

## Community and Stakeholders Towards A Sustainable and Inclusive Disaster Risk Reduction Policy

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**ABSTRACT:** Understanding disaster risk requires active engagement from both communities and stakeholders to foster preparedness and mitigation strategies. This study investigates how communities and stakeholders perceive disaster risks, how governments and stakeholders collaborate to strengthen DRR efforts, and the investments made by governments in enhancing resilience and preparedness. Employing a Multi-Criteria Decision Analysis (MCDA) approach, this research evaluates various factors influencing effective DRR implementation, including governance frameworks, financial mechanisms, technological innovations, and community participation. The findings reveal a critical gap between risk perception and preparedness actions within communities, shed light on the need for targeted education and awareness programs. Stakeholder engagement varies significantly across regions, with more developed areas demonstrating stronger collaboration frameworks. Governments play a pivotal role in institutionalizing DRR through legal frameworks, budgetary allocations, and public-private partnerships. Moreover, investments in climate-adaptive infrastructure, early warning systems, and capacity-building programs have proven effective in enhancing disaster preparedness. The study introduces a novel framework that integrates predictive analytics with community-driven risk assessments, demonstrating improved decision-making outcomes.

**KEYWORDS:** Disaster Risk Reduction; Community Participation; Disaster Development; Stakeholder Engagement, Governance Frameworks; Resilience Building; Disaster Mitigation

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### INTRODUCTION

Natural disasters and global health crises, such as the COVID-19 pandemic, have shown how important it is for communities and stakeholders to have a comprehensive understanding of disaster risk. Disaster risk understanding includes threat awareness, response capacity, and impact mitigation. Several previous studies have shown that social, cultural, and economic factors greatly affect people's understanding of disaster risk (Paton & Johnston, 2017). However, the challenge faced is the low level of disaster literacy in various communities, especially in developing countries, which results in unpreparedness in dealing with disasters (Rahman et al., 2020).

In addition to risk understanding, strengthening capacity for disaster risk is a crucial aspect in mitigation policies. The government and stakeholders play a role in building a strong resilience system through regulations, infrastructure, and training for the community. A study by Tierney (2019) highlights that disaster risk reduction policies often face bureaucratic constraints and budget constraints, especially in developing countries. Therefore, there is a need to develop collaborative strategies that involve the private sector and communities in strengthening disaster resilience. Technology-based approaches are also increasingly a concern, with the use of early warning systems and risk mapping as part of mitigation efforts.

Investment in disaster risk reduction is an integral part of strengthening community resilience and preparedness. Governments in various countries have begun to allocate budgets for disaster-resilient infrastructure, strengthening regulations, and increasing the capacity of human resources in dealing with disasters (UNDRR, 2021). However, debate still arises regarding the effectiveness of fund allocation, which is often more focused on emergency response than on preventive measures. For example, research conducted by Mechler et al. (2019) shows that every USD 1 invested in disaster mitigation can save USD 6 in emergency response costs. Therefore, more balanced investment policies between mitigation and response must be developed to improve long-term resilience.

The post-pandemic period also demands special attention in disaster risk management. The COVID-19 pandemic has taught us that health, economic, and social systems must be resilient to prolonged crises. Many stakeholders face challenges in rebuilding the affected economies, as well as preparing mitigation strategies for potential future health crises (Mendes et al, 2021). Most post-pandemic policies still focus on economic recovery, while aspects of social resilience and health often lack adequate attention.

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On the other hand, there is criticism of conventional approaches in disaster management that tend to be reactive rather than proactive. Several studies state that developing countries still do not have comprehensive policies in dealing with disasters that are multi-hazard (Kelman, 2020). This shows that there is an urgent need to strengthen early warning systems, integration of disaster risk data, and community-based approaches in disaster mitigation. In other words, an approach that relies solely on the government without the involvement of the community and the private sector has the potential to produce less effective strategies.

In the context of global policy, there is a tendency that developed countries are better prepared to deal with disasters than developing countries because of differences in resource and infrastructure capacity (Cutter et al., 2008). However, there are successful examples from several developing countries that have adopted community-based strategies, such as China in flood risk management. Studies show that this community-based approach can significantly increase community resilience and reduce losses due to disasters (Aerts et al., 2020). Therefore, the lessons learned from countries that have been successful in disaster mitigation need to be adapted into more inclusive national policies.

Ultimately, disaster risk reduction policies must be based on the principles of sustainability and inclusivity. Each stakeholder has a complementary role in building community resilience to disasters. By improving risk understanding, strengthening mitigation strategies, allocating effective investments, and improving post-disaster governance, it is hoped that the community can be better prepared to face various disaster threats in the future. By considering the various factors above, this study seeks to fill the gap in the study of public understanding of disaster risk, the role of stakeholders in strengthening resilience, and the investment needed in disaster risk reduction. This approach is expected to provide more applicable recommendations in the formulation of disaster mitigation and preparedness policies at various levels of government. Thus, a multidisciplinary and evidence-based approach is the main key in strengthening the disaster risk reduction system globally.

### LITERATURE REVIEW

In the context of Disaster Risk Reduction Policy, an approach oriented to preparedness and mitigation has developed in line with the increasing understanding of disaster dynamics influenced by social, economic, and environmental factors. Strengthening community and stakeholder understanding of disaster risk is one of the key factors in effective policy implementation. Wisner et al. (2004) emphasized that disaster risk is not only determined by natural hazards alone, but also by social vulnerability factors that can be remedied through inclusive and evidence-based policies.

However, there are differences of opinion regarding how much the community plays in understanding and dealing with disaster risks. Several studies show that community-based approaches can increase community awareness and adaptation capacity in dealing with disasters (Shaw, 2006). In contrast, other studies reveal that limited resources and technical knowledge within the community can hinder the effectiveness of this approach without intervention from the government and other stakeholders (Singh, 2017).

In addition, disaster risk reduction policies also need to consider governance and coordination factors between the government and other stakeholders. Birkland (2006) emphasized the importance of strong coordination mechanisms in the implementation of disaster mitigation policies, including through clear regulations and incentive systems that encourage the participation of various actors. In this context, the government has a strategic role in creating a policy ecosystem that allows the active involvement of the private sector and civil society in disaster risk reduction.

On the other hand, a structural approach that is too oriented towards top-down policies is also inseparable from criticism. Alexander (2018) highlights that policies that are too centralistic can hinder the flexibility of communities in responding to disasters independently. Several case studies in developing countries have shown that overly bureaucratic approaches can reduce the effectiveness of disaster response due to slow decision-making processes (Fan, 2013). Therefore, a hybrid model that combines bottom-up and top-down approaches is considered more adaptive in increasing community resilience to disasters.

Furthermore, government investment in disaster risk reduction is a key factor in improving resilience and preparedness. A study conducted by Mechler (2016) shows that adequate budget allocation for disaster mitigation can significantly reduce the economic impact of disasters. This is also reinforced by the research of Hallegatte et al. (2019) which revealed that investment in disaster-resilient infrastructure has greater long-term benefits compared to the cost of post-disaster recovery.

In terms of technology, advances in big data analysis and satellite-based monitoring systems have changed the way governments and stakeholders understand and manage disaster risk. Paul & Bhaumik (2022) noted that the application of AI-based technologies and geo-mapping systems can improve the accuracy of disaster prediction and enable faster responses. However, the main challenges in the application of this technology are access to digital infrastructure and increasing technological literacy at the community level.

In relation to post-disaster recovery, a sustainable approach is becoming an increasingly emphasized aspect of disaster risk reduction policies. WHO (2021) highlights that effective recovery is not only limited to physical reconstruction, but also includes social and economic aspects, including mental health and well-being of affected communities. Therefore, recovery strategies must involve close collaboration between governments, non-governmental organizations, and local communities.

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In the midst of the challenge of climate change, disaster risk reduction policies must also consider sustainability and long-term adaptation factors. IPCC (2022) emphasizes that increasing the frequency and intensity of disasters due to climate change requires a more holistic and science-based policy approach. Thus, the integration of climate adaptation policies with disaster risk reduction policies is a must to increase the resilience of communities to evolving threats.

### METHODS

Multi-perspective analysis is a comprehensive approach that integrates various viewpoints to provide a holistic understanding of complex issues (Frazao et al, 2018). This methodology is instrumental in disaster risk management, where multiple stakeholders, including the community, government, and private sector, must collaborate to assess, reduce, and respond to risks. By employing a structured multi-perspective analysis, we can bridge gaps in understanding and strengthen disaster risk reduction.

#### *Steps in Multi-Perspective Analysis*

##### 1. Defining Research Objectives and Scope

The initial step in multi-perspective analysis involves clearly defining the research objectives within the context of disaster risk reduction and preparedness. The study must formulate key research questions, such as how communities and stakeholders perceive disaster risk, how governments and stakeholders strengthen disaster risk reduction efforts, how governments invest in disaster risk reduction to enhance resilience and preparedness, and how stakeholders manage post-pandemic recovery.

##### 2. Identifying Stakeholders and Their Perspectives

The next step entails identifying key stakeholders who play a role in disaster risk reduction. These stakeholders include government agencies such as BNPB, BPBD, local governments, and policymakers; communities including residents, vulnerable groups, NGOs, and community-based organizations; the private sector comprising businesses, insurance companies, and infrastructure providers; and academia and researchers who contribute data-driven insights. After identifying stakeholders, their perspectives have been categorized into major dimensions, such as economic, social, environmental, and policy aspects, to understand how each group perceives and contributes to disaster risk reduction.

### DATA COLLECTION

This study employs a qualitative approach to gather comprehensive data. Qualitative methods include in-depth interviews, focus group discussions, and participatory observations, which facilitate a deeper exploration of stakeholder perspectives. Additionally, secondary data analysis is conducted by reviewing policy documents, disaster reports, and media analyses. To ensure inclusivity, the study actively engages marginalized and vulnerable groups in the data collection process. Once data are collected, the next step is integrating and analyzing them using various techniques. Multi-criteria decision analysis (MCDA) is employed to evaluate trade-offs among different stakeholder perspectives, while thematic analysis is performed on qualitative data to identify emerging themes from interviews and discussions.

Furthermore, the findings are then synthesized to identify converging and diverging viewpoints among stakeholders. This stage aims to analyze how different perspectives contribute to overall disaster resilience. Additionally, gaps in understanding and coordination among stakeholders are assessed to highlight areas that require improvement in disaster risk reduction policies and strategies. To ensure the accuracy and representativeness of the analysis, preliminary findings are presented to stakeholders through workshops or discussion forums. This process facilitates feedback collection, which is crucial for refining interpretations and addressing potential biases or errors in data processing. Furthermore, cross-validation of multiple data sources is conducted to enhance the credibility of the research findings. The final step involves compiling a comprehensive report that systematically presents the research findings, supported by visual aids such as graphs, GIS maps, and disaster models. The report is tailored to different audiences, including technical reports for policymakers, infographics for communities, and executive summaries for the business sector.

### RESULT AND DISCUSSION

#### 1. How The Community and Stakeholder Understand The Risk of Disaster

Communities often understand disaster risks differently, which influences their perceptions and preparedness actions in a varied way (Hideyuki et al, 2024). This is often due to the fact that the scientific language used by experts and related disaster institutions does not resonate with the general public, making it difficult for the public to understand. Community members tend to find metrics like "the number of affected people" more relatable than technical descriptions of hazard frequency and impact. In this section, we will show how different communities across various Indonesian cities provide insight into how they perceive and respond to disaster risk. In a city with susceptible to earthquakes and tsunami like in most of the Sumatra and Sulawesi islands, indicates that communities and local government typically possess a heightened awareness of catastrophe risk. Similarly, a study conducted by

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Ruddin et al (2022) shows how students in Padang, Sumatra Island responded to it, notably, there was no substantial disparity in risk perception between students who had encountered disasters and those who had not.

In the context of the city of Bandung, the assessment of public perception of disaster risk tends to show that people who are often affected have the ability to assess risk quite high in terms of knowledge and habits which then form signals against the potential threat of disaster in the future. This is strengthened through a study conducted by Asmara et al (2022) that the majority of the people of Bandung City receive flood mitigation programs implemented by the government. This is due to the intensity of annual floods that always occur which forms a pattern of community acceptance.

Meanwhile, if we look at the cities of Surakarta and Palu with the severity of the impact of the disaster quite severe, it shows that the increasing level of knowledge and understanding of the community in understanding disaster risk is based on periodic efforts over the past 10 years carried out by the local government through disaster awareness campaigns, early warning systems, Search and Rescue teams, and logistic support. Interestingly, this effort actually creates harmony and knowledge of the community in recognizing the potential for similar disasters in the future. However, another finding was revealed by Muryani et al (2021) that there was an attitude of community indifference in technical involvement in infrastructure maintenance. As a result, there is a tendency to rely on related parties (in this case the relevant government) to fully hand over the maintenance of water pumps and sluices. Although at this level, the community is willing to contribute financially and manpower resources through community service.

In the case of the Mount Merapi disaster in Yogyakarta City, marginalized communities such as homeless people, beggars, or people who have limited access to formal education, tend to have difficulty in achieving the necessary level of preparedness. The city of Yogyakarta, with its privileged status, has flexibility in formulating policies that are in accordance with local conditions. Yogyakarta Governor's Regulation Number 62 of 2020 is an example of specific policies that are prepared to deal with the threat of Mount Merapi eruption. In general, people living on the slopes of Mount Merapi have a close relationship with the mountain, both economically, socially, and spiritually. Reinforcing these conditions, Saifudin et al (2023) in their study also underlined that in Kinahrejo Hamlet, Yogyakarta City, various forms of local wisdom related to disaster mitigation are still practiced, such as traditional rituals and traditional knowledge about natural signs before eruptions. This wisdom helps them in making decisions when there is an increase in volcanic activity.

Therefore, our findings also show that overall if the impact of a disaster event is not significant or if the event is rare, then the risk perception will not have much effect. In other words, disaster experience alone is not enough to affect a person's risk perception because there is a factor in the level of seriousness of the disaster that also plays a role. When the impact of the disaster is more serious, the resulting risk perception will be greater. Communities with a better understanding of disaster risks are more likely to engage in preparedness activities. For instance Syed et al (2024), examine in Quetta, Balochistan, despite being in an active fault zone, most respondents had minimal interaction with warning systems and evacuation procedures.

### 2. How The Government is Investing in Disaster Risk Reduction for Resilience and Preparedness

The Indonesian government, in collaboration with various stakeholders, has been actively investing in disaster risk reduction (DRR) to enhance resilience and preparedness across the nation. These efforts encompass a range of initiatives, from large-scale infrastructure projects to community-based programs, tailored to address the specific needs of different regions. In December 2022, the World Bank approved a \$400 million loan to support Indonesia's National Urban Flood Resilience Project (Kull et al, 2016). This initiative aims to protect approximately 6.3 million people in cities such as Banjarmasin, Bima, Gorontalo, Manado, Medan, and Semarang from flood-related damages. The project focuses on enhancing both national and city-level flood risk management capacities through integrated investments, including the development of early warning systems and the implementation of both structural and non-structural measures.

The integrative approach in this project, such as early warning systems and a combination of structural and non-structural measures, is recognized in the literature as an effective strategy (Hallegatte et al., 2019). However, the main criticism of the program is its over-reliance on external funding, which can create long-term debt as well as the potential lack of sustainability of the project once the funds are exhausted. Meanwhile, the Giant Sea Wall project in Jakarta has become the main debate in flood mitigation policies. This means that this policy either offers a solution or becomes a new problem. Studies such as those conducted by Aerts et al (2020) show that this project can significantly reduce the risk of flash floods. However, criticism of the project arose from a social and ecological perspective. For example, environmental activists highlight the potential negative impacts on coastal ecosystems as well as fishing settlements that are in danger of being relocated (Ishiwatari & Sasaki, 2021). Economically, this project can also be considered non-inclusive because it benefits the business and real estate sectors more than marginalized communities.

As a result, the role of the community in understanding disaster risk tends to be misinterpreted in its continuity, especially after funding ends. In theory, risk-based budget allocation is more efficient and effective in reducing the impact of disasters (Mechler, 2016). However, practice in Indonesia shows bureaucratic constraints as well as potential budget misuse, which reduces the effectiveness of these policies. Furthermore, UCRA's "Urban Communities for Resilient Action" program demonstrates the

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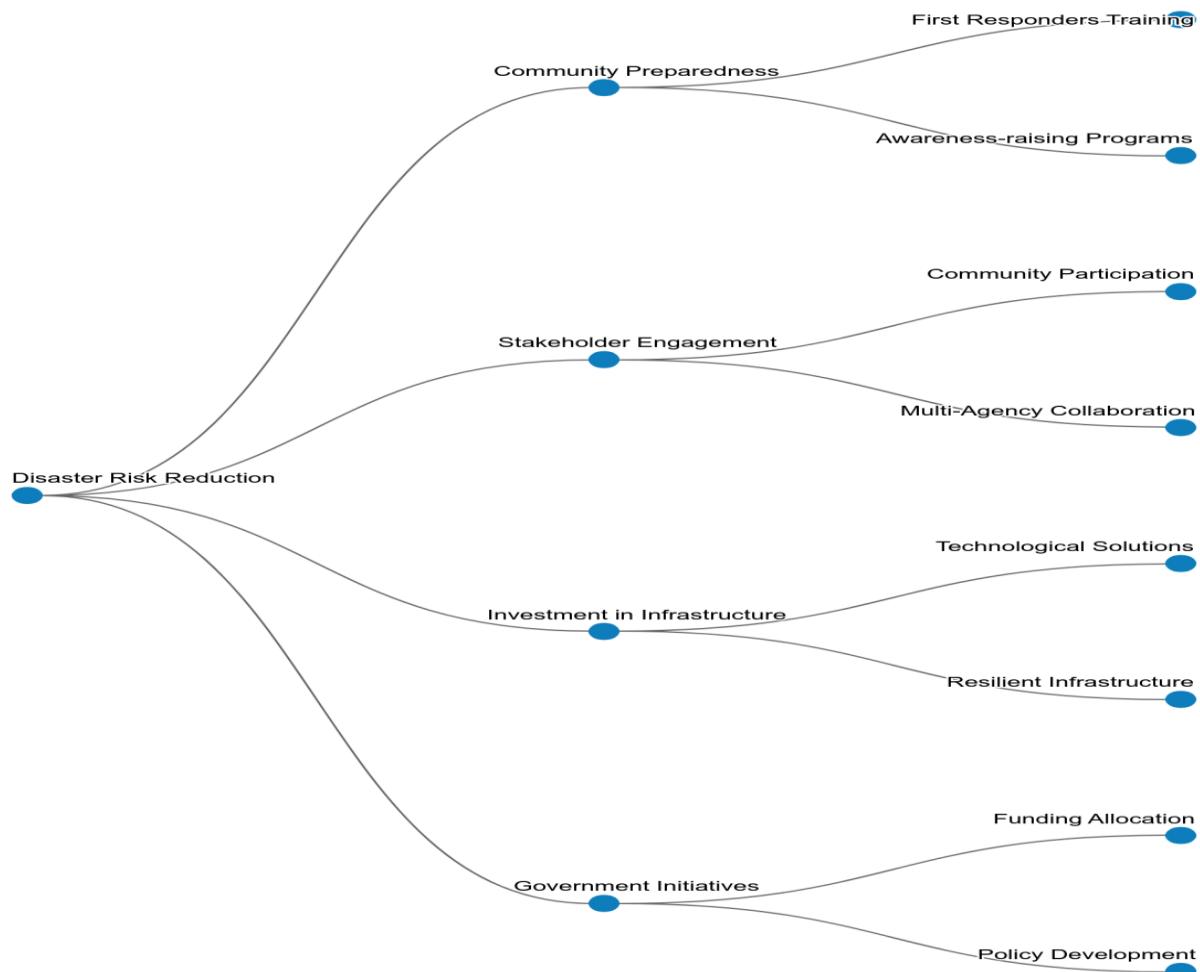
emergence of community-based approaches and partnerships with the private sector in improving disaster resilience. However, over time, reliance on foreign donor funding can hinder sustainable local capacity building (Shreve & Kelman, 2014).

In the academic literature, there is a debate between structural approaches (such as the Giant Sea Wall) and non-structural approaches (such as UCRA). Structural approaches are often criticized for their high costs and significant environmental impacts, while non-structural approaches are considered more inclusive but take longer to build effective resilience (Mechler et al, 2019). Ideally, a combination of these two approaches is necessary to achieve optimal resilience.

**Table 1. Data Investment in Disaster Risk Reduction**

| Investment Area            | Description                                                           | Examples                            |
|----------------------------|-----------------------------------------------------------------------|-------------------------------------|
| Disaster Protection        | Increased budgets post-disaster, linked to GDP and population density | Major flood-prone countries in Asia |
| Local Government Actions   | Multi-hazard risk assessments, urban planning                         | Giant sea wall, UCRA                |
| Institutional Coordination | Strong regional coordination and international recognition            | Urban Flood Resilience Project      |

According to Table 1, governments and stakeholders are strengthening disaster risk reduction through integrated climate and disaster resilience strategies, effective governance, multi-stakeholder partnerships, and targeted financial investments. The World Bank Group has been systematically integrating climate and disaster resilience into its support to low and middle-income countries. Further, investing in climate resilience often requires higher start-up costs but is cost-effective in the long term, with spatial planning that considers short-to-long-term risks reducing the possibilities of stranded assets. Data is presented in table 1 and figure 1 is to illustrate disaster risk reduction and resilience efforts, focusing on investing in DRR for resilience and systemic risk management within community resilience approaches.



**Figure 1. Conceptual Mapping of Disaster Risk Reduction**



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Conceptually, there are 4 key elements that this study presents in this section. First, training for first responders in community preparedness is certainly useful to increase the community's emergency response capacity. In Indonesia, this training has been well conducted, but in some cases it is often constrained by a lack of funds, trained human resources, and supporting tools. Previous research has shown that well-organized training can significantly reduce the initial impact of disasters (Djalante et al., 2017). In practice, this training often does not reach remote communities or marginalized groups. This marginal group tends to have an indifferent attitude towards various efforts made by the government. Therefore, to build understanding, prevention efforts are carried out faster with a high level of effectiveness in the general public compared to marginalized groups.

Awareness-raising programs are often another key component of community-based disaster mitigation. Effective campaigns can increase community preparedness to face disasters. However, the one-way approach that is often used does not always succeed in changing people's behavior (Hallegatte et al, 2019). At this level, the government makes various interactive efforts through technology-based disaster simulations in various tourist attractions, so that the disaster approach is carried out in a fun way. In some other areas, local methods are still used that are adapted to the local culture.

Second, community participation in stakeholder engagement, community participation is considered a key element in DRR. However, in Indonesia, community involvement in disaster cases is often limited to the implementation stage, not in planning. This is because the bottom-up approach that prioritizes the role of the community often clashes with the top-down approach that still dominates government policies. On the other hand, collaboration between institutions is also strengthened to overcome policy fragmentation. This disaster collaboration is not as easy as the implementation of collaboration between institutions in general, this is due to the fact that the collaboration process is often hampered by bureaucracy and conflicts of interest between institutions.

Third, technological approaches in Investment in Infrastructure, such as early warning systems, can provide enough time for people to save themselves. However, this is less relevant to conditions in areas with limited communication networks or in remote areas. Furthermore, in the aspect of infrastructure resilience, infrastructure development often does not consider long-term climate change and the needs of vulnerable communities. For example, the Giant Sea Wall project is considered to benefit the business sector over coastal communities. Ironically, the giant sea wall is currently experiencing water seepage or the condition of the wall's inability to counteract seawater discharge, so this is like a "time bomb" if efforts are not made to improve or improve the giant sea wall. Fourth, in government initiatives, it was found that budget allocations tend to be used more for disaster response than mitigation.

## CONCLUSION

The overall study highlights that the understanding of disaster risk, resilience strengthening, and investment in disaster risk reduction in Indonesia have improved significantly. Understanding disaster risk requires a comprehensive approach that involves both the community and stakeholders. The integration of participatory risk assessment and public awareness campaigns enhances society's preparedness and resilience. Stakeholders, including the private sector, non-governmental organizations, and academia, play crucial roles in disseminating knowledge and developing mitigation strategies.

Governments and stakeholders strengthen DRR by institutionalizing multi-stakeholder partnerships, ensuring cross-sector governance, and implementing evidence-based policies. The transition from reactive to proactive risk management frameworks, as seen in various national and international policies, significantly improves disaster preparedness. Investment in DRR become pivotal for long-term resilience. Sustainable financing mechanisms, legal frameworks, and integration with national development agendas ensure robust disaster preparedness. The case studies reviewed highlight how urban resilience, climate adaptation strategies, and technological advancements collectively enhance DRR effectiveness. Moving forward, embedding DRR within socio-economic planning and governance frameworks will be essential in minimizing disaster risks and fostering sustainable development.

The findings of this study offer practical implications for policymakers, practitioners, and communities. First, governments should enhance regulatory frameworks to enforce DRR measures, ensuring legal mandates translate into actionable policies. Second, integrating DRR into urban planning and infrastructure development will mitigate vulnerabilities in disaster-prone areas. Third, fostering cross-sector partnerships between government agencies, private enterprises, and civil society will enhance resource mobilization and knowledge sharing. Fourth, investment in technology-driven DRR solutions, such as AI-based early warning systems and climate-adaptive infrastructure, will improve disaster response capabilities. Finally, community-based disaster preparedness programs should be expanded, empowering local populations with knowledge and tools to mitigate risks effectively. These measures collectively contribute to a more resilient and adaptive disaster management system.

## REFERENCES

- 1) Aerts, J.P.M., Uhlemann-Elmer, S., Eiklander, D., & Ward, P.J. (2020). Comparison of estimates of global flood models for flood hazard and exposed gross domestic product: a China case study. *Natural Hazards and Earth System Sciences*. 20(12). PP 3245–3260. <https://doi.org/10.5194/nhess-20-3245-2020>.

- 2) Asmara, L.Y., Sagala, S., Azhari, D., & Rianawati, E. (2022). Public risk perception and public acceptance of the existing flood and drought mitigation measure in Bandung city. *IOP Conference Series: Earth and Environmental Science*. 986. DOI 10.1088/1755-1315/986/1/012044.
- 3) Clarvis, M.H., Bohensky, E., & Yarime, M. (2015). Can resilience thinking inform resilience investments? Learning from resilience principles for disaster risk reduction. *Sustainability*. 7(7). PP 9048 – 9066. 10.3390/su7079048.
- 4) Cutter, S.L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., & Webb, J. (2008). A place-based model for understanding community resilience to natural disasters. *Global Environmental Change*. 18(4). PP 598-606. <https://doi.org/10.1016/j.gloenvcha.2008.07.013>.
- 5) Frazão, T. D., Camilo, D. G., Cabral, E. L., & Souza, R. P. (2018). Multicriteria decision analysis (MCDA) in health care: a systematic review of the main characteristics and methodological steps. *BMC medical informatics and decision making*, 18, 1-16.
- 6) Hallegatte, S. Engle, & Nathan, L. (2019). The search for the perfect indicator: Reflections on monitoring and evaluation of resilience for improved climate risk management. *Climate Risk Management*. 23. 1-6. <https://doi.org/10.1016/j.crm.2018.12.001>.
- 7) Hideyuki, S., Ravindra, J., & Kaori, K. (2024). Integrating communities' perspectives in understanding disaster risk. *Natural Hazards*. 120(9). PP 8263-8282. 10.1007/s11069-024-06452-0.
- 8) Hodgson, R.W. (2007). Emotions and sense making in disturbance: Community adaptation to dangerous environments. *Human Ecology Review*. 14(2). PP 233-242.
- 9) Ishiwatari, M., & Sasaki, D. (2021). Investing in flood protection in Asia: An empirical study focusing on the relationship between investment and damage. *Progress in Disaster Science*. 12. <https://doi.org/10.1016/j.pdisas.2021.100197>.
- 10) Kelman, I. (2020). COVID-19: what is the disaster?. *Social Anthropology*. 28(2). pp.296-297. <https://doi.org/10.1111/1469-8676.12890>.
- 11) Kull, D., Gitay, H., Reid, R., Simpson, A., & McCall, K. (2016). Building Resilience: World Bank Group Experience in Climate and Disaster Resilient Development. *Climate Change Adaptation Strategies*.
- 12) Mechler, R. (2016). Reviewing estimates of the economic efficiency of disaster risk management: opportunities and limitations of using risk-based cost-benefit analysis. *Nat Hazards* 81, 2121–2147. <https://doi.org/10.1007/s11069-016-2170-y>.
- 13) Mechler, R., Calliari, E., Bouwer, L. M., Schinko, T., Surminski, S., Linnerooth-Bayer, ..... & Zommers, Z. (2019) Science for loss and damage. Findings and propositions. In: Mechler, R., Bouwer, L. M., Schinko, T., Surminski, S. and Linnerooth, & Bayer, J. (eds.) *Loss and Damage from Climate Change: Concepts, Methods and Policy Options*. Climate Risk Management, Policy and Governance (CRMPG). Springer, pp. ISBN 9783319720265 [https://doi.org/10.1007/978-3-319-72026-5\\_1](https://doi.org/10.1007/978-3-319-72026-5_1) Available at <https://centaur.reading.ac.uk/81490/>.
- 14) Mendes, J.M., Kalonji, G., Jigyasu, R., & Chang-Rhichards, A. (2021). Strengthening Disaster Risk Governance to Manage Disaster Risk. PP 1-147. 10.1016/B978-0-12-818750-0.09991-8.
- 15) Muryani, C., Koesuma, S., & Yusup, Y. (2021). PEOPLE PERCEPTION AND PARTICIPATION IN DISASTER RISK REDUCTION AT SURAKARTA CITY, CENTRAL JAVA, INDONESIA. *GeoEco*. 7(1). ALSO: <https://doi.org/10.20961/ge.v7i1.49126>.
- 16) Naheed, S. (2021). Understanding disaster risk reduction and resilience: A conceptual framework. *Handbook of Disaster Risk Reduction for Resilience: New Frameworks for Building Resilience to Disasters*. PP 1-25. 10.1007/978-3-030-61278-8\_1.
- 17) Paton, D., & Johnston, D. (Eds.) (2017). *Disaster resilience: An integrated approach*. (2nd ed.) Charles C. Thomas Publisher Ltd.
- 18) Paul, S. K., & Bhaumik, P. (2022). Disaster Management through Integrative AI. *International Conference of Distributed Computing and Networking*. <https://doi.org/10.1145/3491003.3493235>.
- 19) Rahman MA, Zaman N, Asyhari AT, Al-Turjman F, Alam Bhuiyan MZ, Zolkipli MF. (2020). Data-driven dynamic clustering framework for mitigating the adverse economic impact of Covid-19 lockdown practices. *Sustain Cities Soc*. 62:102372. doi: 10.1016/j.scs.2020.102372.
- 20) Ruddin, F., Nurhabibi, P., & Saputra, B. (2022). Perception of Disaster Risk in Students in Padang City Reviewed from Experience and Demographic Variables. *Kawista, Journal of Social Sciences and Humanities*. 12(2). <https://doi.org/10.22146/kawistara.72639>.
- 21) Saifudin, I.M.M.Y., Setyaningrum, N.,..... & Astuti, N.L.S. (2023). Disaster Health Literacy, Risk Perception, and Preparedness towards Resilience in a Volcano-Prone Community: A Cross-sectional Study in Yogyakarta, Indonesia. *Journal of Community Empowerment for Health*. 6(3). pp 154-164. <http://dx.doi.org/10.22146/jcoemph.86343>.
- 22) Shaw, R. (2006). Critical Issues of Community Based Flood Mitigation: Examples from Bangladesh and Vietnam. *Journal of Science & Culture*, 72, 1-17.
- 23) Shreve, C.M., & Kelman, I. (2014). Does mitigation save? Reviewing cost-benefit analyses of disaster risk reduction. *International Journal of Disaster Risk Reduction*. 10. PP 213-235. 10.1016/j.ijdrr.2014.08.004.

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- 24) Singh, C. (2017). Is participatory watershed development building local adaptive capacity? Findings from a case study in Rajasthan, India. *Environmental Development*. <https://doi.org/10.1016/J.ENVDEV.2017.11.004>.
- 25) Syed, A., Chamawang, S., Ariya, A., Daniel, A., & Abida, S.H. (2024). Community-level risk awareness and disaster preparedness: an exploratory investigation of Quetta, Balochistan. *International Journal of Disaster Resilience in the Built Environment*. 10.1108/IJDRBE-05-2024-0058.
- 26) Tierney, K. (2019). *Disasters: A Sociological Approach*. Cambridge, United Kingdom: Polity Press, 311 pages. ISBN: 978-0-7456-7102-4.
- 27) United Nations Office for Disaster Risk Reduction (UNDRR). (2021). *UNDRR Annual report 2021*. Pp 82. <https://www.undrr.org/publication/undrr-annual-report-2021>.
- 28) Wisner, B., Blaikie, P., Cannon, T. and Davis, I. (2004) *At risk: Natural hazards, people's vulnerability and disasters*. 2nd Edition, Routledge, London. [https://www.preventionweb.net/files/670\\_72351.pdf](https://www.preventionweb.net/files/670_72351.pdf).



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