

The Balance of Social, Cultural, and Ecological Aspects in Traditional Batak Toba Settlements to Support Sustainable Development

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Abstract. This research aims to examine the role of balancing social, cultural, and ecological dimensions within traditional Batak Toba settlements as a contribution to sustainable development. The research employs a qualitative methodology with an ethnographic approach, involving data collection through in-depth interviews, participatory observation, and document analysis related to customary practices and the surrounding environment. The findings indicate that the social structure, grounded in the *Dalihan Na Tolu* principle, strengthens community solidarity and governance, while cultural values embedded in architecture and traditional rituals serve to preserve community identity and spiritual relationships with nature. Ecologically, the settlement applies principles of sustainable natural resource utilization and adaptive spatial planning in harmony with the environment. The research concludes that the integration of these three dimensions produces a harmonious and sustainable development model, which can serve as a reference for managing traditional settlement areas and formulating environmental development policies.

Keywords: Socio-Cultural, Ecology, Traditional Settlements, Batak Toba

1 Introduction

Sustainable development is increasingly framed as a holistic paradigm that requires the integration of social, cultural, and ecological dimensions. This perspective recognizes sustainability not merely as an environmental concern but as an interdependent system in which cultural values and social structures play a decisive role. In many indigenous and traditional contexts, local wisdom embodied in customary norms, symbolic practices, and spiritual beliefs functions as a regulatory mechanism that maintains balance between human needs and environmental stewardship. Within traditional architecture and settlement studies, these insights demonstrate that sustainability cannot be detached from cultural identity; rather, the preservation and adaptation of local knowledge systems provide a critical foundation for long-term environmental governance and community resilience. [1]

The traditional settlements of the Batak Toba in North Sumatra represent a concrete manifestation of an indigenous community that harmoniously integrates social, cultural, and ecological elements. Within this community, social structures grounded in customary and religious values serve as the primary foundation for the management of both settlement organization and natural resources. Kinship systems, spatial arrangements of villages (*huta*), and the architectural design of the traditional house (*rumah bolon*) not only embody cultural identity but also function as mechanisms for sustainable environmental management. For instance, customary regulations prohibit the cutting of certain tree species, while the orientation and placement of houses follow cosmological principles that reflect a profound respect for nature as an essential part of communal life. Traditional Batak Toba houses incorporate sustainability principles through energy efficiency, optimal use of natural resources, and the reinforcement of social cohesion and spiritual values within the community.[2].

The sustainability of Batak Toba settlements is fundamentally dependent on achieving a balance among three interrelated dimensions: the social, encompassing interactions between individuals and the community; the cultural, comprising values, norms, and traditions; and the ecological, related to the wise management of natural resources. This equilibrium enables the community not only to maintain its livelihood but also to preserve the environment over the long term. However, under the increasing pressures of modernization, urbanization, and globalization, these traditional value systems and governance mechanisms face the risk of erosion, which may threaten both the sustainability of the settlements and the continuity of local cultural heritage.

To address these challenges, the revitalization of Batak Toba cultural values particularly the *Dalihan Na Tolu* philosophy is crucial in sustaining the existence of traditional settlements and maintaining social equilibrium in daily life. *Dalihan Na Tolu* constitutes a cornerstone of Batak Toba cultural identity, regulating kinship systems and patterns of interaction not only within the nuclear and extended family but also with neighbors, kin groups, the wider community, ancestors, and ultimately with the divine. By reinforcing this indigenous philosophical framework, Batak Toba society preserves a balanced relationship between humans, culture, and nature, thereby providing a resilient foundation for sustainable settlement governance [3]

The traditional settlements of the Batak Toba in North Sumatra exemplify an indigenous community characterized by a strong system of religious and cultural values that significantly shape everyday life. These values, transmitted across generations, form the foundation of multiple dimensions of existence, including patterns of social interaction, spatial organization of settlements, and the management of natural resources. Within Batak Toba tradition, religious values are integrated with cultural principles that emphasize harmony among humans, the natural environment, and the ancestors an interconnection that serves as the central basis for maintaining both ecological and social balance. Traditional belief systems, as an essential component of Batak Toba culture, are deeply intertwined with the community's life in the Lake Toba region. They play a significant role in shaping collective identity, guiding social interactions, and reinforcing spiritual dimensions of communal life. [4]

The uniqueness of Batak Toba traditional settlements lies in the architectural configuration of the *rumah bolon* (traditional house), the spatial organization of the village (*huta*), and the customary norms that govern land use and the sustainable management of natural resources. [5] Examples include the system of reverence for specific trees, prohibitions against altering the orientation of settlements without customary approval, and restrictions on the excessive exploitation of natural resources. Such practices embody religious and cultural values that function not only to safeguard environmental sustainability but also to reinforce social cohesion within the community.

In the context of accelerating modernization and globalization, these values are increasingly confronted with profound challenges and transformations. Threats such as environmental degradation, the erosion of cultural identity, and economic pressures that drive unsustainable settlement patterns and resource utilization have become pressing issues within Batak Toba communities. Consequently, examining the role of religious and cultural values in supporting sustainable development in these traditional settlements is of critical importance.

This research seeks to explore the contribution of local wisdom not merely as a marker of cultural identity but also as a foundation for developing settlement models that are both environmentally sustainable and socially equitable. Local wisdom, as an intrinsic element of culture, has been transmitted through oral traditions across generations. It encompasses norms, cultural values, and collective ideas that significantly influence various dimensions of life, including technological adaptation, health practices, and artistic expression [6]

With a more comprehensive understanding of the role of religious and cultural values, efforts to preserve Batak Toba traditional settlements can be synergistically aligned with sustainable development programs. Such an approach not only ensures the continuity of local environmental and cultural heritage but also strengthens community capacity to manage change in accordance with the ancestral values passed down across generations. The integration of Batak Toba socio-cultural values within traditional settlements must be supported by the implementation of the philosophical principles of *hamoraon* (prosperity), *hagabeon* (fertility and posterity), and *hasangapon* (honor and dignity), which constitute the fundamental goals and highly esteemed values of Batak Toba society. These philosophies function as the spiritual essence that guides daily life and social conduct, wherever community members reside. On the one hand, this worldview provides a source of resilience and strength in navigating processes of development, while on the other, it serves as a cultural compass for achieving sustainable and inclusive progress [5].

Ultimately, the integration of religious and cultural values with the principles of sustainable development can serve as a strategic and applicable model for other regions with similar cultural backgrounds. A recent study by Gurning and Nurini on the morphological patterns of the traditional village of Jangga Dolok, Toba Regency, North Sumatra, based on local wisdom, demonstrates how the village has developed organically in line with the needs of its inhabitants while preserving traditions that have endured since the past. From a morphological perspective, Jangga Dolok can be classified as a ribbon-shaped settlement, where the village's spatial

development has been strongly influenced by transportation routes, which act as a determining factor in its growth process .[7]

Another research by Emmy Ria and Ikaputra on the transformation of Batak Toba traditional settlements highlights that these settlements reflect an organized system of resource management, defense, and kinship structures, which operate from the smallest community units to broader territorial scales. The indigenous community has developed governance mechanisms encompassing economic, security, and spiritual dimensions, with autonomous authority functioning at each level of the territorial hierarchy [8]

This research contributes to the discourse on sustainable development by examining the holistic interplay of social, cultural, and ecological dimensions within Batak Toba traditional settlements a perspective that has seldom been addressed in an integrated manner. While much of the existing scholarship has analyzed these aspects separately, this study emphasizes the critical role of local wisdom, encompassing both religious practices and customary traditions, as the core foundation for environmental stewardship and social organization in Batak Toba society. By adopting this integrative approach, the study seeks to uncover mechanisms of adaptation and the preservation of traditional values in the face of modernization, thereby advancing the theoretical framework of sustainable development with insights derived from an indigenous cultural context.

2 Method

This research adopts an ethnographic methodology to explore the intricate interplay of social, cultural, and ecological dimensions within Batak Toba traditional settlements. The ethnographic approach is particularly relevant as it provides a holistic framework for capturing the lived experiences, values, and practices of the community, while also allowing for nuanced interpretation of social interactions within their cultural and environmental contexts. [9]

The research was conducted in Lintongnihuta Village, Samosir Regency, North Sumatra, which was purposively selected due to its community's strong adherence to traditional social, cultural, and ecological values. This village represents one of the remaining Batak Toba settlements where customary practices are still actively maintained and integrated into daily life.

The research participants consisted of members of the Batak Toba indigenous community, including traditional leaders, community elders, households residing in traditional settlements, and individuals directly engaged in natural resource management and local cultural practices. The selection of participants was based on their knowledge, role, and active involvement in sustaining cultural traditions and ecological practices within the community.

Data for this research were collected through a combination of ethnographic techniques designed to capture the complexity of social, cultural, and ecological interactions within the Batak Toba traditional settlement. The primary method was participant observation, where the researcher lived within the community for an extended period. This immersion allowed for a

direct understanding of everyday practices, ranging from routine household activities to ceremonial events and resource management strategies.

In addition, in-depth interviews were carried out with traditional leaders, local authorities, and community members. These interviews, conducted in a semi-structured format, provided space for participants to share their experiences, values, and perspectives regarding religious traditions, customary norms, and the challenges posed by modernization and environmental change. To further strengthen the data, focus group discussions (FGDs) were organized at the community level. These discussions facilitated a collective exploration of issues such as sustainable development, cultural continuity, and social transformation, enabling diverse voices to be heard and compared.

Finally, documentary analysis was employed by collecting and reviewing a range of supporting materials, including customary records, spatial maps of the settlement, photographs, and secondary data from official reports. This triangulation of methods not only enhanced the reliability of the data but also provided a more holistic understanding of how the Batak Toba community negotiates the balance between tradition and sustainability [9].

The data collected were analyzed using thematic analysis, through which recurring patterns and central themes within the qualitative data were systematically identified, categorized, and interpreted. This approach allowed for a deeper understanding of the mechanisms by which social, cultural, and ecological dimensions interact to sustain community life and support principles of sustainable development. In addition, a data triangulation strategy was applied to enhance the validity and reliability of the findings. Triangulation was conducted by cross-verifying information obtained from different sources and data collection techniques namely observation, interviews, focus group discussions, and documentary analysis thereby ensuring a more comprehensive and credible interpretation of the research context.[10] To ensure the validity of the data, this study employed source triangulation, methodological triangulation, and member checking, actively involving respondents in the verification of research findings. In addition, the researcher's prolonged engagement in the field contributed to enhancing the credibility and trustworthiness of the data. [11]

3 Result and Discussion

3.1 The Balance of Social Life in Traditional Batak Toba Settlements

Traditional Batak Toba settlements are characterized by a systematically organized and well-structured social system that plays a vital role in fostering and maintaining community cohesion and solidarity. This system is primarily manifested through the kinship network, which extends beyond biological ties to form a resilient web of interdependence within the community. Within this network, values such as mutual respect, cooperation or *gotong royong*, and collective responsibility are consistently upheld as guiding principles of everyday life. These values serve as the moral and ethical foundation regulating social interactions, while simultaneously strengthening the sense of communal belonging and collective ownership. By embedding such

principles into both social practices and settlement organization, the Batak Toba community ensures the continuity of solidarity and resilience across generations.

Customary institutions such as *Huta Bolon* (the central institution of governance and communal authority) and *Dalihan Na Tolu* (the kinship and social system consisting of three primary roles: the clan family, the wife-giver family, and the wife-taker family) play a crucial role in regulating and reinforcing the social order of Batak Toba communities. The *Huta Bolon* functions as the traditional decision-making body as well as a mediator in conflict resolution, thereby contributing to the preservation of social harmony and the coordination of collective activities. In parallel, the *Dalihan Na Tolu* serves as a normative framework that structures interpersonal relations and reciprocal obligations among individuals and groups, fostering balance and stability in community life. Together, these institutions operate as cultural mechanisms that not only sustain social cohesion but also ensure the resilience and continuity of traditional governance within Batak Toba settlements.

Through the mechanisms of customary institutions, traditional Batak Toba settlements are able to manage communal resources such as land, forests, and water wisely and sustainably. Decision-making processes are conducted collectively with the participation of multiple social levels within the community, ensuring alignment between individual or kinship interests and the broader needs of society as a whole. This participatory approach fosters a social environment conducive to active involvement and collective awareness, particularly in sustaining both cultural traditions and ecological stewardship. By embedding fairness, reciprocity, and shared responsibility into local governance, these communities create a resilient model of social-ecological balance that contributes to long-term sustainability.

From a theoretical perspective, the social balance embedded in traditional Batak Toba settlements can be understood as a manifestation of social-ecological resilience, where cultural norms, kinship systems, and communal practices function as adaptive mechanisms for sustaining both social stability and ecological integrity. This balance transcends the notion of mere structural stability; it operates as a dynamic process that enables communities to negotiate change, absorb external pressures, and maintain continuity across generations. In line with community based sustainability frameworks, the Batak Toba community is not relegated to the role of passive beneficiaries of development initiatives, but rather acts as an active agent in co-producing sustainable futures. By integrating cultural heritage preservation with ecological stewardship, these settlements offer a critical model of localized sustainability that challenges top-down approaches and underscores the importance of embedding development strategies within the lived realities and normative systems of indigenous communities.

3.2 Cultural Balance as a Foundation for Identity and Preservation

The cultural values of the Batak Toba community are reflected across multiple dimensions of life, encompassing religious traditions, customary rituals, and everyday behavioral patterns. The traditional house (*rumah bolon*) functions not only as a physical dwelling but also as a medium for reinforcing cultural identity and spiritual values transmitted across generations. Customary

practices such as reverence for ancestral spirits, prohibitions against cutting certain sacred trees, and specific rules governing settlement layouts operate as mechanisms for cultural preservation while simultaneously ensuring ecological balance.

Rituals and religious ceremonies strengthen social bonds and serve as instruments for transmitting environmental sustainability values to community members. Such cultural consciousness fosters a lifestyle that is both harmonious with nature and deeply rooted in heritage, providing a cultural foundation that aligns with the principles of sustainable development in traditional settlements. In this sense, cultural balance can be understood as the community's capacity to uphold fundamental values such as customs, local wisdom, symbols, and rituals while at the same time adapting to socio-economic changes and the pressures of modernization. This dynamic equilibrium highlights the role of culture not only as an identity marker but also as a living system of resilience in the pursuit of sustainability.

In Batak Toba society, cultural balance is embodied through the application of the *Dalihan Na Tolu* kinship philosophy, the structure of familial relations, the performance of customary rituals (including marriage, funerary rites, and thanksgiving ceremonies), as well as the spatial organization of dwellings such as the *rumah bolon* and the *huta* (village). These values function not merely as cultural heritage, but as a normative framework essential for maintaining the integrity and cohesion of the community.

A preservation approach oriented toward balance requires compromises between economic demands such as tourism and modern development and the continuity of cultural values. The maintenance of traditional houses, the practice of ceremonial rituals, and the management of local wisdom including agricultural traditions, water resource systems such as *Sihali Aek*, and sacred forest areas (forbidden forest) represent concrete manifestations of this balance. These practices simultaneously reinforce cultural identity while creating spaces for adaptation. Such a perspective emphasizes that cultural balance must be transformative rather than static: it should not be limited to conserving physical forms or ritual practices in isolation, but should instead embrace a dynamic management of culture that ensures its relevance and acceptance among younger generations. This transformative equilibrium thus positions Batak Toba traditions as a living heritage anchored in ancestral values yet responsive to contemporary socio-economic realities.

3.3 Ecological Life Balance through Local Wisdom-Based Environmental Management

The management of natural resources in Batak Toba settlements is grounded in local wisdom (*kearifan lokal*) that emphasizes precautionary principles and respect for the environment. Practices such as the veneration of sacred trees and specific land areas, restrictions on resource utilization, and the enforcement of customary laws prohibiting excessive exploitation operate as effective mechanisms of ecological governance. These indigenous regulatory systems embody what Ostrom (1990) terms common-pool resource management, wherein collective rules and sanctions are established to secure the sustainability of shared resources.

The spatial organization of villages, designed according to cosmological principles, reflects an integrative approach in which ecological, social, and cultural dimensions are inseparable. Dependency on natural resources is managed through customary mechanisms aimed at preventing environmental degradation while ensuring ecological regeneration. Such arrangements echo the notion of social-ecological resilience, in which cultural practices act as adaptive strategies to sustain human–environment relationships.

By aligning ecological practices with spiritual beliefs and community-based regulations, Batak Toba settlements exemplify a model of sustainability that resists the dichotomy between tradition and modernity. Instead, their environmental governance illustrates a cultural ecology paradigm demonstrating that the preservation of ecosystems is inseparable from cultural continuity and community identity. This positions Batak Toba local wisdom not as a relic of the past, but as a living system of ecological ethics that contributes to contemporary discourses on sustainable development.

The role of local wisdom in ecological management within Batak Toba communities encompasses several interrelated dimensions. First, resource control is embedded in customary regulations that limit excessive exploitation, such as restricting the opening of agricultural fields to specific times of the year. This system reflects a preventive approach to ecological degradation, ensuring that natural regeneration processes are not disrupted. Second, ritual-based conservation is evident in numerous customary practices that connect nature with ancestral spirits. In this cosmological framework, destructive acts against the environment are not only perceived as ecological violations but also as ethical-religious transgressions, reinforcing compliance through spiritual sanctions.

Furthermore, the social structure of *Dalihan Na Tolu* serves not merely as a kinship system but also as a socio-regulatory mechanism that enforces adherence to environmental norms. This highlights how ecological governance is deeply embedded within cultural frameworks and collective social relations, functioning as a form of community-based ecological stewardship.

Nevertheless, these mechanisms are increasingly challenged by contemporary forces. Modernization and tourism development in the Lake Toba region often disregard traditional ecological spatial arrangements, leading to habitat disruption and resource depletion. At the same time, the erosion of customary values among younger generations has resulted in a declining understanding of the ecological functions of tradition, as such practices are frequently perceived as outdated. Moreover, state-driven, top-down environmental regulations are not always aligned with local wisdom, creating tensions and conflicts between customary law and formal legal systems.

This, while local wisdom provides a resilient and culturally embedded framework for ecological management, its sustainability depends on the capacity to negotiate and adapt to modern pressures. This necessitates a dialogical approach between customary practices and formal governance, ensuring that ecological management remains both culturally legitimate and environmentally sustainable.

3.4 Interaction and Integration of the Three Dimensions of Life

The findings indicate that the social, cultural, and ecological dimensions of traditional Batak Toba settlements do not function in isolation but rather operate as an interdependent and mutually reinforcing system. Religious and customary values serve as cohesive elements that sustain the balance among these three dimensions. For instance, customary regulations that prohibit alterations to settlement layouts without collective approval not only safeguard social order but also contribute to environmental conservation. This integration produces an adaptive system that responds to social dynamics and ecological change while simultaneously preserving cultural identity. The harmonious relationship between humans and nature within these communities exemplifies a practical application of sustainable development principles grounded in local wisdom.

In the Batak Toba context, the social dimension is primarily embodied in the kinship system of *Dalihan Na Tolu*, which encompasses the roles of *hula-hula* (wife-givers), *dongan sabutuha* (clan relatives), and *boru* (wife-takers). This kinship structure not only organizes interpersonal relations but also regulates the distribution of social roles in ritual and ceremonial events, including weddings, funerals, and harvest celebrations. Social solidarity is further manifested through the practice of *marsiadapari* (mutual cooperation), which functions as a key mechanism for ensuring continuity, resilience, and harmony in collective life.

The cultural dimension is expressed through indigenous values, symbols, language, rituals, and tangible heritage such as the *rumah bolon* (traditional house), *huta* (village compound), and *ulos* (woven textile). The *rumah bolon* is not merely a physical dwelling but also a form of social architecture, spatially organized into the front area for receiving guests, the central area for family interaction, and the upper area endowed with spiritual symbolism. Rituals act as mechanisms for connecting the community with their ancestors, while also reinforcing social order and cultural transmission. Collectively, these cultural practices constitute a collective identity that differentiates Batak Toba communities from others while strengthening internal cohesion.

Nevertheless, the findings also reveal significant contemporary challenges. Globalization and the expansion of tourism often trigger processes of cultural commodification. Traditional houses are increasingly transformed into homestays, ritual dances are performed primarily for tourist audiences, and the sacred meanings embedded in ceremonies risk being reduced to performative displays. This shift illustrates a tension between economic opportunities and cultural authenticity, raising critical questions about the long-term sustainability of Batak Toba cultural heritage in the face of external pressures.

3.5 Challenges and Implications for Sustainable Development

Although the structural balance of Batak Toba community life has been firmly established, the pressures of modernization, urbanization, and shifting economic dynamics present significant challenges. The migration of younger generations, the penetration of modern lifestyles, and

increasing economic demands have the potential to diminish the influence of traditional values. This condition has led to a transformation in resource management practices, which increasingly tend toward exploitation and consequently elevate the risks of environmental degradation.

In response, the implementation of development policies that integrate local wisdom with modern innovation becomes crucial to ensure sustainable development. Governments and stakeholders are encouraged to adopt participatory and community based approaches so that social, cultural, and ecological values remain the fundamental pillars of development in this region. Traditional Batak Toba settlements, characterized by a rich equilibrium between social, cultural, and ecological dimensions, provide a compelling model that can serve as a foundation for sustainable development initiatives. Strengthening the integration of these three dimensions is essential to guarantee that development in this area does not merely achieve physical or economic objectives, but also ensures the long-term preservation of socio-cultural heritage and environmental sustainability.

4 Conclusion

Traditional Batak Toba settlements represent a tangible manifestation of the integrated balance among social, cultural, and ecological dimensions, synergistically supporting the principles of sustainable development. The robust social structure, established through kinship networks and customary institutions such as *Huta Bolon* and *Dalihan Na Tolu*, reinforces community cohesion while enabling collective and sustainable resource management. Cultural values embedded in religious traditions, customary rituals, and the traditional house (*rumah bolon*) play a central role in preserving community identity and maintaining harmony with the natural environment through resource management practices grounded in local wisdom.

The integration of these three dimensions forms an adaptive system that is responsive to social and environmental change while sustaining the cultural identity of the Batak Toba community. Despite facing pressures from modernization, urbanization, and economic transformation, these settlements demonstrate significant potential as a model for inclusive and ecologically-informed sustainable development. Therefore, it is imperative for stakeholders to implement development policies that combine local wisdom with contemporary innovation and emphasize participatory approaches. Such strategies are essential to preserve and strengthen the social, cultural, and ecological balance, ensuring the long-term sustainability of traditional Batak Toba settlements.

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