Original Research Article

THE OLD WAYS: BLAAN TRIBE INDIGENOUS KNOWLEDGE IN DISASTER RISK REDUCTION IN THE MUNICIPALITY OF MAGSAYSAY, DAVAO DEL SUR

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ABSTRACT

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| **Aims:** This study conducted research on the Blaan Tribe's indigenous knowledge in disaster risk reduction, that is, earthquake preparedness and response, within the Municipality of Magsaysay, Davao del Sur. The study wanted to document the traditional strategies being used by the community towards earthquake risk mitigation and to test their relevance with modern urban disaster management practices.  **Study design:** The study used Qualitative Descriptive Phenomenological Design.  **Place and Duration of Study:** Barangay Balnate, Magsaysay, Davao del Sur, Philippines, between January 2023 and July 2023.  **Methodology:** Seven Blaan Tribe participants, who were purposively sampled, participated in focus group discussions (FGDs). FGDs were conducted with a validated semi-structured interview guide. Data were analyzed using Braun & Clarke's six-step thematic analysis to derive emerging themes related to indigenous disaster preparedness strategies. Ethical clearance was provided by the University of Mindanao Ethics Committee, and informed consent was sought from all participants.  **Results:** Thematic analysis revealed that the Blaan people relied on environmental indicators such as unusual animal behavior, changes in water levels, and changes in wind patterns as precursors to earthquakes. Their adaptation strategies were constructing elevated wooden houses with support from large stones to absorb the shock and performing practical measures based on environmental observations. The communities emphasized the importance of passing indigenous knowledge orally to be able to provide community resilience. The study also found that while these indigenous methods proved effective, they were not necessarily incorporated into official disaster preparedness schemes.  **Conclusion:** Indigenous knowledge is the foundation of disaster risk reduction among the Blaan Tribe. They could be tapped, identified, and integrated into traditional disaster management methods to enhance the resilience of the community. Drawing from the research, the local government units should design culturally responsive disaster preparedness policies that would utilize indigenous ways and scientific technologies in disaster risk reduction. |

*Keywords: Indigenous knowledge, earthquake preparedness, disaster risk reduction, Blaan Tribe, local government intervention*

1. INTRODUCTION

**1.1 Background of Study**

Throughout the years, the world has become increasingly worried about natural calamities, particularly earthquakes that have led to massive destruction in different parts of the globe. The Philippines is one of the most disaster-struck countries owing to its position within the Pacific Ring of Fire where earthquakes, volcanic eruptions, and tsunamis happen frequently (Jha, 2018). Certain recent outbreaks of seismic activity like the Midanao region’s famed 6.3 magnitude earthquake that caused both fatalities and an alarming number of displaced citizens in Magsaysay, Davao del Sur (Bonquin 2019), clearly illustrate the lack of pro-active disaster management along with a worrying trend in disaster preparedness and risk management paradigms.

Standard approaches to the management of the calamity typically tend to apply scientific and mechanistic solutions while completely ignoring the importance of local educational approaches. Integration of conventional and modern approaches to DRR is acknowledged by the United Nations Office for Disaster Risk Reduction (UNDRR) as a useful way alongside the merging of more traditional methods for the development of stronger society (Guterres 2022). On the contrary though, because of policies, Osorio (2020) suggests that Indigenous Knowledge is unappreciated and unable to be mainstreamed despite its success in preempting and controlling the impacts of natural threats.

The Blaan Tribe of indigenous people settled in Magsaysay traditionally depended on old disaster risk reduction measures. Academic research indicates indigenous knowledge is crucial in understanding hazard patterns at a local level as well as local resilience strategies (Ford & Harper, 2020). This traditional wisdom never finds its place in formalized disaster preparedness plans, narrowing the holistic response of DRR efforts.

**1.2 Theoretical Framework**

This study is anchored to Warren’s (1991) Indigenous Knowledge Systems Theory, which states that indigenous knowledge is a vibrant, community-centered system that is crucial in alleviating environmental hazards, especially during disasters. This theory explains that indigenous knowledge is not a relic of the past; it is a living reality that develops as people undergo social experiences, pass them on to the younger generation, and respond to various changes in nature. It underscores the strong bond that indigenous people have with nature, where proactive measures for disaster risk reduction (DRR) like the building of earthquake-resistant houses and the reading of environmental signs take place. Warren’s framework suggests that there is indigenous knowledge which, when complemented with scientific knowledge, produce a more comprehensive DRR and development strategy. Instead of condemning indigenous practices as primitive, or as an inferior version of science, this view appreciates them as real phenomena and as useful tools for understanding and addressing natural danger. As the study aims to demonstrate the role of indigenous knowledge as a resource for disaster resilience, it corresponds to Warren’s assertion on the need to develop responsive disaster management plans that honor local knowledge and incorporate scientific progress so that indigenous systems can function, evolve, and be used in disaster management planning at all levels.

Despite enhanced recognition of indigenous knowledge in disaster risk reduction, there were limited studies that investigated its practical application in the Philippine context, particularly among the Blaan Tribe. Existing disaster management frameworks were dominantly found on scientific methods, which in many instances excluded the efficacy of traditional methods. There was a lack of empirical evidence on how indigenous people comprehended environmental signals to predict and mitigate disaster impacts. This study bridged the gap by documenting systematically the disaster preparation system of the Blaan Tribe indigenous community and making practical recommendations to include them in formal DRR plans.

This study was significant in the sense that it provided meaningful information on how indigenous knowledge would complement existing disaster risk reduction activities. In documenting the traditional practices of the Blaan Tribe, this paper contributed to the preservation of indigenous cultural heritage and provided evidence regarding the relevance of ancestral wisdom in contemporary disaster preparedness. To local government units (LGUs), the findings offered policy-relevant recommendations on how indigenous knowledge could be mainstreamed in disaster risk reduction policy and enhancing community-based readiness and resilience. Disaster management offices would also benefit from this research through mainstreaming indigenous warning systems and construction technologies in their capacity-building activities. Furthermore, the study provided an arena for the use of further research on indigenous knowledge in resilience in disasters as an inspiration for policymakers and scholars to capitalize on the complementarity of scientific tactics with traditional knowledge.

**1.3 Research Objectives**

This study aimed to investigate how local and indigenous knowledge in the Municipality of Magsaysay contributes to disaster risk reduction in times of the occurrence of natural calamities. In detail, it ventures into the following questions: In this study, it aims to point out:

1. Identify the traditional indicators used by the Blaan Tribe to detect impending earthquakes.
2. Analyze how indigenous people preserved and transmitted disaster risk reduction knowledge.
3. Provide recommendations for local government units in integrating indigenous knowledge into formal disaster management policies.

2. methodology

**2.1 Participants**

The qualitative study had a total of seven (7) participants, as recommended for phenomenological research design by Creswell and Creswell (2018). Moser (2018) clarified that FGDs function optimally with controlled participant numbers to ensure the collection of authentic data. Purposive sampling, a non-probability technique in which participants were selected based on some characteristics relevant to the study, was utilized by the researchers. Nikolopoulou (2022) stated that purposive sampling, or judgmental sampling, allows researchers to select individuals who can provide the most meaningful information.

The research subjects were the individuals chosen by the barangay chieftain of the Blaan people based on the following criteria: (1) possessors of indigenous knowledge transmitted to them by their ancestors on disaster preparedness; (2) rightful Blaan community members in the area of focus; and (3) regular practitioners of indigenous knowledge in case of an earthquake. Exclusionary criteria were (a) other municipalities' members of Blaan and (b) non-Blaan residents in the study area.

**2.2 Instruments**

The researchers used guide questions validated by a pool of experts. In this research, it employed open-ended questions, in order not to give participants a predetermined set of answer choices and, hence, enabled the participants to provide answers based on their own experience and words. To address the study topic, the researchers requested precise data. Busetto, Wick, and Gumbinger (2020) said that sometimes “guide questions” are referred to as the interview procedure; this is the list of suggested questions for an interview. Guiding questions is open-ended and encourage respondents to contribute information in their own terms because they are qualitative in nature and are neither structured nor "closed." The research questions are guiding questions that request various types of data. In doing so, they create what is frequently referred to as a semi-structured interview, even though it can be used in a variety of ways.

The researchers used focus group discussions (FGDs) in collecting data because this is best suited to examine beliefs, perceptions, and explanatory research. According to George (2023), FGDs are best suited where questions evoke feelings, require detailed answers beyond a simple "yes" or "no," uncover new information, and provide raw real-life data from the participants.

**2.3 Design and Procedures**

This study employed a descriptive-phenomenological method to explore indigenous knowledge on earthquake preparedness. Qualitative research helps researchers understand participants' views and the meaning they attach to experiences (Hennink, Hutter, & Bailey, 2020). Phenomenological research records the nature of lived experience to describe a phenomenon satisfactorily (Delve & Limpaecher, 2022).

Researchers pilot-tested and established interview guide questions and scheduled FGDs to obtain information. First-time permissions were obtained from the Municipality of Magsaysay, Davao del Sur, and National Commission on Indigenous People thru their IPMR. While having discussions, audio recordings were made, transcribed, and coded with assistance from Braun and Clarke (2019) thematic analysis. Peer debriefing ensured reliability while data collection correspondence to study objectives (Castleberry, Nolen, & Nowell et al., 2018).

3. results and discussion

**3.1 On Detecting an Incoming Earthquake**

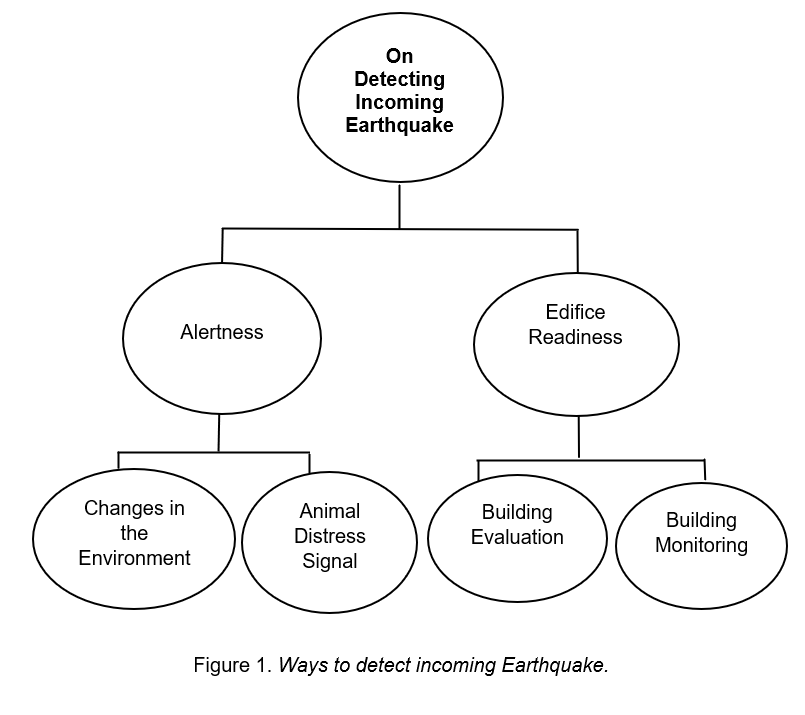
Figure 1 shows *alertness* as one of the core themeshighlighting *environmental changes*, *animals' distress signals*. The second core theme is *edifice preparedness* with sub-themes*, building evaluation and building monitoring.* It presents environmental sensitivity, community involvement, and psychological effects of environmental change.

**3.1.1 Alertness.** Disaster preparedness alertness involves the ability to detect early warning signs of impending an earthquake, including environmental changes and animal distress signals. Studies suggest that unusual natural phenomena, such as differences in ground water levels or unusual cloud formations, could be indicative of seismic activity (Mogi, 2022). In addition, animal behavior was discovered to be changing prior to an earthquake, as animals react to pre-seismic ground motion before humans perceive it (Grant et al., 2023). Increased public awareness and the integration of traditional observation with modern seismic monitoring networks will enhance the sensitivity of early warning systems (Liu & Chen, 2021).

***3.1.1.1 Changes in the Environment***. A higher level of alertness is essential for ensuring the safety of individuals and communities during an earthquake. Animals’ distress signals are useful indicators of an approaching earthquake. Creatures have an intrinsic aversion to normal peculiarities, and their way of behaving can frequently give early warning signs. It can alert humans to take immediate action and seek shelter if nearby animals appear agitated, restless, or exhibit unusual behavior. Additionally, sudden environmental shifts may signal the onset of an earthquake, as may birds suddenly taking flight. In connection with this, a manifestation of Blaan Elder 1 showcases these experiences:

*Isip usa ka tribu dong, ang imong palibot imong amigo, pinaagi sa pagpaminaw sa atong palibot makahibaw ta kung naay katalagman moabot. Epektibo ang kinaraang pamaagi sama sa pag obserbar sa palibot pareho atong year nineteen ay twenty-nineteen diay, nga ang mga iro mag alingasa ug kun kani mahitabo manggawas nami sa balay gunit akong apo kay siguro mo linog gyud.* (As a member of a tribe, the environment is your friend, by listening to our environment we can know when there is a disaster coming. The old method is effective like observing the surroundings, during the year twenty-nineteen, whenever dogs are barking abnormally, we go out of the house with my grandchild because probably an earthquake might occur.) *–* ***Line 9, Participant 1***

The statement is a crystal-clear indication that old ways play a vital role in disaster preparedness for the tribe. The distress felt by dogs gives immediate warning to the tribe in the upland area, enabling them to take the necessary precautions to reduce the risk of strong tremors. Miller (2022), in his article “The animals that detect disasters,” showcases the unbelievable behavior of dogs’ minutes before the strong earthquake and tsunami in Indonesia last year. These are accounts from survivors. Furthermore, Wikelski (2020) expresses that research suggests that the distance of an animal, such as a dog, from the impending earthquake or the epicenter allows the behavior of the animal to abruptly change.



It was firmly stated that sudden changes in the environment, such as the muteness of nature and hearing no sounds from animals or even insects, which is unusual to occur, is an old traditional way for the tribe to detect calamities. Members of the tribe living with nature observed it well a thousand times and familiarized themselves with every phenomenon; animals and insects are two of their drills (Coren, 2023). The experiences shared by the tribal elders about the precautions during earthquakes using old methods of observing nature enable a few families in Barangay Balnate to be safe and ready for the many strong aftershocks that occurred in Magsaysay, Davao del Sur.

***3.1.1.2 Animal Distress Signal.*** The essence of animal distress signals sent to tribes during an earthquake serves as an essential warning system. Animals exhibit behaviors that indicate their fear and discomfort as the environment shakes and becomes chaotic. Due to their proximity to the environment, the tribes have developed a profound comprehension of these signals. The tribes’ ability to anticipate imminent danger is aided by the frantic calls of birds, the agitated movements of livestock, and the unusual behavior of wildlife. They can quickly respond and take measures to shield themselves and their communities from the devastating effects of earthquakes. This was the coverage of the experiences of Blaan Elder 3:

*…Sa ako lang nakita pud sa balay kabahin anang imong pangutana nga makamatngon bag una ang hayop kaysa sa tao, akong masulti siguro kay sa among payag ang mga gungak nga gapuyo mana sa lapok manaka na ug balay, usahay naa sa moskit siguro mahadlok sila sa linog mag alingasa sad ba. Ang mga gangis manghilom usab, unya mo linog na dayun taud-taud.* (…Moreover, I observed in the house that part of your question, that animals can easily detect calamity than humans, I can probably say because in our hut the toads that live in mud climb up the house seeking refuge, sometimes they are in mosquito nets maybe they are afraid of the earthquake. When crickets are silent, sudden earthquakes will follow.) ***Line 11, Participant 3***

Grant's (2023) findings suggest that pre-seismic cues like gas and charged particles prompted toads to seek higher ground to bring themselves to safety. According to the NASA (2010) investigation, charged particles are blamed because rocks under extreme tectonic stress release positive ions that have the potential to affect animals. The ions may react with the water of the toads, resulting in a hydrogen peroxide environment that could be harmful to them and forcing them to move on. Tribal communities have a strong connection to the natural world and can intuitively sense danger and recognize signs of impending disaster. Keeping an eye on weather patterns, animal behavior, and natural elements are ways indigenous people anticipate disasters like earthquake (Kenny, 2019). Due to the unique sense organ of insects, strong receptors allow them to perceive changes in the earth’s magnetic field and infrared (20 Hz) produced by earthquakes, which is faster than ultrasound (>20 Hz), allowing them to avoid them by embracing various mechanisms (Bailey, 2019).

The “restlessness of animals” may denote catastrophes such as earthquakes; in this instance, when crickets, and locusts muted their sound, it was an indication of impending tremors, which was witnessed by a Virginia correspondent in Charleston when a strong earthquake struck in that vicinity (Oswald, 2021). For locals, such as tribes, the silencing of crickets prior to an earthquake is a common warning sign that gives them a chance to take safety precautions (Sigal, 2022). The indigenous knowledge they have helps them and their communities stay safe from upcoming disasters. The perceived significance of cricket silencing highlights the importance of traditional knowledge in natural disaster preparedness, despite the uncertainty of its scientific validity.

**3.1.2 Edifice Readiness.** Edifice readiness is the structural readiness of buildings to withstand seismic activity through ongoing monitoring and evaluation. Resilience of buildings depends on materials, construction, and adherence to updated seismic codes, according to recent studies (Kumar et al., 2023). Effective disaster risk reduction activities involve regular inspections of structures to identify weaknesses before an earthquake occurs (Yoshida & Tanaka, 2022). Moreover, sensor-based real-time monitoring and AI-driven predictive models have significantly improved structural weakness identification, which has improved the earthquake resilience of the structures (Rahman et al., 2021).

***3.1.2.1 Building Evaluation.*** Tribes and indigenous communities living in areas that are prone to earthquakes need to be ready for buildings and evaluate them. Life is safeguarded, and community resilience is bolstered by these practices. Traditional structures are built to withstand local environmental conditions, including seismic activity (Reddy, 2023). Building evaluations aid in the identification of potential flaws, the prevention of structural damage, and the education of community members regarding safe construction methods. Kurnio, Fekete, and Naz et al. (2021) laid down in their article that indigenous people in Baduy strictly regulate how to construct a house, and they have their own local wisdom for dealing with earthquakes: the house should not touch the ground and use adaptable resources like bamboo, wood, and leaves. Blaan elder 4 says equal:

*Sa unang mga gipangandaman sa mga tribu sauna kay ang linog talagsaon man lang, ang ingun sa akong amahan nga ang balay dili angay ilubong sa yuta kay mas kusog ug epekto sa balay kun nakalubong, ang gibuhat nga hangtod karon gisunod man lang gihapon namo sir mao gyud ang ipatong ang balay nga kahoy ngadto sa dagkung bato, ug kani epektibo basi sa akong experyensya atong linog, kay ug wala palang mi pugsa nga pababaon ni mayor diri sa relocation, magpabilin kos akong balay kay safety man ko.* (During the old times, the tribe had preparations for earthquake, though it unusually occurs, my father's testimony that the house should not be buried in the ground is stronger and the effect on the house is not devastated if buried. The wooden house is actually placed on a big stone, and it is effective based on my experience during the earthquake, if the mayor did not force us to transfer into the relocation, I will remain in my house at all costs because I'm safe.) ***Line 12, Participant 4***

The Blaan Tribe's earthquake-resilient culture of housing is guided by experience in employing low-cost and light materials to build long-lasting structures (Kurnio, 2021). The *Dasan Beleq Hamlet hamlet* in Indonesia's Lombok Regency gained earthquake avoidance from the employment of ropes and poles in conventional building of structures (Susanthi, Meisandy, & Nisa, 2022). Well-bonded foundation buildings also increase stability via earthquake flexibility, reducing building damage (Syamsuri & Sufianto, 2020). The same methods, used in constructing stone or reinforced concrete, provide long-lasting houses, which has been duplicated by the Blaan Tribe of Barangay Balnate.

***3.1.2.2 Building Monitoring.*** Structure availability and building monitoring are necessary parts of guaranteeing earthquake flexibility in customary houses. To improve preparedness and monitor the structural integrity of their traditional houses, tribes and indigenous communities employ a variety of strategies. These include conducting regular inspections of the house by skilled tribe members to evaluate its condition. The application of traditional knowledge plays a vital role in making earthquake-proof houses, (Gohri, 2023). Sinha, Brzev, and Kharel (2019) manifest that the needs of everyday life led to the development of traditional structures, which now serve to meet those needs and shield occupants from harsh catastrophe. Blaan elder 2 has synonymous experience:

*Sa akong setentay-singko anyos nga pangidaron sir, kato nga linog lang mi kabati ug atu kakusog nga katalagman. Busa kami nag igmat na kay hadlok sab mi mawad ag minahal sa kinabuhi labi na diri mi sa bukid nag puyo. Among karaang kahibalo dakung tabang labaw na sa paghimog pinuy-anan diin dili kani basta-basta ma apektuhan sa linog. Kung lig-on imong balay dili naka angay pa maniid sa palibot, saligi na lang imong balay nga dili malup-og.* (At sixty-five years of age, we just felt an earthquake that strong, and it was a total disaster. So, we are worried because we are also afraid of losing our loved ones, especially since we live in the mountains. Our old knowledge is a great help in terms of making a home where it will not be affected by the earthquake. if your house is strong, it needs no observation around, just trust your house that it won't collapse.)  ***Line 10, Participant 2***

Monitoring foundations and building earthquake-proof homes require traditional skills and knowledge. Merging the new with the old by virtue of engineering strengthens the building, maintains cultural heritage, and invokes safety in seismically active regions (Wu, 2020). Further, stone and deodar wood Kath Kuni houses in the Himalayas resisted earthquakes because of traditional quake-proof constructions (Mohnot, 2022). The longevity of most of the ancient buildings across the globe reveals the necessity of learning and utilizing effective construction procedures in contemporary architecture.

**3.2 Risk Reduction Preservation: The Old Traditional Ways**

Figure 2 shows Blaan elders as the important bridges of new practice adaptation and old ways preservation, embracing LGU programs and media for information dissemination. There is balance between *new practice adaptation* and *old ways preservation*, and they embrace technology without abandoning cultural heritage to build community resilience.

**3.2.1****Adoption of New Practices.** Implementation of new practices to disaster risk reduction involves the integration of scientific innovations into conventional wisdom in a bid to elevate levels of preparedness. Literature emphasizes the visibility of technology-enabled solutions such as GIS maps and AI models in enhancing the efficiency of response in the event of disasters (Chen et al., 2022). Government measures in the guise of early warning systems and city resilience programs have also minimized risks of disasters to vulnerable groups (Nguyen & Patel, 2023). A mix of these innovations and community-based measures of preparedness guarantees a broad disaster mitigation effort (Jones & Smith, 2021).

***3.2.1.1 Adaption of New Practices (LGU’s Program on Disaster Readiness).***Participating in disaster preparedness programs run by the local government can benefit tribal communities and the traditional ways they live. Traditional practices are enhanced, and resilience is strengthened by these programs, which give participants access to cutting-edge scientific information, resources, and technologies. Participating in these programs encourages cultural pride, collaboration, and the exchange of ideas. Hoyos, Batzin, and Arnold (2020) underscored that tribes can overcome obstacles, preserve their cultural heritage, and increase their resilience to earthquake calamities by valuing and respecting both modern and traditional practices. Domingo and Manejar (2018) stated that LGUs are mandated to assess the vulnerabilities of the area and its constituents and instill basic knowledge in disaster reduction. This was the experience of Blaan Elder 1:

*Subo man pamalandungon nga ang modernong panahon daku nag gibag-o sa among kultura, atong human sa kusog nga linog kami gi diskursuhan ug unsa tong ahensyaha sa goberno, kauban ang taga munisipyo, naghisgot ug mga pamaagi arun ma pagamyan ang risgo ug naay kalamidad. Pero kami sa tribu padayon among pagmatoto sa mga kabataan sa kinaraang pamaagi.* (It is sad to think that the modern era has changed our culture a lot, after the strong earthquake we were educated by an agency of the government I can't remember, together with the municipal LGU, discussing methods to reduce the risk of calamity. But we in the tribe continue to educate the children in the old-fashioned way.) ***Line 21, Participant 1***

In terms of disaster preparedness, response, recovery, and disaster readiness, seminars for indigenous communities provide valuable knowledge and skills (Scott, 2023). To empower indigenous communities to take an active role in their own safety and well-being, these seminars provide them with practical information on early warning systems, evacuation procedures, first aid, and emergency planning. They also strengthen social networks and mutual support systems, promoting cohesion. In addition, these seminars foster cultural exchange and dialogue by recognizing and valuing indigenous knowledge and practices, their distinct perspectives, and their expertise in combining contemporary approaches with indigenous perspectives (Herrera et al. 2022).

A diagram of a risk management process

AI-generated content may be incorrect.

***3.2.1.2 Adaption of New Practices (Media Informational Content on Disaster Readiness).***Native people can benefit from the adoption of new practices, such as media content on disaster preparedness, without harming their traditional methods of disaster mitigation. While incorporating contemporary scientific insights, indigenous people also acknowledge and value the significance of their customary wisdom. Indigenous people can benefit from the additional resources and knowledge provided by media content while simultaneously preserving their cultural traditions, which fosters harmonious coexistence between traditional and modern approaches. Blaan Elder 2 has to say:

*Kay Kuya Kim ragyud ko nakahibalo anang mga modernong paagi sa pag detect sa linog sir, pero sa kinaraan namo ang signal advance man kay mohilom gani ang palibot dili nagyud kompyansahan. Sa bag-ong kahibalo karon igu na lang man i-pasibaw unsa ka kusog ang maong linog. Importante gyud gihapon nga bisan mag kinaraan angay gihapon tuohan.* (Through Kuya Kim, I know the modern methods of detecting earthquakes, sir, the new knowledge now, only showcases how strong the earthquake was, but in the old days, the signal was advanced because if the environment is quiet, it means you need to be vigilant. It is still important that even if it is old-fashioned, it is still worth believing.) ***Line 22, Participant 2***

By using methods that are unavailable to local people in empirical studies and theory in data-poor locations to fill in empirical gaps and test empirically derived inferences, modern science such as television can add value by expanding traditional knowledge; hence, a growing number of case studies have emphasized the importance of indigenous knowledge, particularly in the context of disaster risk reduction (McWilliam, Wasson, Rouwenhorst, & Amaral, 2020).

Bojarski, Pierre-Pierre, and André (2019) reveal that during the earthquake that struck Haiti, local media played a role, while the world witnessed the widespread use of digital technology and social media to document a major tragedy. Despite many modern ways, the tribe is still eager to follow old ways. Blaan Elder 7 has this observation:

*Kasagaran sa TV nimo makita sir unsa ang mga bag-o nga kahibalo mahitungod aning kalamidad, sa amo sa mga Blaan labi natung unang panahon ma obserbar nimo ang palibot tungod ikaw nga lumad nagpuyo anang yutaa kamao ka ug unsay nausab diha, naa gani kausaban imoha ng pamatikdan ug unsay hinungdan, ngun ana ang kinabuhi diri sa bukid.* (Usually on TV, you can see what is the latest knowledge about calamity, in the case of the Blaan, especially during the old times you can observe the environment because you are a native living in that land and what has changed there, even small changes you must observe what is the reason behind it, that's the norm here in the mountain.) ***Line 28, Participant 7***

Though its effectiveness in disaster risk reduction and climate adaptation has been proven, indigenous knowledge is not maximally applied in disaster policy and science (Dube & Munsaka, 2018). However, its long histories, adaptive strategies, and cultural resilience make it priceless, even superior to modern approaches in most cases (Fuller et al., 2023). Rai and Khawas (2019) opine that indigenous knowledge must be combined with technocratic science to have an integrated approach towards disasters. Likewise, Mikulecky et al. (2022) discuss the applicability of indigenous wisdom in adaptation by quoting its vast, unrecorded knowledge of nature. Blaan Elder 2 reiterated this:

*Ang amoang mga amahan sauna mangandam ugaling naay kalamidad, ugaling naay baha mangandam o bisan unsa nga kalamidad gamiton tanang makita nga materyales maoy makasalbar. Sa karon ug naay mga aksidente sa dalan, o atong naglinog naay matabunan dali ang pag respunde kay nindot na ug dalan, naa sab ekipo ug medisina, sauna dahon ramay itambal.* (Our fathers always prepare in case of calamity, in case of flood or any other calamity, they use all available materials to keep us safe. Currently, if there are accidents on the road, or we have an earthquake casualty, the response is easy because the road is good, and there is also equipment and medicine, during the past herbal leaves are the only treatment.) ***Line 32, Participant 2***

While modern knowledge and equipment offer scientific advancements and technological solutions for improved analysis and response, old traditional knowledge and its associated equipment offer valuable insights and techniques deeply rooted in customary knowledge, opening possibilities for an integrated approach to earthquake resilience (Izumi, Djalante, Komino, Shaw, & Ishiwatari, 2019). Each type of earthquake resilience knowledge comes with its own set of tools that can be used. Johansson (2023) specified that modern knowledge advances technology and specialized equipment, whereas traditional knowledge relies on locally available resources and straightforward tools.

**3.2.2****Preservation of Old Ways Practices***.* Indigenous communities place a high priority on the preservation of traditional earthquake preparedness methods. The deep connection to the land, ancestral wisdom, and cultural heritage have sustained their identity, resilience, and capacity for effective earthquake response by preserving and passing down these traditional practices (Iloka, 2018). Traditional knowledge and folklore that dates back many generations are used by indigenous people to understand disaster risk; lived experiences serve as a solid foundation for these (Field, 2022). An illustration of this can be shown by Blaan Elder 5:

*Dinhi sa bukid kani gyud akong ingun nga Kyul ug sa bisaya pa Halu, mao ni mohatag ug sign gyud kay sa yuta mani nagpuyo, galing lang kay ang mga hayop nga mohatag ug sign gipangkaon naman. Sa tribu nakakaplag sad mig mga bag ong kahibalo sama anang duck, kober, hold nga ginatudlo diha sa may elementary school.* (Here in the mountain, this Kyul known in Bisaya as, Halu (Monitor Lizard), gives a sign because it lives on the ground, the problem is that the animals that give signs are eaten. Aside from this, in the tribe, we also found new knowledge such as duck, cover, and hold which is taught in elementary school.)  ***Line 25, Participant 5***

Despite the availability of modern earthquake knowledge, the tribe continues to rely on their customary disaster knowledge because their traditional practices have proven effective over generations and are deeply rooted in their cultural identity and connection to the land (Zulfadrim, Toyoda, & Kanegae, 2019). Adaptive strategies, community cohesion, and a localized understanding of the environment are all part of this knowledge, which provides a holistic approach to resilience that complements and enhances the effectiveness of contemporary methods (Hermans et al., 2022). The continuous teaching of indigenous knowledge for disasters is the goal set by Blaan Elder 1 as an old-fashioned practitioner:

*Subo man pamalandungon nga ang modernong panahon daku nag gibag-o sa among kultura, atong human sa kusog nga linog kami gi diskursuhan ug unsa tong ahensyaha sa goberno, kauban ang taga munisipyo, naghisgot ug mga pamaagi arun ma pagamyan ang risgo ug naay kalamidad. Pero kami sa tribu padayon among pagmatoto sa mga kabataan sa kinaraang pamaagi.* (It is sad to think that the modern era has changed our culture a lot, after the strong earthquake we were educated by an agency of the government I can't remember, together with the municipal LGU, discussing methods to reduce the risk of calamity. But we in the tribe continue to educate the children in the old-fashioned way.)  ***Line 21, Participant 1***

Amidst local government endeavors to present new information about disaster risk reduction, the tribe’s obligation to save their customary information about tremor risk decrease stays resolute (Kelman, Mercer, and Gaillard, 2020). They are aware of the inherent worth and efficacy of traditional methods, which have been handed down through the generations. Buergelt et al. (2021) highlight that the tribe's efforts must center on ensuring that younger members receive this priceless knowledge, preserving community cohesion, and actively collaborating with the local government to integrate their traditional practices with the new information.

A member of the indigenous people is regarded as a practitioner of traditional disaster preparedness methods because they have a thorough comprehension of traditional strategies that have been handed down through many years (Hoyos, Batzin, & Arnold, 2020). To effectively mitigate the effects of disasters, including earthquakes, within their community, they actively engage in the preservation and application of this ancestral wisdom (Troglic et al., 2022). These old methods were still disseminated during the Indigenous People’s Gathering, Blaan Elder 4 stated:

*…Pero sa tribu, mao ng panahon sa Kialegnon Festival amo gyud nga gina sunggal ang uban membro sa tribu nga padayunon ang kinaraan, labaw pa nga halos batan-on ron dili na gani kamao aning mga kinaraan.* (…But in the tribe, it is during the Kialegnon Festival that the other members of the tribe are challenged to continue the old ways, even more so since there are a lot of young that don't even know these old ways.) ***Line 24, Participant 4***

Indigenous people’s gathering is essential for sharing traditional practices, methods, and wisdom on disaster preparedness and preserving and transmitting ancestral knowledge (Gutteres, 2019). They promote the preservation of heritage, empower community members, and strengthen cultural identity while also promoting efficient disaster management strategies (Ochieng, Recha, & Bebe, 2020).

Moreover, the limited availability or accessibility of equipment for detecting earthquakes in some regions contributes to the fervent pursuit of indigenous knowledge in earthquake resilience to be continuous rather than coping in modern ways, Gutteres (2021). Through their enhanced senses and close connection to the natural environment, indigenous communities frequently rely on their generations-old traditional knowledge to detect and interpret subtle signs of seismic activity. In the absence of sophisticated equipment, indigenous knowledge becomes essential because it provides a practical and dependable method for detecting earthquakes and responding to them, ensuring the community’s safety and well-being (William, Wasson, Rouwenhorst, & Amaral, 2020). Blaan Elder 6 proves that unity is essential in old-fashioned practices:

*Kay lagi wala pay selpon sauna, mag kuratong ang mga tao arun makabalo sa mga mo abutay nga kalamidad, ug patugtugon na layooooo kaayog maabtan, mo lanog gyud. Sa karon ang modernong kahibalo mahitungod sa linog nagbalik balik lang, pareho anang duck, cover, hold unya usahay sa ka ratol dili na masunod mokaratil nag dagan, galing kung imong balay kay payag bisan pag hitam-ukan ka gas-gas ray imong makuha.* (Since there were still no cellphones in the past, people use kuratong to know about the calamities that are coming, and it will be scattered far away, and you will be able to hear it from a distance. Today, the modern knowledge about earthquakes is limited to duck, cover, hold, and sometimes due to panic you can't follow it, you crawl and run, but, if you have a native house, even if it collapsed, you'll only get mild bruises.) ***Line 39, Participant 6***

Traditional disaster preparedness methods that foster a sense of community unity are crucial because they facilitate coordinated efforts, strengthen community bonds, and foster collective resilience (Ali et al., 2021). It strengthens community members' ability to effectively navigate and recover from disasters while preserving their cultural identity and well-being by establishing a foundation of trust, cooperation, and mutual support (Syahputra, 2019). While others stated much about century-old disaster practices, Blaan Elder 7 admitted this:

*Ang amoa sab kahibalo dili gyud eksakto nga naay senyales gikan sa palibot nag tino nga kani bagyo, kani hulaw, perog obserbaran nimo ug tarong labi na ug ang mga hayop sa kayutaan matarantar angay gyud mag igmat. Daku man sad nuon ug matabang ang lecture sa linog, sama anang dili ka mataranta unya magmatngon tungod kay naa mi sa bukid possible kuno ang landslide.* (Our knowledge is not exact, that if there are signals from the environment it doesn't directly determine that this is a typhoon, this is a drought, but if you observe it correctly, especially if the animals in the land are panicked, you should be careful. The lecture on the earthquake is also great and helpful, like, don't panic, be calm and we must be prepared because we are situated in the mountains, and a landslide is said to be possible.) ***Line 40, Participant 7***

Indigenous people adhere to conventional disaster knowledge despite its inaccuracy at times because it serves to preserve cultural identity, provide an integrated resilience strategy, and support self-determination. It is spiritual, community, and functional in nature, making them well-adjusted in their environment. Ankrah, Kwapong, and Boateng (2019) confirm their validity at 0.72 compared to the index of science-based predictors, which is 0.88, and both being effective in disaster prediction.

**3.3 Government Intervention on the Inclusion of the**

**Old Ways in Disaster Risk Reduction**

For Figure 3, the Local Government of Magsaysay, Davao del Sur has received various recommendations from the Blaan Elders to improve disaster preparedness. Primary themes are *Inclusion of Traditional Practices on Disaster Readiness blueprint*; *Alternative building plan using lightweight materials*; and *Environmental Program (Forest restoration and preservation and Wildlife Protection).*

**3.3.1 Inclusion of Traditional Practices on Disaster Readiness Blueprint.** It is frequently assumed that community-based approaches to DRR are the most effective means of incorporating local knowledge (Trogrlic, Duncan, Wright, van den Homberg, Adeloye, & Mwali, 2022). The consideration of mixing customary practices and science-based knowledge in a yearly disaster risk reduction plan is critical. The primary reason is that it acknowledges and respects the invaluable wisdom that indigenous communities possess, fostering cultural preservation and giving them the authority to participate actively in resilience efforts (Tarafder & Debnath, 2021). Next, by incorporating context-specific approaches that have stood the test of time, incorporating traditional practices increases the overall effectiveness and relevance of disaster preparedness strategies (Bang, 2022). Sharing knowledge is not just limited to the tribe but for all, according to the plan of Blaan Elder 4 added:

*Basin ug pwede nga pinaagi sa among IPMR sa munisipyo sir, among kinaraang kahibalo mapadayag sa konseho ug mahilakip sa disaster plan nga gina ingun ninyu ganina kay ginabuhat man kaha ni matag tuig.* (Maybe it is possible that through our IPMR in the municipality, sir, our old knowledge will be revealed to the council and will be included in the disaster plan that you are saying a while ago because it is done every year.) ***Line 47, Participant 4***

A diagram of a disaster risk

AI-generated content may be incorrect.

Both Blaan elder 4 and Blaan elder 6 shared the same thoughts, the latter supported the idea of the former and the statement is very clear:

*Sa pagkakaron angay lang nga hatagan sab ug pagtagad sa goberno ang among karaang kahibalo, kay sa pagkakaron nahadlok naming kini mawala. Siguro ang pagbuhat ug ordinansa mahitungod sa pagpreserba sa among karaang kahibalo sa kalamidad dili lang kay linog apan bisan unsang katalagman, basin mamahimo kining makapabalik sa among karaang kultura ug kahibalo sa tribu.* (At the moment, it is only appropriate that the government also pay attention to our old knowledge, because now we are afraid of losing it. Maybe the creation of an ordinance that will preserve and enable our old knowledge about disaster preparedness not just in earthquake but other calamities to be scattered around the municipality, it may help the tribe build its culture and traditions back.) ***Line 49, Participant 6***

Indigenous knowledge is rich in information, tested and proven methods, and close familiarity with local risks and ecosystems and is therefore critical in disaster risk reduction (DRR). Through the integration of indigenous and scientific knowledge, communities can develop more inclusive, cross-cultural disaster preparedness strategies that enhance resilience (Pratap, 2022). However, the issue arises when top-down methods are not localized, limiting the functionality of early warning systems (EWS) and DRR (Vasiliou, Barnett, & Fraser, 2022). Indigenous communities, although vulnerable, have a certain role in DRR discourse due to their extensive traditional knowledge (Lambert, Simon, & Scott, 2019). While participatory approaches may enhance communities, they are effective when they are rooted in long-term evaluation, adequate funding, and participatory know-how (Tzai & Chen, 2020).

**3.3.2****Alternative Building Plan using Lightweight Materials***.* Integration of local seismic-resistant house knowledge into disaster risk reduction plans improves resilience and sustainability. Shine (2023) points out that resilient structures reduce economic loss, save lives, and prevent injury. Further, the use of sustainable materials contributes to reduced environmental impact through lesser debris, the use of fewer resources, and emissions (Das & Mukhopadhyay, 2018)*.* This is the recommendation from Blaan Elder 7

*Sa ako lang masulti nindot nga ipadayon ang mga balay gama sa kahoy, tungod ang materyales dili makadalag kadaut sa namuyo, kay ugaling naay matumbahan ug haligi nga kawayan dili kaayu maka damage. Kita kay Magsaysay man gina linog gwapo ni nga impormasyon ipaabot sa katawhan diin diri namuyo. So, ang unang panahon nga paghimo ug balay mas pabor ako nga kun kadto sa pagkakaron ang gamiton tungod kay bagay sa sitwasyon diri sa atong lungsod.* (As far as I can tell, it is good to continue the houses made of wood, because the material does not bring harm to the resident, because even if there is a bamboo pole that falls, it will not cause damage. We in Magsaysay are mainly affected by the earthquake, it is good that this information will be conveyed to the people. So, I am more in favor of using the old process to build a house, it should be used today because it compliments with our situation here in our town.) ***Line 50, Participant 7***

In India, timber frame structures, lime mortar, buttresses, and stone masonry are all traditional building methods. Lumber outline structures utilize wooden pillars to make an edge loaded up with mud or different materials, permitting the structure to be flexible during a tremor (Shaikh, 2023). The same is true of the Bahay Kubo; its structural design and choice of materials make it better to have during an earthquake. The construction of bamboo and thatch, which is lightweight, reduces the likelihood of collapse by allowing for greater flexibility and the ability to absorb seismic energy. Gacho (2022), an environmentalist, said that indigenous people know their land and use it to stay alive. Families are shielded from the dangers of the lowlands by indigenous house designs like the bahay kubo and torogan, which are elevated.

**3.3.3****Environment Program.** Environmental initiatives concerned with disaster risk reduction include climate change mitigation, deforestation avoidance, and sustainable land use. Current research indicates that green cover preservation and reforestation in vulnerable areas could avert landslide and flood risk (Mendoza & Santos, 2022). Governments and NGOs also increasingly adopt policies involving environmental protection and disaster preparedness measures (Wang & Chen, 2023). Investing in community-driven environment projects fosters the preventive element of diminishing disaster vulnerabilities (Garcia & Rodriguez, 2021).

***3.3.3.1 Environmental Program (Forest Restoration and Preservation).***Planting trees in earthquake-prone areas benefits indigenous communities by preserving their cultural practices and heritage. Traditional houses are built using sustainable materials like timber and thatch. Trees stabilize slopes, reduce landslide risk, and control erosion, thereby enhancing the resilience of these communities. Forest restoration seems out of context when it comes to earthquake calamities, but Blaan Elder 3 illustrates how it helps a lot:

*Subay sab sa iyahang ideya ma'am ang pagpananom ug kahoy makatabang ug himog lig-on nga panimalay alang sa linog, dili sakit sa bulsa. Duha ang katuyoan ba, ang mabalik nga dili ma upaw ang bukid unya naay kakuhaan ug kahoy nga pwede himuong balay, isip tribu daku naning tabang sa amo nga ang gobyerno mohatag ug seedlings.* (According to his idea, ma'am, planting trees will help make a strong home for earthquakes, not a pain in the pocket. The purpose is twofold, to return the mountain to its original form from baldness and then to get wood that can be used to build a house, as a tribe this is a big help to us, if ever the government gives us seedlings.)***Line 45, Participant 3***

Let’s look at some earthquakes from the past. Access the chapter on this subject in Impacts and Insights of the Gorkha earthquake, which demonstrates that wooden structures were unaffected by any of the major tremors. Dogangun, Tuluk, Livaoglu, and Acar, (2018) said that up to 1960, wood, a traditional building material, was common in Turkey; however, during a strong earthquake, reinforced concrete buildings sustained significant damage, so traditional building material like trees makes sense, at least in rural areas around the world. As it would help make many people more resilient to multiple hazards in making a quake-proof house (Gautam & Rodrigues, 2018).

***3.3.3.2 Environmental Program (Wildlife Protection).***Wildlife conservation is essential to disaster preparedness since animals serve as natural earthquake warning systems (Woith et al., 2018). Monitoring their behavior enhances seismic detection (Gesellschaft, 2020). The Blaan Tribe stresses that strict laws must be enforced to discourage the trapping or consumption of these animals, as expressed by Blaan Elder 5:

*Ang kahayupan diri sa bukid angay sad nga proteksyunan sa kagamhanan labaw natung giingon na nako nga mga mananap mohatag ug senyales mahitungod sa linog. Strikto nga implementasyon sa balaud sa pagbawal ug pagdakop, pagkaon aning mga matang sa hayop.* (The wildlife here in the mountain should be protected by the government especially those enumerated animals that give signals about earthquakes. Strict implementation of the law to prohibit catching or eating these types of animals.) **Line 48, Participant 5**

This agrees with Cagayan de Oro conservation legislations and the conservation of species with pre-earthquake behavior by the Higaonon Tribe (Cervantes, 2022; Fabro, 2023). Indigenous knowledge coupled with modern disaster mitigation reinforces resilience, advocating for government intervention (Hadlos & Hadigheh, 2022).

4. Conclusion

The research determines indigenous knowledge as essential in disaster risk reduction of the Blaan Tribe in the Municipality of Magsaysay. It finds that indigenous ways of environmental monitoring, animals' distress signals, and structural evaluation are essential in identifying signs of possible seismic activities. Such practices as old as they are still relevant today and can be integrated with current disaster preparedness measures. It also emphasizes the proactive and dynamic role of local government units (LGUs) in integrating indigenous knowledge with existing disaster risk management approaches.

Apart from this, there is a requirement for conservation and adaptation in maintaining traditional methods of risk reduction. Local knowledge programs must take precedence in enhancing disaster resilience through awareness, training, and policy mainstreaming. Government action should be aimed at documenting, validating, and institutionalizing the indigenous practice to provide sustainable use for future generations. Finally, this research adds to disaster preparedness studies by highlighting traditional knowledge systems. Future studies will need to examine further uses of the old traditions as well as testing their usefulness in reducing the impact of disasters under different conditions.

**CONSENT**

All the participants in the present study provided their informed consent before their participation. The researchers invited participants formally through an official letter signed by the Research Publication Center, Research Instructor, and institution head. Participants were clearly informed about the study purpose, voluntary participation, and right to withdraw at any time without penalty.

Informed verbal and written consent were obtained before interviewing and following focus group discussions. Participants agreed to have their responses tape-recorded and transcribed for analysis, while maintaining confidentiality and anonymity. Data gathered were used solely for research, and no information likely to identify individuals was disclosed. Ethical research conduct was practiced in the research, in accordance with rights and well-being of all participants.

Ethical approval

The study was conducted in terms of ethical study regulations and approved by the corresponding institutional authorities. Researchers had the consent of the Research Publication Center, Research Instructor, and institution head before the collection of data. Ethical practices like informed consent, privacy, and voluntariness were ensured throughout the research.

Participants were explicitly informed of the aims, methods, and potential outcomes of the study. Membership was entirely voluntary, with liberty to withdraw at any time without penalty. Personal privacy was respected by anonymizing all data obtained and utilizing such data solely for research purposes. The study upheld the ethical norms outlined in the Declaration of Helsinki as guidelines for investigation involving human participants.

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