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Indigenous Knowledge and Disaster Resilience: The Role of Toto Tribe's Cultural Practices in India

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Abstract:

Indigenous knowledge systems provide vital insights into environmental adaptation and resilience, especially in disaster-prone areas. The Toto tribe of North Bengal in India explores how their traditional cultural practices contribute to disaster resilience. The Toto tribe is one of India's most distinct and isolated indigenous communities, residing primarily in Totopara, a small village in the Alipurduar district of West Bengal, near the Indo- Bhutan border. The Totos traditionally lead a semi-nomadic lifestyle and have a robust, symbiotic relationship with their natural environment, which has shaped their unique way of life. As one of India's smallest indigenous populations, the Toto tribe has developed unique ways to deal with natural issues such as floods, landslides, and seasonal monsoon impacts, based on a thorough awareness of their local ecosystem. Different studies reveal that Toto's indigenous practices, such as early warning signals from nature, community-centric resource management, and sustainable building techniques, assess their effectiveness in mitigating disaster risks. Their practices promote community preparedness and provide adaptable strategies that could improve broader disaster management frameworks. This study contributes to our understanding of how Indigenous knowledge can be linked with modern disaster management to build long-term resilience in vulnerable communities, and it also advocates for the preservation and incorporation of Indigenous practices in India's disaster resilience policy.

Key Words: Toto tribe, Indigenous knowledge, disaster management, resilience, Resource management, environmental sustainability

Introduction:

Tribal people are the primitive inhabitants of our nation (Devalle, 1990). They only know the forest's way of life because it supplies them with enough of food and shelter (Xaxa, 1999). The Toto tribe, one of India's smallest indigenous groups, lives in the Himalayan foothills, namely in the Totopara region of West Bengal. Totos are reputed as Mongoloid people, with flat noses, small eyes, broad and wide cheeks (Sinha and Pal, 1983). They generally have darker complexions which shows they are nearer to the equator (Debnath, Das and Saha, 2019). According to anthropologists, the Toto's language and culture are very unique and totally distinguished from the neighboring tribes like Koch and Bhutanese Shar chop (Singh, 2017).

Totos live in high bamboo huts, identify as Hindus, and practice kindred marriage, which allows them to stay in the same neighborhood even after marriage (Basak et al. 2009). Their traditional livelihood depends on agriculture and their interactions with nature, which shape their cultural and environmental knowledge. Indigenous communities like the Toto have developed sophisticated ways of predicting and responding to environmental hazards. This research seeks to document the traditional disaster management practices of the Toto tribe, contributing to the wider discourse on integrating indigenous knowledge systems into modern disaster preparedness and response strategies.

Contextual Reviews:

Traditional cultural knowledge (TCK) has been increasingly recognized as an essential resource in disaster management, particularly within indigenous and rural communities. TCK refers to the body of knowledge, practices, and beliefs passed down through generations, reflecting a community's deep understanding of their local environment and its dynamics. Berkes (1999) highlights that indigenous knowledge systems have evolved through sustained interaction with nature, making them invaluable for understanding environmental changes and mitigating the effects of disasters. These knowledge systems include ecological observations, sustainable resource management, and collective action that promote resilience in the face of natural hazards (Hiwasaki et al., 2014). Research on indigenous disaster management strategies indicates that traditional knowledge often provides a nuanced understanding of local environmental risks. Mercer et al. (2010) assert that indigenous communities, due to their direct dependence on natural resources, possess observational skills that help them anticipate and mitigate disasters.

For example, traditional indicators, such as changes in animal behavior, cloud formations, and the timing of natural events, have been used to predict floods, droughts, and earthquakes. According to Shaw et al. (2008), indigenous people living in hazard-prone areas like the Himalayas have adapted their livelihoods and housing structures to minimize disaster risk. These adaptive practices contribute to the community's overall resilience.

In India, various indigenous groups rely on traditional knowledge for environmental sustainability and disaster preparedness. Scholars such as Agarwal and Narain (1997) have documented the role of traditional water conservation techniques in desert regions like Rajasthan, which helps communities endure prolonged periods of drought. Similarly, research by Chakravarty and Shiva (2001) emphasizes the contributions of forest-dwelling tribes to biodiversity conservation and ecosystem management, which indirectly strengthens their resilience to climate-related disasters. These studies reveal that indigenous knowledge is not static but dynamic, evolving to address contemporary challenges while maintaining traditional practices.

The Toto tribe is a small, semi-isolated indigenous group residing in the foothills of the eastern Himalayas, particularly in Totopara, West Bengal. Several anthropological studies have focused on the socio-cultural aspects of the Toto people. Majumdar (1995) and Danda (1982) offer detailed descriptions of the tribe's subsistence farming practices, communal resource sharing, and reliance on forest products. However, there has been limited research specifically on how their cultural practices relate to disaster management. The Toto's close relationship with nature has historically provided them with the ability to predict weather patterns, manage resources, and recover from natural disasters. This traditional ecological knowledge (TEK) forms the foundation of their disaster preparedness strategies, making it essential for future research and documentation.

The Toto tribe, like many indigenous communities, uses ecological indicators to predict natural disasters. Berkes and Folke (1998) discuss how communities use local environmental cues, such as animal behavior, river levels, and plant growth, to forecast events like floods or storms. For instance, sudden changes in bird migration patterns or the unexpected blooming of certain plants can signal shifts in the local environment, prompting the Toto community to take precautionary measures. This form of environmental knowledge enables indigenous communities to respond to disasters without relying on modern technology, making it particularly valuable in remote regions with limited infrastructure (Nakashima et al., 2018).

The architectural practices of indigenous communities often reflect their adaptation to local environmental risks. Rapoport (1969) noted that traditional housing designs among indigenous groups are a direct response to the environmental hazards of their region. The Toto tribe constructs their houses using bamboo, thatch, and mud, materials that are abundant, cost-effective, and environmentally friendly. These homes, being flexible and lightweight, are more resistant to seismic tremors and heavy rainfall compared to modern concrete structures. The use of elevated platforms to avoid flood damage is another example of how the Toto's cultural practices help them manage natural disasters (Majumdar, 1995). These traditional architectural practices can serve as a model for disaster-resilient building designs in vulnerable areas.

Traditional agricultural practices are central to the Toto tribe's disaster management strategies. Ghosh (2005) highlights that the Toto practice mixed cropping and shifting cultivation, which allows them to diversify their food sources and avoid crop failure due to environmental shocks like floods or droughts. This form of agroecological knowledge has evolved to ensure that food security is maintained even during adverse conditions. Shifting cultivation helps in soil conservation and reduces the risk of land degradation, making it a sustainable practice for disaster-prone regions. However, with the encroachment of modern farming methods, these traditional practices are increasingly under threat, raising concerns about food security in the face of climate change (Scott, 1998).

One of the strengths of the Toto tribe's disaster management approach lies in their collective action and communal resource management. Turner et al. (2008) note that many indigenous communities adopt a communal approach to land, water, and forest management, which allows them to share the burden of resource scarcity during and after disasters. In the case of the Toto, resources like food, water, and shelter are shared among families during crises, ensuring that no one household bears the full brunt of a disaster. This social cohesion and collective responsibility are crucial to the community's ability to recover from environmental shocks, as they foster a strong support network and a sense of solidarity (Danda, 1982). Cultural beliefs play a critical role in disaster management by providing psychological resilience and social cohesion. Tapsell et al. (2002) and Norris et al. (2008) argue that rituals, myths, and spiritual practices help communities cope with the psychological stress of disasters by reinforcing a sense of control and belonging. The Toto tribe's spiritual practices, such as rituals performed to appease natural forces or to seek protection from disasters, not only reflect their worldview but also promote emotional and psychological resilience during crises. These rituals strengthen the community's unity, providing emotional support that complements their physical disaster management strategies (Majumdar, 1995).

There is growing recognition of the need to integrate traditional cultural knowledge into modern disaster management frameworks. International frameworks like the Sendai Framework for Disaster Risk Reduction (2015-2030) emphasize the inclusion of indigenous knowledge as part of a holistic approach to disaster risk reduction. Mercer et al. (2010) and Shaw et al. (2008) suggest that combining indigenous early warning systems with modern technology can enhance the effectiveness of disaster preparedness and response. In the case of the Toto tribe, integrating their environmental knowledge and communal resource management with formal disaster risk reduction efforts could provide a more culturally appropriate and sustainable approach to managing natural hazards.

Despite the proven effectiveness of traditional cultural knowledge in disaster management, it is increasingly at risk of erosion due to globalization, modernization, and the adoption of Western lifestyles. As younger generations of the Toto tribe become more integrated into modern society, there is a gradual abandonment of traditional practices (Majumdar, 1995). Additionally, external interventions by governments and development agencies often fail to recognize or incorporate indigenous knowledge into formal disaster management policies, leading to the marginalization of local communities (Ghosh,

2005). This loss of traditional knowledge not only weakens the community's disaster resilience but also threatens their cultural identity and autonomy.

While several studies have explored the cultural and environmental practices of the Toto, there is a significant gap in research specifically addressing their role in disaster management. This research aims to document and analyze the Toto tribe's traditional knowledge, including ecological indicators, housing designs, agricultural practices, and communal resource management, to understand how these practices contribute to disaster resilience. Preserving and integrating this knowledge into formal disaster risk reduction frameworks could provide a more sustainable, inclusive, and culturally sensitive approach to disaster management.

Objectives:

The primary objective of this research is to explore, document, and analyze the traditional cultural knowledge (TCK) of the Toto tribe, specifically focusing on how this knowledge contributes to disaster management practices. The study aims to understand the role of indigenous environmental knowledge, agricultural practices, architectural techniques, and communal resource management in predicting, mitigating, and responding to natural hazards such as floods, landslides, and storms. Additionally, the research seeks to evaluate the potential integration of Toto tribe's traditional knowledge with modern disaster management frameworks, highlighting ways to preserve and leverage these practices for sustainable and culturally sensitive disaster risk reduction.

Materials and Methods:

Study Area: In British India, an experienced official worker under the seal of the government of India acknowledged Toto, who lived on the Bhutan-India border (Sanyal, 1955). Toto lived in Totopara, a tiny community (Das, 1999). The village is located in West Bengal's Alipurduar district, near the Bhutan border and about 25 kilometers from Madarihat railway station (Dutta, 2017). The Toto tribe, with a total population of 1574, is considered the state's smallest tribal group and one of 75 tribal tribes statewide (Sarkar, 2015). The Toto tribe is included in the list of PVTGs (Particularly Vulnerable Tribal Groups) by the Indian government's Ministry of Tribal Affairs. Schedule tribes from 18 states and the Andaman & Nicobar Islands Union Territories are covered by the Ministry (Press Information Bureau, 2018). Their seclusion from raging rivers like the Torsha and Hauri, woods like the Titi, and mountains from Bhutan aid in preserving their freedom and dignity (Majumdar, 2013). It becomes extremely difficult for anyone who is vulnerable in the context of globalization and privatization to retain their indigenous culture, and Totos are no exception (Chakrabarti et al. 2002). Because Vasudhaiva Kutumbakam is built on the premise that everyone is related to someone and everyone else is a stranger, they may retain their rich cultural legacy (Ghosh and Saha, 2017).

Research Design: This research employed a qualitative approach to explore the traditional cultural knowledge of the Toto Tribe and its application in disaster management. The study aimed to understand how indigenous practices and beliefs contribute to resilience against disasters. Participants were selected using purposive sampling to ensure the inclusion of knowledgeable individuals within the Toto community. The criteria for selection included Adults aged 18 and above, Individuals with a minimum of five years of experience living in the area familiarity with traditional practices, and preferences given to the community leaders, elders, and practitioners of traditional knowledge. A total of 50 participants were involved in the study, consisting of 25 men and 25 women, to ensure gender representation.

Data Collection: Data were collected through the methods of direct observation, In-depth interviews, and Focus group discussion. Direct methods include Researchers participated in community activities, including rituals and seasonal events, to gain insights into the cultural context and practical applications of traditional knowledge in disaster management. In-depth Interviews were conducted with participants to gather detailed narratives about their traditional knowledge related to disaster management. An interview guide was developed, focusing on topics of Traditional disaster prediction methods, Community response strategies and Cultural practices that enhance resilience. Focus Group Discussions were held with community members to facilitate discussion on collective experiences and insights regarding disaster management practices. Each group comprised 8-10 participants and was facilitated by a local researcher fluent in the Toto language.

Data Analysis: Data were analyzed using thematic analysis through reviewed transcripts and field notes to immerse themselves in the data. Themes were validated through member checking, wherein participants reviewed the findings to ensure accuracy and relevance.

Result and Discussion:

This research adopts a qualitative approach, combining ethnographic fieldwork, participatory observation, and in-depth interviews with the Toto community. Oral histories and testimonies from tribal elders were recorded, focusing on how the community historically responded to environmental changes and natural disasters. Additionally, a review of existing literature on the Toto tribe and indigenous disaster management practices was conducted to contextualize the findings.

Environmental Context of the Toto Tribe:

The Toto tribe lives in a region prone to natural hazards, such as monsoonal floods, landslides, and occasional earthquakes. The hilly terrain, coupled with heavy rainfall, creates challenges for agriculture and habitation. These conditions have forced the community to develop keen environmental awareness and practical coping mechanisms.

Traditional Knowledge and Environmental Signals:

Toto elders possess intricate knowledge of environmental indicators that predict natural disasters. For instance, changes in animal behaviour, unusual plant growth patterns, or shifts in river water levels are interpreted as signs of imminent

floods or storms. These observations are often shared orally within the community, ensuring that younger generations remain aware of potential dangers. Some of these environmental signals include:

Bird and Animal Behaviours: The sudden migration of birds and unusual movements of animals are seen as warning signs of impending natural disasters.

Plant Indicators: Certain plants blooming out of season or fruits ripening early are interpreted as changes in the local ecosystem, signaling a potential disaster.

River Patterns: Observing the colour and flow of rivers helps the Toto predict floods. A sudden rise in water levels and increased turbidity indicate heavy rainfall upstream, which may lead to flooding downstream.

Cultural Practices and Disaster Management:

The Toto tribe has developed adaptive strategies to cope with disasters, deeply embedded in their cultural practices and community structure. Key practices include:

Traditional Architecture: The traditional huts of the Toto are designed to withstand heavy rains and minor seismic tremors. Made of bamboo and thatched grass, these houses are flexible and resilient to the impact of natural forces. In areas prone to flooding, houses are often built on stilts.

Crop Diversity and Shifting Cultivation: The Toto practice mixed cropping and shifting cultivation, which helps minimize the risk of total crop failure during floods or droughts. By cultivating multiple crops with different growth cycles and water requirements, they ensure food security even during natural calamities.

Community-Based Resource Management: The tribe manages their natural resources collectively. In times of disaster, such as crop failure or food shortages, the entire community pools its resources to support affected families, thereby reducing individual vulnerability.

Rituals and Beliefs: The Toto people also perform rituals and prayers to appease natural forces, seeking protection from disasters. While some may view these rituals as purely spiritual, they also reinforce social cohesion and psychological resilience, helping the community remain united in the face of adversity.

Integrating Traditional Knowledge into Modern Disaster Management:

The Toto tribe's traditional practices, though rooted in ancient wisdom, offer valuable insights for contemporary disaster management strategies. The following recommendations suggest how this indigenous knowledge can complement modern techniques:

Early Warning Systems: Integrating the Toto's observational methods with modern meteorological technology could enhance the accuracy of early warning systems. For example, combining local environmental signals with satellite data might improve predictions of floods or landslides.

Resilient Architecture: The tribe's traditional housing designs could inspire climate-resilient, low-cost construction in vulnerable rural areas. Using locally available, eco-friendly materials can reduce the environmental impact and improve disaster resilience.

Sustainable Land Management: The Toto's mixed cropping and communal resource management strategies align with modern principles of sustainable agriculture and disaster risk reduction. Policymakers could support the preservation and promotion of these traditional practices to ensure food security in disaster-prone regions.

Cultural Integration in Disaster Preparedness: Recognizing the importance of cultural beliefs in fostering resilience, disaster management programs should engage indigenous communities in planning processes. Incorporating traditional rituals and community participation ensures a more holistic and inclusive approach to disaster preparedness.

Challenges in Preserving Traditional Knowledge:

Despite the importance of traditional knowledge, several challenges threaten its continuity. The younger generation of the Toto tribe is increasingly adopting modern lifestyles, leading to a gradual erosion of traditional practices. Additionally, external interventions in disaster management often overlook or undermine indigenous systems, further marginalizing local knowledge. To preserve the cultural heritage of the Toto tribe and their disaster management wisdom, it is essential to:

- Promote community-based education programs that emphasize the value of traditional knowledge.
- Document and archive oral histories and environmental knowledge passed down through generations.
- Foster collaboration between indigenous communities and governmental or non-governmental organizations involved in disaster management.

Conclusion:

The traditional knowledge of the Toto tribe offers a rich resource for enhancing disaster resilience in their region. By understanding environmental signals, practicing sustainable agriculture, and fostering community solidarity, the tribe has developed an effective system for managing natural hazards. Integrating these indigenous practices with modern disaster management frameworks could lead to more sustainable and culturally sensitive approaches to disaster risk reduction. Future efforts should focus on preserving this knowledge and ensuring its transmission to future generations, recognizing its vital role in environmental stewardship and disaster preparedness.

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