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Post-Disaster Urban and Community Resilience: The Dynamics of Indigenous Communities Maintaining Environmental Sustainability in Makassar City

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ABSTRACT

The urgency of this research lies in the high risk of disasters in Makassar City each year, primarily floods, which threaten residents' safety, damage infrastructure, and disrupt the community's socio-economic stability. The purpose of this study is to explore the role of indigenous communities in maintaining environmental sustainability and increasing community resilience after a disaster through local wisdom. This research method uses a qualitative approach. Data were collected through in-depth interviews, direct observation, documentation, and Focus Group Discussions (FGDs) and analyzed using NVivo 12 Plus to identify patterns and relationships between variables. Data validity was strengthened by triangulation of sources, methods, and theories to ensure the accuracy of the research findings. This study confirms that indigenous communities in Makassar City play a strategic role in maintaining environmental sustainability while strengthening disaster mitigation and adaptation through local wisdom, including traditional early warning systems, disaster-resistant architecture, adaptive ecosystem management, and social solidarity. This role demonstrates that indigenous communities are not only inheritors of tradition but also key actors in building socio-ecological resilience. By integrating local and modern knowledge into policies, education, culture-based infrastructure, and multi-stakeholder collaboration, empowering indigenous communities can become the foundation for inclusive, sustainable, and disaster-resilient urban resilience.

1. INTRODUCTION

The background of this research is based on the fact that almost every year, Makassar City experiences a relatively high impact of disasters [1]. In early 2025, Makassar City also experienced a flood disaster that caused thousands of residents to be evacuated in several affected sub-districts [2]. Repeated disasters in Makassar City increase the vulnerability of the city and society by exacerbating environmental degradation, disrupting socio-economic stability, and weakening the capacity for adaptation and resilience to disasters in affected areas [3]. This situation highlights the importance of the role of all communities, especially indigenous communities and local groups, in maintaining environmental sustainability and increasing community resilience post-disaster. Local wisdom possessed by indigenous communities in Indonesia, in general, has become a crucial aspect in preserving natural resources and the environment, especially with the high potential for disasters [4]. Therefore, this study aims to explore the dynamics of indigenous communities in maintaining environmental sustainability in Makassar City, especially in the context of urban and community resilience post-disaster.

The presence of indigenous communities in Makassar City plays a strategic role as guardians of local wisdom and environmental conservationists, a practice that has been passed down through generations. Indigenous communities in this region not only maintain cultural traditions but also implement sustainable natural resource management practices, which are crucial in facing the threat of frequent disasters. The urgency of involving indigenous communities in post-disaster urban and community resilience efforts is increasingly crucial, as they possess unique local knowledge and adaptive capacities that can support disaster risk reduction while maintaining environmental sustainability amidst the pressures of climate change and rapid urbanization.

Various studies show that indigenous communities have a crucial role in maintaining environmental sustainability and reducing disaster risks through their local wisdom [5]. In Japan, communities implement a tradition-based ecosystem monitoring system to anticipate flooding and environmental changes [6]. Meanwhile, the Maori community in New Zealand integrates environmental stewardship values into natural disaster mitigation, such as landslides and earthquakes [7]. In the Philippines, the Ifugao maintain a system that serves as a natural buffer against erosion and flooding [8]. Studies in Canada show that First Nations communities play a crucial role in traditional knowledge-based natural resource management to reduce the impact of forest fires [9]. In Indonesia, the Baduy community in Banten maintains customary forests as natural protection zones that are effective

in resisting hydrometeorological disasters, such as floods and droughts [10]. These findings confirm that the local wisdom of indigenous communities can be a model for sustainable environmental adaptation in the face of disaster risks.

Various other studies also show that the resilience of cities and communities after a disaster is highly dependent on the integration of community-based adaptation (CBA) strategies [11], primarily through the local wisdom approach in environmental management and disaster risk mitigation [12]. Previous studies also revealed that traditional practices in ecosystem monitoring can help anticipate floods and environmental changes [13]. Several other studies also highlight the role of cultural values in maintaining the balance of nature and reducing the impact of landslides and earthquakes [14]. Other studies also show that natural resource management that adopts inherited knowledge can contribute to reducing the impacts caused by disasters [15]. Thus, the integration of local wisdom in adaptation strategies and environmental management plays an important role in increasing the resilience of cities and communities after a disaster.

Overall, post-disaster urban and community resilience refers to the ability of a region and its population to withstand, adapt [16], and recover from the impacts of a disaster [16], serta pulih dari dampak bencana [17]. This concept encompasses physical, social, economic, and environmental aspects that interact to build a resilient system [18]. Disaster-resilient urban infrastructure [19], early warning systems, and effective response and recovery mechanisms are essential elements of urban resilience [20]. Meanwhile, community resilience involves the capacity of individuals and groups to develop adaptation strategies, including strengthening social networks, utilizing local wisdom, and diversifying the economy to reduce vulnerability. Furthermore, the active participation of various stakeholders—including government, academics, the private sector, and local communities—is needed to ensure sustainable disaster mitigation and adaptation policies. This resilience is also influenced by risk-based spatial planning policies and sustainable natural resource management to reduce the potential for future disasters.

Although relevant research exists, there is still a lack of specific studies examining the same topics as in this study. Bibliometric analysis using VOSviewer shows that research on environmental sustainability, communities, and disasters remains limited, with only 23 documents found in a recent search. However, studies that simultaneously link indigenous communities to urban and community resilience are still minimal.

The bibliometric search did not restrict publication year and used the keywords *"Disaster," "Community Resilience," and "Communities"* to define the scope of analysis. Even with this broad search strategy, only 23 relevant documents were identified, indicating the limited scholarly attention to studies linking indigenous communities with urban and community resilience (see Figure 1).

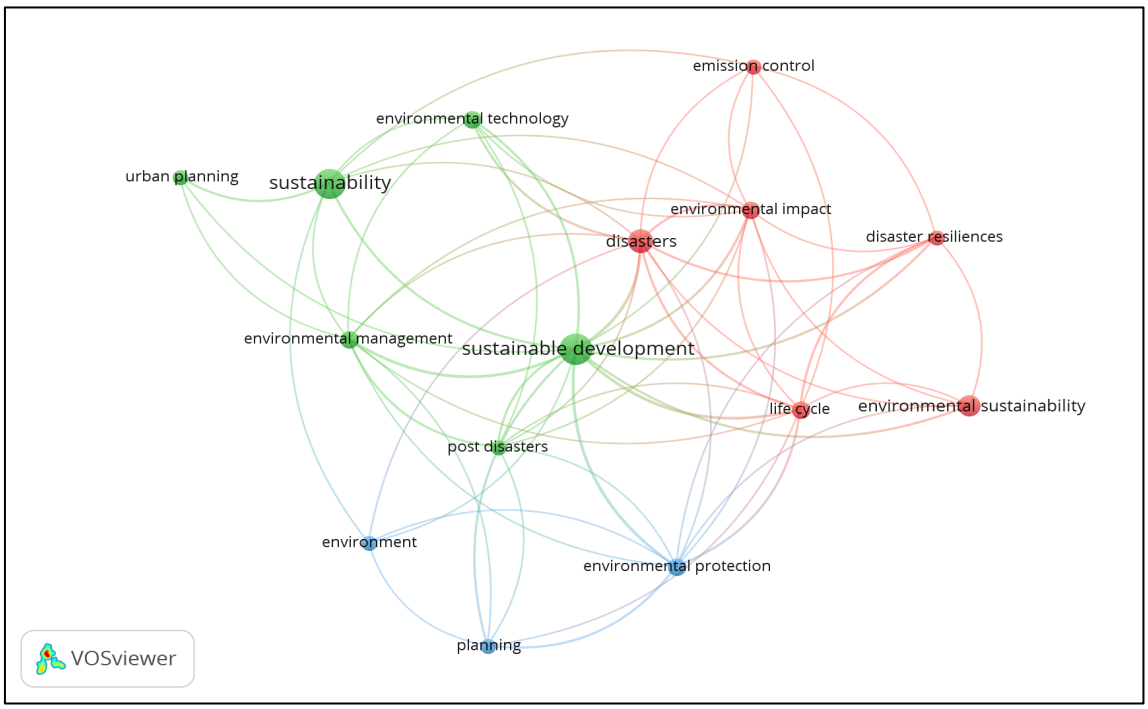

Figure 1. Current research mapping

The state-of-the-art in this research shows that most available studies focus more on community-based disaster mitigation or environmental sustainability in urban contexts. Although there are various studies on the role of communities in disaster risk reduction, approaches that consider the local wisdom of indigenous communities in strengthening urban resilience are still rare. The novelty of this research lies in its in-depth exploration of the contribution of indigenous communities in building urban and community resilience post-disaster through a local wisdom-based approach. Conceptually, the novelty lies in the integration of an indigenous CBA approach with a socio-ecological resilience framework in the context of urban resilience and post-disaster management. Thus, this research is expected to fill the literature gap and provide relevant policy recommendations for strengthening the role of indigenous communities in urban resilience governance. These findings also have the potential to form the basis for the development of more inclusive and

sustainable disaster adaptation and mitigation models.

Based on this background, this research focuses on three main research questions: (a) How are the dynamics of indigenous communities in maintaining environmental sustainability in Makassar City? (b) To what extent does local wisdom applied by indigenous communities contribute to mitigation and adaptation to disaster risks? (c) What policies can be proposed to strengthen the resilience of cities and communities post-disaster through empowering indigenous communities? These questions aim to understand CBA patterns and formulate more inclusive and sustainable policy strategies. Answering these research questions will provide a deeper understanding of the strategic role of indigenous communities in environmental management and sustainable disaster risk reduction. The research results will also form the basis for more inclusive and practical policy recommendations to strengthen urban resilience through empowering indigenous communities post-disaster.

Problem-solving approaches in the context of post-disaster urban and community resilience are analyzed through the perspectives of CBA and socio-ecological resilience [21]. CBA emphasizes the active role of communities in identifying risks, developing adaptation strategies, and utilizing local wisdom to increase disaster resilience. The innovation of this approach lies in the integration of participatory digital technology that supports real-time disaster risk monitoring by indigenous communities, thereby accelerating response and decision-making. In addition, this method incorporates the use of application-based communication platforms to effectively strengthen coordination between communities, government, and other stakeholders. Thus, this approach not only relies on local wisdom but also utilizes modern technology to increase community resilience and adaptation dynamically and sustainably.

2. METHOD

This research uses a qualitative approach with a case study method to understand the dynamics of indigenous communities in maintaining environmental sustainability and building urban and community resilience post-disaster in Makassar City. Data collection was conducted through in-depth interviews, direct observation, documentation, and Focus Group Discussions (FGDs). Interviews were conducted with key informants, including indigenous community leaders, local government representatives, academics, and non-governmental organizations working in the field of environment and disaster mitigation. This research project aims to interview 20 key informants selected purposively based on their roles and knowledge related to indigenous communities and environmental resilience. In addition, FGDs with 10 participants each will be involved to explore collective perspectives and community dynamics in depth. The FGDs also discuss sustainability strategies and community resilience in facing disasters. Purposive sampling and snowball sampling techniques were used to ensure diversity and representativeness of informants in this study.

The number of informants and FGD participants in this study was determined by the principle of information power and the depth of data needed to address the research objectives, rather than an arbitrary number. The selection of 20 key informants was based on the diversity of roles, experiences, and knowledge relevant to indigenous communities and environmental resilience, thereby ensuring a rich, comprehensive dataset. Furthermore, two FGDs with 10 participants each were deemed sufficient to explore collective perspectives and community dynamics, given the context's homogeneity and the focus of the issues discussed. Purposive and snowball sampling techniques were used to ensure the representativeness of relevant perspectives until data saturation was reached. Therefore, the sample size was methodologically determined and accounted for in accordance with qualitative research standards.

Direct observation focused on the sustainability practices and adaptation of indigenous communities to disaster risks. At the same time, documentation includes government regulations, disaster reports, academic studies, and media archives relevant to this research. The collected data were analyzed using NVivo 12 Plus software to identify patterns and relationships between research variables. The first step was to import data from interview transcripts, observation notes, documentation, and FGD recordings into NVivo. Next, coding was performed to group the data based on key themes, such as the role of indigenous communities in disaster mitigation, environmental sustainability practices, and post-disaster urban resilience strategies. The units of analysis in this study included informant narratives, analyzed policies, and social interactions within indigenous communities. Data visualization was performed using mind maps and word clouds to understand the interrelationships between concepts, and network analysis to display the relationships between actors and implemented strategies.

To enhance the transparency of the analysis, this study employed a mixed coding approach (inductive–deductive) in NVivo 12 Plus. The deductive process involved developing initial categories based on theoretical frameworks on indigenous communities, disaster resilience, and environmental sustainability. The inductive process then led to the emergence of new codes from informant narratives, observation notes, and FGD results, thereby allowing themes to develop naturally from the data. After all data were coded, the researchers conducted a constant comparison to confirm consistency across sources, then grouped the codes into themes and subthemes through node classification and hierarchical clustering in NVivo. This procedure ensured that the resulting main themes were valid, traceable, and firmly rooted in the empirical data.

Data validation was conducted through triangulation techniques of sources, methods, and theories. Source triangulation was conducted by comparing information from various informants, while method triangulation was conducted by confirming interview findings through observation and document analysis. Meanwhile, theory triangulation was used by comparing research findings with the concepts of urban resilience, environmental sustainability, and local wisdom in disaster mitigation. Furthermore, data validity was strengthened through member checking, where the analysis results were reconfirmed with informants to ensure the accuracy of interpretation. With this approach, the research is expected to provide a more comprehensive, in-depth understanding of the contribution of indigenous communities in building urban and community resilience post-disaster. The research results obtained were then compiled and reported to inform the progress of the research.

3. RESULTS AND DISCUSSION

This section focuses on the strategic role of indigenous communities in building urban and community resilience in post-disaster Makassar. This includes socio-ecological dynamics, the contribution of local wisdom, and policy directions that can strengthen adaptive capacity and environmental sustainability.

3.1 Dynamics of indigenous communities in maintaining environmental sustainability in Makassar City

The dynamics of indigenous communities in maintaining environmental sustainability in Makassar City are reflected in the various functions they have carried out for generations. These functions are manifested in concrete activities that not only preserve local wisdom but also strengthen the community's capacity to adapt to disaster threats. For example, the indigenous people of Niasang Village in Bontoa District are known to implement the para' sitammu-tammu agricultural pattern, which regulates land rotation to maintain soil fertility; the indigenous community in Tallo Village maintains bulu' tana (prohibited land space) and protects the old Jene' Tallasa well as a traditional water source, while the indigenous people of Barombong practice the knowledge of reading wind direction (angngaru' bosi) as an early sign of potential extreme weather [22]. Furthermore, the Bugis-Makassar stilt house architecture used by indigenous people on the Tamalate coast has been proven to be more resistant to tidal flooding and strong winds. The inclusion of specific examples such as these strengthens the local context, demonstrates the unique ecological practices of the Makassar indigenous people, and increases the credibility of the analysis in describing their dynamics in maintaining environmental sustainability.

Table 1 illustrates the strategic role of indigenous communities through their functions and activities in sustainable environmental management.

Table 1. Functions and activities of indigenous communities in maintaining environmental sustainability in Makassar City

Functions of Indigenous Communities	Activities Carried Out
Guardians of Local Wisdom	Preserving traditions, customary rituals, and nature management practices based on cultural values; conducting customary outreach on living in harmony with nature.
Environmental Conservators	Designating forests or lands as no-exploitation zones; protecting water sources; conducting community-based reforestation and greening activities.
Natural Resource Managers	Applying traditional farming patterns that consider land rotation, regulating the sustainable use of forest and marine products, and maintaining river ecosystems.
Social Mediators	Acting as a bridge among community members in resolving land or resource use conflicts, strengthening social solidarity through customary deliberations.
Traditional Disaster Mitigation Actors	Using natural signs as a traditional early warning system, building flood/wind-resistant houses with indigenous architecture, and protecting water catchment areas.
Education and Knowledge Transfer	Passing down environmental values and skills to younger generations through folklore, hands-on practices, and customary education.
Collaborators with the Government and NGOs	Participating in environmental, reforestation, and conservation programs; serving as strategic partners in community-based policy formulation.

The role of indigenous communities as guardians of local wisdom emphasizes the crucial role of cultural values in building environmental awareness. Through traditions, rituals, and natural management practices passed down through generations, indigenous communities can maintain a lifestyle in harmony with the ecosystem. Indigenous outreach activities conducted at the community level serve as an important means of transmitting ecological values to the younger generation. This aligns with the view that local wisdom is not only normative but also operational in maintaining the balance between humans and nature.

As environmental conservationists, indigenous communities designate certain areas as no-exploitation zones to ensure the sustainability of resources. This practice is evident in local policies to protect customary forests, preserve water sources, and even carry out community-based reforestation. Community-based reforestation is both an ecological and social strategy because it connects conservation with cooperation. This effort demonstrates that indigenous communities are capable of providing participatory environmental management mechanisms that are more sustainable than short-term project-based approaches.

In their capacity as natural resource managers, indigenous communities implement systems that prioritize land rotation, regulate the use of forest products, and preserve river ecosystems. These traditional systems reflect sustainable economic principles by preventing overexploitation. For example, specific cropping patterns tailored to ecosystem conditions not only ensure land productivity but also reduce the risk of environmental degradation. Thus, the contribution of indigenous communities to natural resource management is not merely a tradition but also a relevant adaptive strategy in the face of the pressures of urbanization and climate change.

In addition, indigenous communities also function as social mediators in maintaining harmony among community members. Conflicts over land and resource use often arise, especially in areas under high development pressure. Through customary deliberation mechanisms, conflicts can be resolved peacefully by prioritizing shared interests. This mediation function strengthens social solidarity, which in turn increases community resilience to external shocks. The existence of social mediators from indigenous communities demonstrates that social aspects are inseparable from environmental sustainability strategies.

Their role as traditional disaster mitigation actors is also a hallmark of indigenous communities. By utilizing natural signs as an early warning system, they are able to anticipate potential disasters before they occur. Furthermore, the flood- and wind-resistant architecture of traditional houses is clear evidence of the application of local knowledge in mitigation. Efforts to protect water catchment areas demonstrate the integration of disaster mitigation strategies with environmental conservation. This confirms that local wisdom is not only part of cultural heritage but also a relevant

adaptation mechanism for disaster risk reduction.

Finally, the role of indigenous communities as educators and collaborators further strengthens their role in sustainable environmental management. Through intergenerational knowledge transfer, ecological values and skills are maintained and contextualized. Meanwhile, collaboration with the government and NGOs creates space for the integration of traditional knowledge with modern technology. Participation in reforestation, conservation, and community-based policymaking programs demonstrates the potential for constructive synergy. Thus, indigenous community dynamics operate not only internally but also contribute externally to inclusive environmental and disaster management.

The dynamics of indigenous communities in maintaining environmental sustainability in Makassar City demonstrate their ability to adapt to changing times. On the one hand, they maintain traditional practices such as local wisdom-based natural resource management, while on the other, they are opening up to innovation and collaboration with various parties. The combination of traditional knowledge and modern approaches creates new adaptation patterns that not only preserve ecosystems but also increase community resilience to disasters. This demonstrates that indigenous communities have the capacity to navigate the challenges of urbanization and climate change without losing their cultural identity.

Furthermore, these dynamics demonstrate the role of indigenous communities as key actors in environmental governance and urban resilience. By serving as guardians of values, preservers of ecosystems, and strategic partners of the government, indigenous communities occupy a crucial position in building an inclusive socio-ecological resilience system. Their presence not only safeguards cultural heritage but also offers practical, community-based solutions that can be replicated in sustainable development policies. Therefore, strengthening the capacity of indigenous communities through regulatory support, funding, and formal recognition is a crucial step in ensuring their continued function in the future.

3.2 The contribution of local wisdom of indigenous communities to disaster risk mitigation and adaptation

The local wisdom of indigenous communities plays a crucial role in disaster risk mitigation and adaptation efforts, particularly in highly vulnerable areas like Makassar City (Figure 2). This knowledge, passed down through generations, serves not only as a cultural guideline but also as an adaptive strategy in dealing with natural hazards. The integration of traditional values with everyday environmental practices makes indigenous communities crucial actors in building community resilience. In general, this contribution can be mapped into the following four main aspects:

The contribution of the local wisdom of indigenous communities to traditional early warning systems demonstrates a high degree of adaptability to the environment. By observing changes in wind direction, animal behavior, and cloud conditions, indigenous communities are able to anticipate early signs of disasters. Although these methods are not based on modern technology, their existence is highly relevant in reducing response delays and minimizing potential losses. In Japan, traditional coastal communities use fish behavior and tidal changes as an early warning system to anticipate the arrival of tsunamis [23]. This demonstrates that local knowledge remains a crucial component of inclusive disaster mitigation strategies.

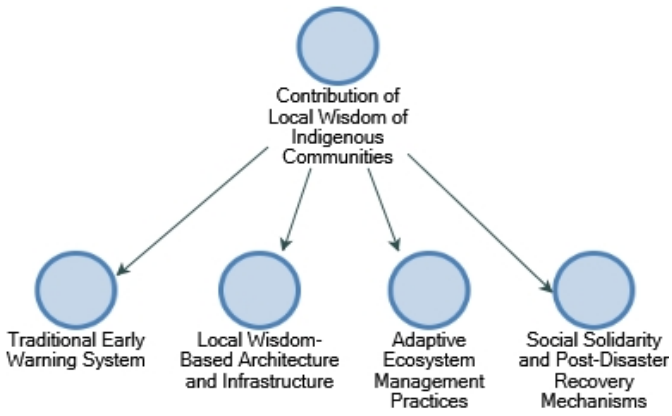

Figure 2. The contribution of the local wisdom of indigenous communities to disaster risk mitigation and adaptation

In addition, local wisdom is also reflected in traditional architecture and infrastructure designed to face natural challenges. Traditional houses are generally built with local, environmentally friendly materials and are more resistant to flooding or strong winds. The layout of traditional settlements also takes into account safety aspects and the ecological function of the area. In Japan, traditional minka houses are built with flexible wooden structures and sloping thatched roofs that can withstand earthquakes and reduce the risk of damage from snow and strong winds [24]. Thus, this practice not only preserves cultural values but also serves as a model for resilient and sustainable infrastructure development amidst the threat of disasters.

In terms of ecosystem management, indigenous communities implement adaptive strategies based on ecological balance. Practices such as crop rotation, protection of water catchment areas, and prohibition of overexploitation are concrete forms of risk mitigation against hydrometeorological disasters. These efforts ensure that resource availability is maintained without causing environmental degradation. In the Philippines, the Ifugao indigenous community implements a rice terrace system with crop rotation and traditional water management that maintains ecosystem balance while preventing landslides and flooding [25]. Thus, ecosystem sustainability is a key foundation for long-term community resilience.

Finally, social solidarity is a key strength for indigenous communities in facing and recovering from disasters. The values of cooperation, deliberation, and indigenous social networks accelerate the recovery process, both in material and psychosocial aspects. This collective support enables communities to rise together, reducing trauma and strengthening social cohesion. In Nepal, the Newar indigenous community practices social solidarity through the gotong royong guthi system, which has been proven to accelerate recovery after the 2015 earthquake by mobilizing collective aid and support for affected residents [26]. Thus, local wisdom is not only an adaptation strategy but also essential social capital for community resilience after a disaster.

The local wisdom of indigenous communities in disaster risk mitigation and adaptation demonstrates both strengths and limitations that require critical examination. On the one hand, traditional practices such as natural sign-based early warning systems, eco-friendly architecture, sustainable ecosystem management, and social solidarity have proven effective in building community resilience, even recognized in countries such as Japan, the Philippines, and Nepal. However, on the

other hand, local wisdom is at risk of being eroded by modernization, lifestyle changes, and limited documentation and knowledge regeneration. The main challenge is how to integrate local knowledge with modern technology without losing the cultural values that underpin it. Therefore, an inclusive disaster mitigation strategy needs to position local wisdom not merely as a complement but as a source of knowledge that can be synergized with contemporary science to strengthen community resilience in the era of climate change.

However, to strengthen the link between global examples and the local context of Makassar, a discussion of the contributions of local wisdom needs to explicitly demonstrate how similar practices are also implemented by local indigenous communities. For example, the Bugis-Makassar traditional stilt houses with their flexible wooden structures, undercarriage spaces for water runoff, and wind-resistant passiringanna construction have proven effective in reducing the impact of tidal flooding and strong winds in coastal areas. Knowledge of natural signs such as west-east wind patterns, changes in river estuaries, and the behavior of certain marine animals also serves as a traditional early warning system still practiced by the coastal indigenous communities of Tamalate and Tallo. The para' sitammu-tammu land rotation farming pattern adopted by the Bontoa indigenous community serves to prevent erosion and reduce the risk of flash floods. By linking international examples with local practices like these, the analysis becomes more contextual. It demonstrates that Makassar's local wisdom not only aligns with successful global practices but also has unique characteristics that strengthen community resilience to disasters.

3.3 Policy proposal to strengthen post-disaster urban and community resilience through empowerment of indigenous communities

Experience shows that indigenous communities possess local wisdom that has proven effective in responding to disasters, through mitigation, adaptation, and post-disaster recovery strategies. However, the role of indigenous communities is often not optimally integrated into disaster management policies at the city and national levels. Empowering indigenous communities can strengthen community capacity and enrich resilient development strategies with a culture-based approach. Therefore, policy proposals are needed that combine local wisdom with modern policies to strengthen the resilience of cities and communities post-disaster (Figure 3).

The integration of local wisdom into disaster management systems is important because traditional knowledge has proven to be able to complement modern technology, which often has limitations in local aspects. For example, in Japan, the tsunami tendenko system—a traditional practice that emphasizes the importance of immediately fleeing to higher ground as soon as danger signals appear, without waiting for official instructions—was proven to save many lives during the 2011 Tohoku earthquake and tsunami [27]. This practice shows that policies that integrate local wisdom into formal systems can improve rapid response and reduce loss of life. For indigenous communities in Makassar City, a similar model can be implemented by combining local knowledge of natural signs with modern warning systems, so that communities are more responsive and have an effective early response mechanism in dealing with disaster risks.

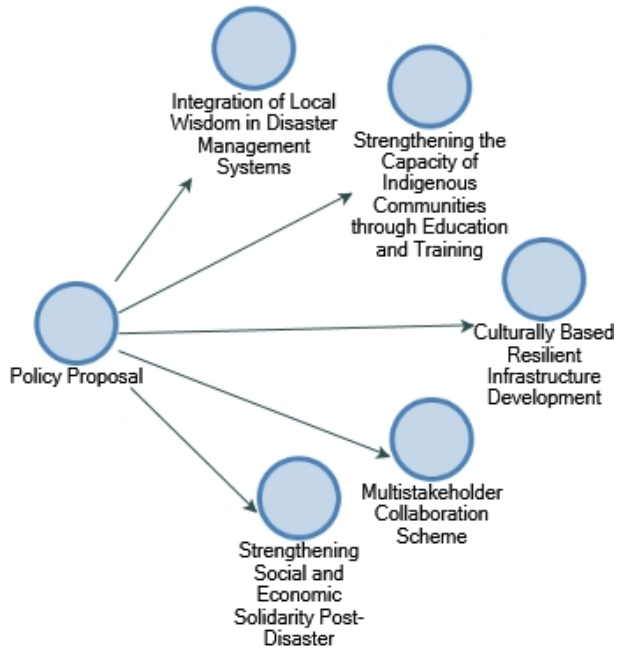

Figure 3. Policy proposal to strengthen post-disaster urban and community resilience through the empowerment of indigenous communities

Strengthening the capacity of indigenous communities through disaster education and training is a strategic step to ensure the sustainability of local knowledge while strengthening adaptation to modern challenges. In the Philippines, for example, the government and NGOs collaborate with the Aeta indigenous community in a disaster education program that combines local wisdom—such as reading natural signs—with modern disaster science, so that the younger generation has a comprehensive understanding of how to deal with disaster risks [28]. This model has successfully increased preparedness while maintaining the relevance of local wisdom amidst climate change and urbanization. For indigenous communities in Makassar City, a similar approach can be adopted by involving the younger generation in integrated training that combines indigenous practices, such as traditional disaster-resistant settlement patterns, with modern early warning technology to maintain strong and sustainable community capacity.

Developing resilient, culturally-based infrastructure is a crucial step in creating sustainable, disaster-safe cities. Adaptive, environmentally friendly traditional architectural principles, combined with the use of local materials, have been shown to reduce vulnerability to disasters while preserving a community's cultural identity. A concrete example can be seen in Japan, with traditional minka houses constructed with flexible wooden structures to withstand earthquakes and sloping thatched roofs that withstand snow and strong winds [29]. This practice demonstrates how combining local wisdom with modern construction standards can produce resilient infrastructure that is both culturally rooted. For Makassar, indigenous communities can adopt a similar approach by combining the flood-resistant Bugis-Makassar stilt house design with modern construction technology to create a safe, comfortable, and sustainable residential environment.

On the other hand, multi-stakeholder collaboration schemes are crucial in strengthening community resilience after a disaster. Integrating indigenous knowledge with academic expertise, government support, and private sector innovation

can create a more inclusive and effective disaster management mechanism. Successful practices can be seen in Bangladesh, where local communities, NGOs, the government, and international institutions collaborated in a community-based disaster risk reduction (CB-DRR) program. This collaboration resulted in an early warning system, the development of flood-resistant infrastructure, and increased community capacity that has been proven to save many lives during cyclones [30]. This model is relevant for adoption by indigenous communities in Makassar City, emphasizing the synergy between local wisdom, academic research, and technological support, so that disaster management mechanisms become stronger, more participatory, and more sustainable.

4. CONCLUSION

The main findings of this study indicate that indigenous communities in Makassar City play a strategic role in maintaining environmental sustainability while strengthening disaster risk mitigation and adaptation. Through their functions as guardians of local wisdom, environmental conservationists, natural resource managers, social mediators, and traditional disaster mitigation actors, indigenous communities are able to provide participatory and sustainable environmental management mechanisms. Local wisdom, manifested in natural sign-based early warning systems, disaster-friendly architecture, adaptive ecosystem management practices, and social solidarity, has proven relevant in addressing contemporary disaster threats. The combination of traditional knowledge with modern approaches further strengthens communities' capacity to respond to climate change and urbanization pressures without losing their cultural identity.

In the context of post-disaster urban and community resilience, the dynamics of these indigenous communities demonstrate that they are not merely inheritors of tradition but key actors in building socio-ecological resilience. Integrating local wisdom into disaster management policies, strengthening capacity through education, developing resilient, culture-based infrastructure, and multi-stakeholder collaboration are pathways to expanding the contribution of indigenous communities at the city level. Thus, empowering indigenous communities in Makassar City can lay the foundation for creating inclusive, sustainable urban resilience that can minimize the impact of future disasters.

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