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Mountain Rituals and Socio-Ecological Adaptation: Comparing *Ngasa Gandoang*, Indonesia and *Xiō Bū*, China

Ninawati Syahrul[1]*, Sastri Sunarti[2], Priscila Fitriasih Limbong[3], Syahrial[4]
[1,2]National Research and Innovation Agency, Indonesia
[3,4]University of Indonesia, Indonesia
Email: [1]nina015@brin.go.id, [2]sast003@brin.go.id, [3]priscila.fitriasih@ui.ac.id, [4]ssyahrial10@gmail.com

Abstract: *This study compares the Ngasa Gandoang tradition in Brebes, Indonesia, and the Xiō Bū ritual of the Yi people of Liangshan, China, to understand the relationship between sacred space, ritual practices, ecological knowledge, and collective participation. The study employed a comparative qualitative approach. Data for Ngasa Gandoang were obtained through observation, interviews, and documentation, while data for Xiō Bū were sourced from ethnographic literature. Analysis was conducted through thematic interpretation of each case and cross-case comparisons. The results indicate that both traditions connect social and environmental life through sacred meanings of mountain space and the transmission of cultural knowledge.In the Ngasa Gandoang tradition, this relationship is manifested through deliberation, mutual cooperation, offerings of agricultural produce, and maintaining a relationship with sacred spaces.Xiō Bū, these relationships are reflected in the sacredness of forested mountains, beliefs in ancestors and nature spirits, and the role of ritual specialists. This comparison demonstrates that socio-ecological relationships in rituals are shaped by local cultural contexts and practices, rather than by universal patterns. This research enriches the study of mountain rituals by examining the similarities and differences in how communities interpret and maintain relationships between community, ancestors, and the environment.*

Keywords: *Mountain Rituals, Socio-Ecological Adaptation, Ngasa Gandoang, Xiō Bū, Sacred Space*

INTRODUCTION

Mountains are both ecological and life-giving spaces that support agriculture, food security, and social relations. Climate change, land use, and pressure on natural resources can impact environmental conditions and the lives of mountain communities. In addressing these changes, local knowledge can complement formal approaches to understanding environmental dynamics and developing adaptation strategies (Sherpa, 2023; Dorji et al., 2024). In this context, mountain rituals are important to study because they connect beliefs, social practices, environmental knowledge, and community life within a cultural framework.

Previous research has shown that local knowledge plays a role in environmental adaptation through understanding climate conditions, land and water management, and community-based governance (Dorji et al., 2024; Galappaththi & Schlingmann, 2023). Zant et al. (2023) distinguish between gradual adaptation and fundamental change, while (Tatay and Merino, 2023) demonstrate the relationship between sacred spaces and taboos and resource management, without considering sacredness solely as a conservation instrument. In the Indonesian context, (Syahrul et al., 2026b) discuss the role of women in maintaining and passing down the *Ngasa Gandoang* tradition.

*Corresponding author
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Meanwhile, (Zhang and Cai, 2026) outline the relationship between mountains, ancestors, community, and ecological ethics in the Xiō Bū ritual. While these studies demonstrate the interconnectedness of ritual, local knowledge, and the environment, a comparison of how these elements relate to socio-ecological adaptation across different cultural contexts remains to be developed.

This study aims to compare the *Ngasa Gandoang* tradition in Brebes, Indonesia, and the Xiō Bū ritual of the Yi people in Liangshan, China, to explain the relationship between mountain rituals and socio-ecological adaptation. This study answers three questions: (1) how are human-environmental relationships expressed in both rituals; (2) what social and ecological practices are related to the rituals; and (3) how do the similarities and differences between the two traditions explain socio-ecological relationships in their respective cultural contexts? The analysis is conducted through four dimensions, namely sacred space, ecological knowledge, ritual practices, and collective participation. This comparison takes into account differences in data sources: *Ngasa Gandoang* is studied through fieldwork, while Xiō Bū is analyzed based on ethnographic literature.

This study argues that mountain rituals serve as a socio-cultural context that shapes people's relationships with the environment through sacred spaces, local knowledge, ritual practices, and cultural obligations. These relationships do not operate through uniform mechanisms. In Ngasa Gandoang, these relationships are reflected in deliberation, mutual cooperation, agricultural offerings, and attachment to sacred mountain spaces (Syahrul et al., 2026a). In Xiō Bū, the relationship between forested mountains, beliefs in ancestors and nature spirits, the role of ritual specialists, and the transmission of ecological knowledge are crucial elements in the meaning of rituals (Zhang & Cai, 2026). By comparing these two cases, this study explains how local history and values shape socio-ecological relationships, without assuming that rituals produce measurable ecological impacts or follow universal patterns.

LITERATURE REVIEW

Socio-Ecological Adaptation and Local Community Knowledge

Socio-ecological adaptation views society and the environment as interconnected systems. Folke et al. (2021) explain that socio-ecological resilience relates to a system's ability to face change, learn, and adapt without losing its essential functions. In this process, indigenous and local knowledge plays a role through their experiences in understanding natural changes, utilizing resources, and transmitting knowledge between generations (Fernández-Llamazares et al., 2021; Berkes, 2021). Adaptation thus encompasses not only technical responses but also cultural practices, institutions, social relationships, and value systems.

Local knowledge can be embedded in language, norms, collective memory, and cultural activities, and support community responses to environmental change through social networks and territorial governance (Ruiz-Mallen et al., 2021; David-Chavez et al., 2024). However, the presence of local knowledge does not automatically indicate successful adaptation. In this study, socio-ecological adaptation is used as an interpretive framework to understand how knowledge, social practices, cultural values, and relationships with the environment relate to community adaptation, not as a measure of effectiveness in addressing specific ecological risks.

Sacred Mountains, Rituals, and Ecological Relationships

Sacred mountains and natural sites hold significance not only related to spirituality but also to social practices, cultural values, and communities' relationships with the environment. Bhagwat and Rutte (2006) discuss the potential of sacred forests for biodiversity management, while Zannini et al. (2021) present a systematic review of the contribution of sacred natural sites to biodiversity conservation. Tatay and Merino (2023) demonstrate that the meaning of sacredness in a conservation context must be understood by considering the local social and cultural context. Therefore, the relationship between sacredness and the environment needs to be analyzed based on the values, rules, and practices of the communities associated with those places. However, the presence of sacred values does not in itself prove a measurable conservation impact. These values serve as a foundation for understanding how communities interpret and regulate their relationships with the environment.

Ritual is a space where people's relationships with place, ancestors, and the environment are expressed and passed down through symbolic, material, and social practices (Harvey, 2021). The relationship between society, cultural values, and the environment can be understood through a research approach that respects relational values and the rights of indigenous peoples (David-Chavez et al., 2024). Meanwhile, Dudley et al. (2009) discuss the relationship between protected areas, religion, and sacred natural sites.Based on this literature, this study analyzes mountain rituals through four dimensions: sacred space, ecological knowledge, ritual practice, and collective participation. This framework is used to distinguish sacred meaning, ritual action, and ecological consequences so that the relationships between them are analyzed based on data, not assumed from the outset.

The Ngasa Gandoang Tradition and the Xiō Bū Ritual as Comparative Cases

The *Ngasa Gandoang* tradition in Brebes, Indonesia, provides a context for examining the relationship between ritual, agriculture, social life, and mountain space. (Syahrul et al., 2026b) discuss the maintenance and transmission of this tradition through community involvement. A series of rituals, including dadangir (clearing the path to Mount Sagara), the journey to the ritual site, communal prayer, and the sharing of food, demonstrate the collective involvement and connection of tradition to local community life. These elements can be examined to understand how sacred space, agricultural products, ritual practices, and social relations are interconnected.

For comparison, the Xiō Bū ritual of the Yi people of Liangshan, China, demonstrates a different cultural context. Zhang and Cai (2026) describe the relationship of forested mountains to ancestors, spiritual entities, communities, ritual specialists, and the transmission of knowledge. These two cases were chosen not because they share identical ritual forms, but because they allow for a comparative study of the relationship between natural space, beliefs, cultural practices, and community life. Using the same four dimensions of analysis, this study compares the similarities and differences between the two traditions, while taking into account the cultural context and the differences in data sources. The *Ngasa Gandoang* data are derived from fieldwork, while the Xiō Bū analysis relies on ethnographic literature. This comparison aims to explain how socio-ecological relationships are interpreted and

practiced in the two contexts, without assuming either represents a universal pattern of adaptation.

METHODS

This study employs a comparative qualitative design to examine the relationship between mountain rituals and socio-ecological adaptation in the Ngasa Gandoang tradition in Brebes, Indonesia, and the *Xiō Bū* ritual among the Yi community in Liangshan, China. The two cases are not treated as cases with equivalent data depth. Ngasa Gandoang constitutes the primary empirical case, investigated directly through fieldwork, whereas *Xiō Bū* serves as a comparative case analyzed through the ethnographic publication by Zhang and Cai (2026). Accordingly, this study is not a comparison of two ethnographic sites investigated by the same research team, but rather a thematic comparison of two bodies of evidence with different origins and characteristics.

These differences in data sources have implications for the scope of the analysis. For *Ngasa Gandoang*, the researchers were able to examine the sequence of activities, practices, spatial use, informants' accounts, and field documentation directly. For *Xiō Bū*, the analysis is limited to the information reported and interpreted by Zhang and Cai (2026), without independent observation, interviews, or field verification. Therefore, the comparison focuses on themes available in both sources rather than on establishing equivalence across all ritual elements, measuring ecological impacts, or testing causal relationships.

Fieldwork on Ngasa Gandoang was conducted in Gandoang Village, Salem District, Brebes Regency, Central Java, Indonesia. Data were collected through observation of the tradition on 28 January 2025, semi-structured interviews, and documentation. Follow-up data collection began on 10 September 2025. The study involved eight informants: three *kuncen* (ritual custodians), two customary elders, and three community members with knowledge of or involvement in the tradition. The field data covered the meanings attached to sacred space, local knowledge, ritual sequences and regulations, the use of agricultural products, and forms of community participation.

Data on *Xiō Bū* were obtained through a review of Zhang and Cai's (2026) ethnographic article, particularly its discussion of forested mountains, ancestors, natural entities, ritual practices, ritual practitioners, the Yi community, and knowledge transmission. This article serves as a secondary source for the present study, rather than as field data collected or directly verified by the researchers. Accordingly, every account of *Xiō Bū* presented in the Results and Discussion is attributed to Zhang and Cai (2026), while information not specifically addressed in their publication is identified as unavailable.

The unit of analysis is ritual practice within the socio-ecological context of each community. The comparison is structured around four dimensions. First, sacred space, which identifies the meanings attached to mountains and ritual sites, as well as the regulations governing community relationships with these spaces. Second, ecological knowledge, which examines knowledge of the environment, food resources, agricultural products, ancestors, and natural entities as represented in the sources. Third, ritual practices, which examines the sequence of actions, prohibitions, offerings, prayers, and use of resources during ritual performance. Fourth, collective participation, which

explores community involvement, the distribution of roles, social relationships, and knowledge transmission. These four dimensions are applied to both cases, but the scope of discussion in each case is determined by the availability of evidence in the respective sources.

The data were analyzed thematically, drawing on the reflexive thematic analysis approach of Braun and Clarke (2021), as discussed by Byrne (2022). The analysis proceeded in three stages: (1) reading and interpreting each case separately in accordance with the characteristics of its data sources; (2) organizing the findings into the four analytical dimensions; and (3) comparing similarities and differences while taking cultural contexts and source asymmetries into account. For *Ngasa Gandoang,* the consistency of interpretation was examined by comparing accounts from the eight informants with the observations and documentation. For *Xiō Bū*, the validity of the interpretation was limited to the information presented by Zhang and Cai (2026); this study does not claim to have independently verified their account through fieldwork. Fieldwork ethics were addressed by explaining the research objectives, obtaining consent for the use of information, and protecting informants' identities where necessary.

This analysis explains the relationships among values, knowledge, regulations, and social practices in shaping community–environment relationships. The study does not measure changes in ecological conditions, conservation effectiveness, adaptive capacity, or the causal impacts of rituals on the environment.

RESULTS AND DISCUSSION

Results

The comparison is organized around four analytical dimensions: sacred space, ecological knowledge, ritual practice, and collective participation. The analysis of the Ngasa Gandoang tradition draws on field observations, interviews, and documentation collected in Gandoang Village, Salem District, Brebes Regency. In contrast, the analysis of the Xiō Bū ritual is based on the ethnographic study by Zhang and Cai (2026), rather than on direct fieldwork conducted by the researchers. Given these differences in data sources, the comparison focuses on themes documented in each case and does not assume an equivalent level of empirical detail.

Sacred Space and Environmental Arrangement

Observations and interviews indicate that Mount Sagara in the Ngasa Gandoang tradition is regarded as a culturally significant space governed by customary rules. According to the SR caretaker, these rules include prohibitions against swearing, cutting down trees, killing animals, damaging plants, and littering. These prohibitions guide community behavior in the area, particularly during ritual activities and in relation to respect for ancestors.

The procession toward the ritual site includes dadangir, understood in this study as the clearing of the path to Mount Sagara, followed by purification at Pancuran Lima (the Five Fountains). In comparison, Zhang and Cai (2026) associate the Xiō Bū ritual with forested mountains, ancestors, and natural entities within Yi cosmology. Both cases demonstrate the cultural significance of mountain spaces in ritual life, although the customary rules and documented practices differ between the two traditions.

Table 1. Sacred Space and Environmental Arrangement

Dimension	*Ngasa Gandoang* Tradition	*Xiō Bū* Ritual
Sacred space	Mount Sagara and ritual spaces associated with ancestors	Forested mountains within the Yi cultural landscape
Relationship with space	Respect for ancestors and customary rules	Relationships among humans, ancestors, and natural entities
Form of arrangement	Pamali (prohibitions), respect for sacred spaces, and customary rules of conduct	Norms and ritual practices associated with mountain spaces
Relationship with the environment	Regulation of community behavior in the mountainous area	Human relationships with the environment within Yi cosmology
Access to the ritual site	Dadangir (clearing the path to Mount Sagara) and purification at Pancuran Lima before proceeding to the ritual site	

Figure 1. *Ngasa Gandoang* Ritual Room in the Mount Sagara Area



Source: Researcher Documentation 2025

The findings show that mountain spaces in both traditions are associated with cultural meanings and behavioral norms. In Ngasa Gandoang, these norms are expressed through specific customary prohibitions governing conduct around Mount Sagara. In Xiō Bū, the relationship with mountain spaces is described through the Yi people's cosmological understanding of ancestors and natural entities. However, the present study did not measure changes in environmental conditions; therefore, these findings cannot establish the direct ecological effects of the customary rules or ritual practices.

Ecological Knowledge and Ritual Food

The Ngasa Gandoang tradition uses agricultural products available within the local community as ritual food. The documented ingredients include corn rice (kejo jagong), sticky rice, vegetables, and tubers such as yam, gembili, taro, and cassava. Following the communal prayer, the agricultural products are shared and consumed by participants. Their use is go verned by customary food rules, including restrictions on bringing or consuming certain foods during the ritual. These practices indicate that knowledge of agricultural products, food preparation, and customary requirements forms part of the community's ritual knowledge.

Zhang and Cai (2026) discuss Xiō Bū in relation to ancestors, natural entities, and the mountain environment within Yi cosmology. However, the publication examined

does not provide specific information about the types of food served in the ritual. Consequently, the food-related comparison is supported more extensively by the Ngasa Gandoang field data, while the Xiō Bū case provides a broader account of the relationship between ritual, ancestors, and the environment.

Table 2. Ecological Knowledge and Ritual Food

Dimension	*Ngasa Gandoang* Tradition	*Xiō Bū Ritual*
Documented materials	Corn rice (kejo jagong), sticky rice, vegetables, and tubers such as yam, gembili, taro, and cassava	Not specified in the source examined
Food regulations	Customary restrictions on bringing or consuming certain foods during the ritual	Not specified in the source examined
Ritual function	Offerings, communal prayer, sharing, and eating together	Discussed in relation to ritual practices within Yi cosmology
Related knowledge	Knowledge of agricultural products, their use, and customary food rules	Knowledge concerning relationships among rituals, mountains, ancestors, and nature
Relationship with the environment	Connection between ritual food practices and local agricultural products	Relationships between humans and the mountain environment within Yi cosmology

Figure 2. Offerings and Eating Together in the *Ngasa Gandoang* Tradition



Source: Researcher Documentation 2025

The findings indicate that food in Ngasa Gandoang serves a ritual function and is regulated by customary requirements. The use of locally available agricultural products reflects the incorporation of agricultural knowledge into ritual activities. However, the available data do not establish whether these practices directly contribute to increased agricultural biodiversity or measurable improvements in environmental conditions.

Ritual Practice

In the Ngasa Gandoang tradition, ritual practice consists of a sequence of activities involving customary deliberation, preparation, movement toward the ritual site, purification, prayer, and communal food sharing. The documented activities include dadangir, understood as clearing the path t o Mount Sagara, the journey to the ritual site, purification at Pancuran Lima, communal prayer, and the sharing and consumption of agricultural products. These activities are carried out within a customary framework that regulates the use of ritual space and the conduct of participants.

The Xiō Bū ritual, as discussed by Zhang and Cai (2026), is associated with forested mountains, ancestral spirits, natural entities, and ritual specialists within Yi cosmology. The available publication provides a basis for understanding the ritual's

cosmological context and its relationship with the mountain environment. However, the information available in the source does not provide a level of procedural detail equivalent to the field documentation of Ngasa Gandoang. Therefore, the comparison is limited to the documented relationship between ritual practice, sacred space, and cosmological beliefs.

Collective Participation and Social Relations

Community participation in Ngasa Gandoang extends from the preparatory stage to the closing of the ritual. The documented activities include deliberations, dadangir (clearing the path to Mount Sagara), the journey to the ritual site, purification at Pancuran Lima, communal prayer, sharing agricultural products, communal eating, and cleaning the area after the ritual. Deliberations provide an opportunity for residents to discuss the implementation of the activities and the distribution of responsibilities. Other activities, including the journey to the mountain, communal prayer, and food sharing, involve residents in the collective performance of the tradition.

Observations indicate that the ritual provides opportunities for interaction and collaborative work among community members. In relation to Xiō Bū, Zhang and Cai (2026) discuss community involvement in ritual practices associated with ancestors and mountain spaces. However, the publication does not provide detailed descriptions of the stages of participation that can be directly compared with the Ngasa Gandoang field data.

Table 3. Collective Participation and Social Relations

Dimension	*Ngasa Gandoang* Tradition	*Xiō Bū* Ritual
Forms of participation	Deliberation, dadangir (clearing the path to Mount Sagara), collective movement, prayer, and communal eating	Community involvement in ritual practices
Social interaction	Meetings and collaboration among residents	Relationships among the community, ancestors, and ritual practitioners
Involvement	Preparation, implementation of the ritual, and post-ritual cleaning	Not specified in the source examined
Inheritance of knowledge	Knowledge transmitted through community involvement in ritual activities	Knowledge associated with ritual practices and Yi cosmology
Social relations	Togetherness and continuity of tradition	Community relationships with ancestors and mountain spaces

The findings indicate that participation in Ngasa Gandoang encompasses the preparation, implementation, and closing stages of the ritual. The documented evidence supports the presence of collective activities, interaction, and shared responsibilities among residents. However, the study did not measure changes in social cohesion, adaptive capacity, or disaster risk reduction. Accordingly, the findings are limited to the forms of participation and social interaction documented during the research.

Comparative Findings

Table 4. Comparison of the *Ngasa Gandoang* Tradition and the Xiō Bū Ritual

Analytical dimension	*Ngasa Gandoang* Tradition	*Xiō Bū* Ritual
Sacred space	Mount Sagara and associated ritual spaces	Forested mountains in Liangshan
Relationship with the environment	Pamali (customary prohibitions), respect for sacred space, and the use of agricultural products	Relationships among humans, ancestors, and natural entities
Ecological knowledge	Knowledge of agricultural products, customary food rules, and mountain spaces	Knowledge concerning relationships among rituals, ancestors, mountains, and nature
Ritual practice	Deliberation, dadangir (clearing the path to Mount Sagara), purification at Pancuran Lima, offerings, prayer, and communal eating	Ritual practices of the Yi people in the context of mountain spaces and cosmological beliefs
Ritual food	Corn rice, sticky rice, vegetables, and tubers; customary restrictions on certain foods	Not specified in the source examined
Collective participation	Collaboration, community interaction, shared responsibilities, and participation in ritual activities	Community relationships, kinship, and ritual actors as discussed in the ethnographic source
Data source	Field observations, interviews, and researcher documentation, 2025	Zhang and Cai (2026), analyzed by the researchers

The comparison identifies similarities and differences between Ngasa Gandoang and Xiō Bū in terms of sacred space, ecological knowledge, ritual practice, and collective participation. Both traditions associate mountain environments with ancestral relationships and ritual meanings. However, the forms of customary regulation, the use of agricultural products, the documented ritual sequences, and the available information on community participation differ between the two cases.

In Ngasa Gandoang, the relationship between ritual and the environment is documented through customary prohibitions, respect for Mount Sagara, the use of agricultural products, dadangir (clearing the path to Mount Sagara), purification at Pancuran Lima, communal prayer, and food sharing. In Xiō Bū, Zhang and Cai (2026) describe relationships between forested mountains, ancestors, natural entities, and the Yi community within a cosmological framework. The comparison therefore reveals shared concerns with mountain spaces and ancestral relationships, while also showing differences in the cultural practices and empirical detail available for each case.

Overall, the findings show that both traditions connect mountain spaces, ritual practices, cultural knowledge, and community life. The Ngasa Gandoang field data provide detailed information on customary rules, agricultural products, ritual sequences, and community participation. By contrast, the Xiō Bū literature primarily explains the relationship between ritual, ancestors, natural entities, and the mountain environment within Yi cosmology. These differences in source type and empirical detail are important considerations in interpreting the comparison. The findings do not establish that either ritual directly produces measurable ecological outcomes; rather, they demonstrate how relationships between communities, ancestors, and mountain environments are expressed through culturally specific values and practices.

Discussion

Sacred Space as a Regulator of Human–Environment Relations

The findings concerning Mount Sagara indicate that sacred space is constituted through both cultural meanings and behavioral regulations. Prohibitions against using offensive language, cutting down trees, killing animals, damaging plants, and littering demonstrate the existence of norms governing community conduct within the ritual area. In this sense, sacredness is not solely associated with belief; it also provides a normative framework for behavior toward a particular space. This interpretation is consistent with Tatay and Merino (2023), who argue that the significance of sacred natural sites should be understood within their specific social and cultural contexts rather than automatically being assumed to function as instruments of conservation.

In *Xiō Bū,* Zhang and Cai (2026) situate forested mountains within a cosmological relationship among humans, ancestors, and natural entities. The comparison indicates that mountain spaces acquire meaning through value systems specific to each community. However, the spatial regulations documented in *Ngasa Gandoang* through pamali and path-clearing practices cannot be projected onto *Xiō Bū*, because comparable details of customary regulations are not available in the source examined. These findings support an understanding of sacred space as a relational context for society–environment interactions, but they do not yet provide empirical evidence of conservation outcomes.

Ecological Knowledge as Practised Knowledge

In *Ngasa Gandoang,* ecological knowledge is reflected in the selection and use of agricultural products for ritual food, as well as in customary regulations concerning food ingredients. This knowledge operates at the level of practice: community members know which ingredients are used and which customary requirements govern their preparation and serving. Local knowledge therefore encompasses not only technical knowledge of food resources but also cultural classifications concerning which ingredients are appropriate for ritual purposes. This interpretation is consistent with Berkes (2021) and Fernández-Llamazares et al. (2021), who emphasize that local knowledge is embedded in practices, norms, experiences, and intergenerational transmission.

In *Xiō Bū,* the ecological knowledge dimension in Zhang and Cai's (2026) account is more prominently expressed through the conceptual relationships among forested mountains, ancestors, and natural entities within Yi cosmology. Because the publication does not provide comparable details about food knowledge or resource-management techniques, the analysis cannot conclude that the two communities possess the same forms of ecological knowledge. The comparison that can be supported is that environmental knowledge and meanings are present within the ritual contexts of both traditions, although the forms of evidence differ.

It is important to distinguish the presence of local knowledge from evidence of adaptive effectiveness. As emphasized in studies of adaptation based on local knowledge, the existence of such knowledge does not in itself demonstrate successful responses to ecological pressures (Galappaththi & Schlingmann, 2023; Dorji et al., 2024). This study shows how food-related knowledge and cosmological understandings

of the environment are expressed through cultural traditions, but it does not measure their effects on food security, biodiversity, or responses to climate change.

Ritual Practices as a Medium for Enacting Values and Regulations

The sequence of activities in *Ngasa Gandoang* illustrates how cultural values and knowledge are enacted through structured practices. Deliberation, *dadangir*, the journey to the mountain, purification, prayer, the distribution of agricultural products, communal eating, and post-ritual cleaning connect customary regulations with collective action. These practices can be understood as social processes through which traditional values are reiterated and transmitted. However, the term processes here refers to observable socio-cultural activities, not to evidence that rituals directly produce ecological changes.

In *Xiō Bū,* Zhang and Cai (2026) describe ritual practices through their relationships with ancestors, natural entities, and forested mountains. Differences in the level of procedural detail limit the comparison to the role of ritual as a setting for expressing cosmological and social relationships. This study does not assume that the sequences of actions, symbols, or functions of individual ritual elements in the two traditions are interchangeable. This distinction is important to ensure that the comparative interpretation does not overlook the cultural specificity of each context.

Collective Participation and the Continuity of Tradition

The *Ngasa Gandoang* data demonstrate collective participation through deliberation, task allocation, preparatory work, ritual implementation, communal eating, and post-ritual cleaning. Such involvement provides opportunities for community members to interact and perform the tradition collectively. In this context, participation constitutes a social condition for the continuation of the ritual and creates opportunities for knowledge transmission through direct involvement. However, the data do not measure changes in social cohesion, adaptive capacity, or the community's ability to respond to disasters.

Zhang and Cai (2026) position the community and ritual practitioners as integral to the Yi people's relationships with their ancestors and mountain spaces. Because comparable details concerning the division of tasks and stages of participation are not available, this discussion does not conclude that the two traditions exhibit identical participation patterns. This difference also highlights the importance of considering the characteristics of the sources when interpreting comparative data. In line with Ibarra et al. (2023), understanding social-ecological resilience in mountain regions requires consideration of local communities' perspectives and practices. Nevertheless, the present study identifies only documented forms of relationships and practices; it does not assess their resilience outcomes.

Comparative Synthesis and Interpretive Limitations

The four analytical dimensions indicate that mountain rituals provide contexts in which communities interpret spaces, express knowledge, enact customary regulations, and establish social involvement. In *Ngasa Gandoang,* these relationships are supported by field data detailing ritual locations, food offerings, ceremonial sequences, and participation. In *Xiō Bū*, these relationships are described through ethnographic

research on forested mountains, ancestors, natural entities, and the Yi community. Consequently, the comparative findings are not intended to demonstrate equivalent levels of adaptation, ecological impacts, or ritual structures.

The analytical contribution of this study lies in explaining how ritual–environment relationships are shaped by cultural contexts and the available evidence, rather than by a universal pattern. The main limitations are the asymmetry of the data sources and the absence of measurements of ecological indicators. Future research should develop direct comparative ethnographic studies in both communities, systematically document ritual narratives and texts, and incorporate relevant environmental indicators if the ecological consequences of these practices are to be assessed.

CONCLUSION

This study compares the *Ngasa Gandoang* tradition in Indonesia and the *Xiō Bū* ritual of the Yi community in China through four dimensions: sacred space, ecological knowledge, ritual practices, and collective participation. Both traditions connect ritual life with mountain spaces, ancestors, the environment, and community life, but these relationships are expressed through different cultural contexts and forms of practice. In *Ngasa Gandoang,* these relationships are documented through customary regulations at Mount Sagara, the use of agricultural products, the sequence of ritual activities, and collective community work. In Xiō Bū, Zhang and Cai (2026) emphasize the relationships among forested mountains, ancestors, natural entities, Yi cosmology, and ritual practitioners.

The comparison does not demonstrate that the two traditions share identical ritual forms, levels of participation, or ecological impacts. *Ngasa Gandoang* was investigated directly through observations, interviews, and documentation, whereas *Xiō Bū* was analyzed based on the ethnographic publication by Zhang and Cai (2026). These differences in data sources limit the depth and comparability of the findings. Furthermore, this study did not measure changes in environmental conditions and therefore cannot conclude that ritual practices directly cause conservation outcomes or increase adaptive capacity.

The findings emphasize that rituals can be understood as socio-cultural contexts in which communities interpret the environment, enact customary regulations, and transmit knowledge and collective practices. Future research should undertake direct ethnographic studies in both communities, strengthen the documentation of ritual utterances and texts, and employ appropriate ecological indicators to examine the relationship between cultural practices and environmental dynamics.

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