges in coordination with formal disaster relief organizations, the government ultimately recognized their crucial contribution to the Build Back Better process following the earthquake. This case thus demonstrates that community resilience does not solely emerge from formal institutions; rather, the spontaneous and rapid responses of ordinary citizens can exert an equally significant impact on post-disaster recovery.

In contrast, the case of Barangay Banaba presents a different dynamic. Buklod Tao represents a structured community organization that operates with substantial government support throughout its processes. Its collaboration with non-governmental organizations (NGOs) has significantly strengthened the community's preparedness to face the recurring disasters that frequently affect the area. This ideal form of collaboration under Buklod Tao's leadership can be observed through its Community-Based Early Warning System (CBEWS), gender-sensitive participation, and locally designed evacuation protocols. Notably, the CBEWS incorporates volunteers' direct visual assessments of river water levels as a key element in issuing early warnings to nearby residents. The Banaba case thus illustrates how the combination of formalized institutional structures and local knowledge can effectively accelerate coordinated responses during disasters.

Desa Sirnajaya in Indonesia demonstrates a well-developed mechanism of collaboration among multiple stakeholders. Notably, the village has actively engaged with university students and academic experts to create a landslide-prone area map, enabling farmers and local residents to avoid high-risk zones. This initiative directly aligns with the first priority of the Sendai Framework: Understanding Disaster Risk. Through such collaboration, an effective transfer of knowledge occurs from experts to the

community, fostering long-term preparedness and empowering local volunteers to manage potential disasters more effectively.

Although Patakbanteng Village does not yet have a formally documented disaster response scheme, it is not without potential. A brief interview conducted by the author revealed both the existing capacities and limitations within the community. The presence of social cohesion, youth engagement, and community awareness regarding environmental degradation demonstrates an initial foundation for resilience. However, disaster literacy remains unevenly distributed across social groups. The interviews indicate that knowledge of disaster mitigation is concentrated among individuals with access to formal education, while awareness at the family level remains limited.

This condition should serve as an assessment point for nearby universities in Wonosobo to design community service or research programs similar to those implemented in Sirnajaya Village. For Patakbanteng, the path toward resilience depends on the harmonization of three key elements, community participation, knowledge dissemination, and institutional coordination, so that disaster risk reduction can become an integral part of everyday community life. Through this integration, the village can embody the Sendai Framework's principle of transforming local communities from passive recipients of policy into active agents of resilience and sustainable recovery.

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