

Ecological Knowledge and *Muyung* Management among Ifugao Living beyond Their Ancestral Domain

Arnold D. Pitpitunge^{1,3*} and Michele J. Dulay²

¹Student, College of Advanced Education, Ifugao State University, Lamut, Ifugao

²Associate Professor V, College of Advanced Education, Ifugao State University, Lamut, Ifugao

³Philippine Science High School – Cagayan Valley Campus in Nueva Vizcaya, Bayombong, Nueva Vizcaya

DOI: <https://doi.org/10.47772/IJRISS.2026.100800339>

Received: 19 August 2026; Accepted: 24 August 2026; Published: 04 September 2026

ABSTRACT

This study examined the *Muyung*-related knowledge, forest management practices, and challenges of Ifugao migrants who have settled in Quirino Province. Using an exploratory qualitative design, key informant interviews were conducted with 20 elders aged 60 to 80 who had direct experience with forest management practices before and after migration and who had resided in the community for more than 10 years. Forest observations were also conducted to complement the interview data. Findings revealed that migrants continue to retain substantial ecological knowledge, particularly of forest flora, and some practice selective cutting and conservation-oriented resource use. However, traditional systems of *muyung* inheritance based on primogeniture, spiritual regulations governing forest use, communal forest governance, and youth participation have weakened amid increasing pressure from commercial agriculture and market-oriented livelihoods. These pressures have contributed to the abandonment and conversion of some *muyung* areas. The findings suggest that the continuity of Ifugao indigenous forest knowledge is not simply a matter of preservation or loss, but a layered process in which knowledge and practices persist, adapt, or erode depending on responses to changing socio-economic conditions. Thus, the need to intensify intergenerational knowledge transmission and develop locally grounded forest stewardship initiatives that support Ifugao communities living beyond their ancestral domain.

Keywords: forest management, Ifugao, Indigenous Knowledge Systems and Practices (IKSP), migration, *muyung*,

INTRODUCTION

Indigenous forest management systems have gained increasing recognition as critical responses to global crises such as biodiversity loss, climate change, and cultural erosion. These systems embody sustainable practices that integrate ecological stewardship with cultural identity. The systems may offer models of resilience across diverse ecological, cultural, and socio-economic contexts (Reyes, 2020; Gonzales. 2024).

The Convention on Biological Diversity and the United Nations Declaration on the Rights of Indigenous Peoples provide global frameworks that underscore the importance of Indigenous Knowledge Systems and Practices (IKSP) in advancing sustainability. These frameworks highlight the necessity of documenting, sustaining, and integrating indigenous ecological wisdom into broader conservation strategies. Accordingly, studies have examined indigenous knowledge (IK) in relation to climate change adaptation (Makondo and Thomas, 2018; Avtar et al., 2020), sustainable practices (VijayKumar, 2019), conservation (Yuanyi, 2023), territorial management and governance (Brondizio et al., 2025), and survival (Sangat et al., 2026). Customary laws, beliefs, and culturally rooted practices also regulate ecological activities in many indigenous and traditional communities (Ntoko and Schmidt, 2021).

Within the Philippine archipelago, Northern Luzon is home to diverse ethnolinguistic groups including the Ifugao people, who maintain strong connections with their ancestral domains. Under Republic Act No 8371 of 1997, ancestral domains are areas that belong to Indigenous Cultural Communities or Indigenous Peoples. Ancestral domains include ancestral lands, forests, pasturelands, residential and agricultural areas, and other landforms.

Among the Ifugao, the *muyung* system exemplifies indigenous ecological knowledge. The *muyung* system is a long-evolving socio-ecological system that embodies Ifugao cultural values (Butic and Ngidlo, 2003). The *muyung* are privately managed woodlots that provide essential forest products for households and communities. Empirical studies have documented their importance in water regulation, soil conservation, carbon sequestration, and biodiversity protection (Soriano & Herath, 2018). The *muyung* system also contributes to forest conservation, reforestation, environmental protection, and wood production (Gonzales, 2024). Beyond ecological functions, *muyung* is deeply embedded in cultural practices, including rituals, inheritance systems, and communal governance (Sinthumule, 2023). Thereby, *muyung* sustains both ecological and cultural landscapes (Camacho et al., 2016; Daguitan et al., 2023).

Despite its ecological and cultural significance, *muyung* management faces pressures associated with globalization, modernization, and migration. These forces challenge the continuity of indigenous practices, including *muyung* management. They also raise questions about the resilience of the people beyond ancestral domains (Candelario-Aplaon, 2025; Jacoba, 2025; Hipolito, 2024). Migration introduces new socio-economic realities. It provides opportunities for acculturation, integration of new agricultural practices, and the concept of commercial agriculture. The opportunities can affect indigenous knowledge systems and practices of the people. They can disrupt traditional tenure systems, affect knowledge transfer, and challenge conservation and protection practices (Avtar et al., 2019).

The migration of the Ifugao to nearby provinces such as Nueva Vizcaya, Isabela, and Quirino has contributed to changes in the utilization, protection, and conservation of *muyung* resources. Ifugao migrants encounter new, sometimes fragile, socio-ecological contexts (Nantes et al., 2022). In these contexts, migrants may convert their acquired forestland into agricultural production areas. Farms may initially serve subsistence needs but later become commercial farms as demand for agricultural products increases (Valdez & Dumansi, 2022).

In Quirino Province, economic pressures and the combination of traditional and newly acquired values may lead some migrants to prioritize immediate economic benefits over long-term forest stewardship. These conditions indicate the fragility and vulnerability of indigenous ecological knowledge when communities operate in new socio-economic environments.

Although previous studies have recognized the ecological and cultural importance of *muyung*, limited attention has been given to the *Muyung*-related experiences and perceptions of Ifugao migrants, their ecological knowledge, and forest management practices in new socio-ecological settings.

This study addresses that gap by examining the *muyung* experiences and practices of Ifugao migrants. It focuses on the indigenous ecological knowledge of forest flora, traditional and adaptive forest management practices, and challenges affecting indigenous *muyung* management. The study therefore contributes to understanding how indigenous ecological knowledge and practices are maintained, transformed, or weakened under the conditions of migration.

This study aligns with SDG 15, Life on Land, which emphasizes sustainable forest management and biodiversity conservation. It is also aligned with SDG 11, Sustainable Cities and Communities, which highlights the importance of cultural heritage in building resilient communities. Understanding how migration reshapes indigenous forest management knowledge and practices might offer conservation and cultural-heritage initiatives to address challenges in intergenerational knowledge transmission. It provides opportunities that are responsive to local knowledge and changing socio-economic conditions.

Conceptual Framework

This study is anchored in the framework of Indigenous Knowledge Systems and Practices (IKSP). The framework emphasizes the integration of cultural traditions, ecological knowledge, and customary governance in the sustainable management of natural resources. From this perspective, the *muyung* management system is understood not only as an ecological resource but also as a cultural institution. It transmits indigenous knowledge, values, responsibilities, and customary practices across generations.

The IKSP framework recognizes indigenous ecological knowledge, beliefs, and practices in sustaining biodiversity and community identity. It also recognizes that these practices may change when indigenous communities migrate and encounter new socio-economic conditions.

In this study, the Ifugao IKSP associated with *muyung* provides a cultural and ecological foundation for forest stewardship. Migration of Ifugaos to Quirino Province introduces new socio-economic conditions. These conditions interact with migrants' existing IKSP, giving rise to adaptive practices. The resulting changes influence the continuity of *muyung* stewardship and the transmission of ecological knowledge to younger generations.

The framework therefore views migration not simply as a cause of cultural loss but as a process through which IKSP is selectively maintained, transformed, or weakened. This perspective allows the study to examine both continuity and vulnerability in the *muyung* system.

Research Objectives

This study explores the traditional forest management practices among the Ifugao migrants in Quirino Province, Philippines. Specifically, it sought to determine the ecological knowledge of migrants regarding their *muyung* flora in Ifugao Province, analyze the *muyung* management practices of the Ifugao migrants, and identify the challenges and issues migrants in Quirino Province face under the traditional forest management system.

METHODOLOGY

This study employed an exploratory qualitative research design to examine the ecological knowledge and forest management practices of Ifugao migrants in Quirino Province, Philippines. The qualitative approach provided a flexible and in-depth means of exploring cultural knowledge, traditional ecological practices, and experiences of the migrants. It explored how indigenous knowledge and practices have been adapted, maintained, and applied to manage forest resources under new socio-ecological conditions.

Participants and Sampling

Purposive and snowball sampling techniques were used to identify knowledgeable participants. A total of twenty (20) key informants, aged 60 to 80, were selected based on their perceived expertise in *muyung* management and their direct experience of migration. The focus for elder key informants was prioritized as they are among the few remaining community members with firsthand experience of *muyung* management both before and after migration, allowing the study to document ecological knowledge and practices transmitted from previous generations and to capture change overtime that younger, Quirino-community members would not be positioned to describe.

Data Collection

Semi-structured interviews were conducted to elicit narratives about ecological knowledge of flora, traditional forest management practices, current management strategies, and challenges encountered related to *muyung* management. The interviews were conducted following a protocol developed from the related literature and the study's objectives. The open-ended questions were used with probing to elicit their ecological knowledge, clarify their responses, and identify their practices. During the interview, the interviewer used the participants' language, recorded the interview, and took field notes to document relevant observations. Informed consent

was obtained from all participants prior to their voluntary involvement in the interview, ensuring they were fully aware of the study's objectives, procedures, and potential uses of data.

The interviews were complemented by direct observation of forest patches to provide contextual information and support the interpretation of reported practices. Observations focused on evidence of forest management and resource use and maintenance activities. After the interview, the audio was transcribed from Ifugao into English to determine the participants' substantive responses. The researcher reviewed the translated transcript of the audio recording and had it checked by native speakers for translation accuracy.

Data Analysis

The interview data were analyzed using thematic analysis, following the Braun and Clarke (2006). The researcher repeatedly read the transcripts and reviewed the corresponding field notes and observations to gain familiarity with the data. Significant statements relevant to the study objectives were identified, and meaningful segments of the transcripts were assigned initial codes. Coding combined deductive codes guided by the research objectives with inductive codes generated from the practices, experiences, and meanings that emerged from the participants' narratives. The initial codes were compared for similarities and recurring patterns; related codes were grouped into broader categories, which were then developed into themes. Particular attention was given to themes concerning continuity and change in ecological knowledge, forest management practices, resource use and conservation, and governance and adaptive strategies. The coding process was iterative, with emerging themes compared against the original transcripts to ensure they remain grounded in the data. A comparative analysis was also conducted to examine similarities and differences between the traditional practices in Ifugao and Quirino, offering insight into how migration reshapes identity, ecological stewardship, and perceived knowledge transfer. Observations and field notes were used to confirm and validate the emerging themes, which were finalized following confirmation and approval by the elder participants.

RESULTS AND DISCUSSIONS

The findings are organized according to the research objectives and major themes that emerged from the interviews and observation. The key informants retained substantial ecological and cultural knowledge. The results revealed both continuity and transformation in the *muyung* management system. It also shows the challenges on forest management as part of cultural identity.

Ecological Knowledge on *Muyung* Flora

Key informants demonstrated substantial ecological knowledge of the forest species found in their traditional forest in Ifugao. They were able to identify different species of timber and non-timber species. Their knowledge reflects generations of close interaction with forest ecosystems. They have species-level literacy, which they learned from their ancestors. The elders continue to embody this ecological wisdom, focusing on the relationship between biodiversity and their community.

Several key informants identified a wide range of trees and non-timber forest products (NTFPs) in their *muyung* (Table 1). Hardwood species such as *Shorea contorta* (apnit), fruit-bearing species like *Garcinia mangostana* (bulon), and culturally significant plants such as rattan (*Calamus manillensis*) were among the commonly mentioned species. Participants also identified edible ferns and plant materials used for crafts and woodcarving. Some were knowledgeable about medicinal plants and plant species associated with rituals and other significant cultural activities. Their knowledge reveals the role of *muyung* in sustaining both household subsistence and cultural traditions (Tumbali, 2025). Their traditional knowledge also reflects the deep ecological literacy embedded in Indigenous Knowledge Systems and Practices (IKSP).

Aside from native plant species in the *Muyung*, the key informants also reported the introduction of non-native species. The non-native species include fruit-bearing trees such as avocado and citrus, as well as forest trees such as *Alnus*. They described participation in government-initiated reforestation programs in which

introduced species were planted. The integration of new species into the forest illustrates the capacity of the community to incorporate new practices into existing forest-management systems.

Table 1: List of Trees in the Muyung of the Key Informants

Ifugao name	Scientific name	Family
Alimit	<i>Ficus minahassae</i> (Teijsm. & De Vr.) Miq.	Moraceae
Alnus	<i>Alnus japonica</i>	Betulaceae
Anablon	<i>Macaranga sinensis</i>	Euphorbiaceae
Analdung	<i>Trema orientalis</i> (L.) Blume	Ulmaceae
Analtap	<i>Neonauclea media</i> (Havil.) Merr.	Rubiaceae
Apnit	<i>Shorea contorta</i> (Vid.) Merr. & Rolfe	Dipterocarpaceae
Bahag	<i>Syzygium</i> sp.	Myrtaceae
Bakuwog	<i>Sardonicum vidalii</i> Merr.	Meliaceae
Bannutan	<i>Shorea astylosa</i>	Dipterocarpaceae
Bebet	<i>Psidium guajava</i>	Myrtaceae
Binul	<i>Saurauia elegans</i> (Choisy) F.-Vill.	Actinidiaceae
Bulinnayu	<i>Syzygium polycephaloides</i> (C.B. Rob.) Merr.	Myrtaceae
Bulon	<i>Garcinia mangostana</i> (Wild)	Guttiferae
Bultik	<i>Syzygium santosii</i> (Merr.)	Myrtaceae
Bulublu	<i>Baccaurea philippinensis</i> Merr.	Euphorbiaceae
Bunnog	<i>Garcinia benthami</i> Pierre	Guttiferae
Dalakan	<i>Palaquium luzoniense</i> (F. Vill.) Vid.	Sapotaceae
Dogwe	<i>Saurauia bontocensis</i> Merr.	Actinidiaceae
Gabgab	<i>Erythrina orientalis</i> Merr.	Fabaceae
Galiwgiwon	<i>Pavetta membranacea</i> Blanco	Rubiaceae
Gutmu	<i>Vaccinium myrtooides</i>	Ericaceae
Halinghingon	<i>Eurya amplixicaulis</i> Moore	Theaceae
Ihit	<i>Ficus glaberima</i> Blume	Moraceae
kamiling	<i>Semecarpus cuneiformis</i> Blanco	Anacardiaceae
Kantong	<i>Canarium asperum</i> Benth.	Burseraceae

Kape	<i>Coffea arabica</i> L.	Rubiaceae
Kuldadanum	<i>Turpinia ovaliifolia</i> Elm.	Staphyleaceae
Lablabong	<i>Ficus</i> sp.	Moraceae
Luhung	<i>Vaccinium cumingianum</i> Vid.	Ericaceae
Lutping	<i>Ficus ruficaulis</i> Merr.	Moraceae
Palayon	<i>Lithocarpus</i> sp.	Fagaceae
Tuwol	<i>Bischofia javanica</i> Blume	Euphorbiaceae
Udyo	<i>Pterocarpus indicus</i> Wild.	Leguminosae
Umug	<i>Litsea quercoides</i> Elm.	Lauraceae
other forest plants	other forest plants	other forest plants
Abukadu	<i>Persia americana</i>	Lauraceae
Atolbang	<i>Cyanthea</i> sp.	Cyatheaceae
Moma	<i>Areca catechu</i>	Arecaceae
Paku	<i>Diplazium</i> sp.	Athyriaceae
Rattan	<i>Calamus manillensis</i>	Arecaceae
Tabuyug	<i>Citrus</i> sp.	Rutaceae

The key informants know the importance of *muyung* for soil and water conservation. They identified forests as important in retaining soil and preventing erosion, and reducing land degradation. Although soil erosion was not considered predictable, they perceived forested areas as less susceptible to erosion than grasslands, open farms, and unforested areas.

Participants identified forests as an essential source of water for daily use and rice-field irrigation. They believe that forests are the source of water for their rice paddies. Thus, they maintained and protected forested areas to ensure a continuous water supply. Furthermore, they observed that converting forests into swidden farms reduced the volume of water available for their rice paddies. This perception reinforces the ecological knowledge linking forest cover, water supply, and agricultural productivity.

The comparison between Ifugao and Quirino highlighted changes in the application and transmission of ecological knowledge. In Ifugao, *muyung* management is closely associated with rice terrace systems. The people's ecological knowledge is reinforced through daily practice. In Quirino, participants described forest patches that were left unmanaged. They stated that there is limited accounting of plant species growing in the forest that they own. Most of the forest patches were converted to swidden farms. Participants observed that the younger generations have fewer opportunities to learn species-level forest knowledge. The erosion of ecological knowledge therefore represents not merely a matter of forgetting species names but also the weakening of cultural practices that have historically supported biodiversity (Malapane et al., 2024).

The findings reveal both continuity and vulnerability. Elders continue to embody rich ecological knowledge. However, migration and acculturation threaten the transmission of traditional ecological knowledge. The result confirms that migration and modernization weaken the transfer of ecological knowledge (Rabena & Macandog, 2021). The persistence of species identification and adaptive planting demonstrates resilience. The

decline in the interest and engagement of the younger generation indicates the fragility of traditional ecological knowledge and practices. This indicates a need to strengthen IKSP to ensure that ecological knowledge remains a living tradition among Ifugao migrants.

Management Practices

The interviews with key informants revealed diverse knowledge, beliefs, and practices that shape *muyung* management. Thematic analysis identified four major themes: Inheritance of *muyung*, spiritual aspect of forest management, *Muyung* resource use and conservation, and *muyung* governance and adaptive management. These themes illustrate both the continuity of Indigenous Knowledge Systems and Practices (IKSP) and the transformations brought about by migration.

Theme 1: Inheritance of *Muyung*

Muyung management and inheritance are part of Ifugao cultural identity. Traditionally, inheritance follows the principle of primogeniture. The principle of primogeniture dictates that the elder child will inherit a greater portion of the family property than the younger ones (Barton, 1919). According to the participants, inheritance of properties follows the principle of primogeniture. This practice applies particularly to the inheritance of rice fields (*payo*) and forest (*muyung*). This practice is deeply rooted in customary law and kinship systems. It ensures that stewardship of forest resources remains within the family line. Participants traced ownership across several generations. Most of them identified their great-grandparents as original custodians of their *muyung*. This indicates the long-standing cultural importance of *muyung* as both ecological heritage and ancestral property.

Migration to Quirino, however, has altered the continuity of *muyung* inheritance. The participants reported that *muyung* areas in Quirino were not generally maintained specifically for transfer to the next generation. At the same time, some inherited *muyung* in Ifugao were left unmanaged after migration.

In *muyung* inheritance, *boltan* (inheritance) remained the most common mode of transfer. However, the participants mentioned that some of their children were unwilling to return to Ifugao to manage their properties, including their inherited *muyung*. Consequently, some participants reported selling their forest to their kin, while others sold their property to non-relatives in the community. Although the practices of *hubli* (purchase) and *pallog* (trade) existed in the past, the kins are given priority before the property is offered to non-relatives in the community. Some participants reported selling their *muyung* without offering it to their kins before offering it to non-relatives. This reflects an expansion of transactions beyond kinship boundaries. This indicates a shift from strictly customary transfers towards market-oriented forms of property exchange.

In the Ifugao culture, primogeniture does not favor a particular sex. One of the Informants (P1) explained, “*A muyung is transferred to offspring who is next in rank after the rice field is given to the elder offspring. It could be given to a man or woman. It is not only the male who will inherit the forest property. If the forest is a part of the rice field, it is transferred to only one, and the two will not be split.*” It shows that there is gender inclusivity in inheritance. Both male and female offspring are eligible to inherit property.

In some families, the eldest child was given priority and the freedom to choose which property to inherit. One key informant (P10) said, “*In our family, there are several properties that we inherited and acquired, so the first child was given priority to select which of the properties he would inherit.*” In contrast, in others, the parents predetermined which property would be assigned to the children. Several key informants stated that they follow community standards in distributing the properties. Informant (P7) said, “*the largest property is given to the firstborn,*” while another (P2) said, “*the property owned by the father is given to the firstborn, and the second got the larger property owned by the mother*”. Furthermore, the community has expectations and knowledge on property inheritance. Thus, the community could intervene if there is an unlawful inheritance of property.

Despite this continuity, participants reported limited willingness of the younger generation to assume stewardship of inherited forests. Younger generations often prioritize immediate economic opportunities over

forest management. This led to the abandonment of *muyung*. Some abandoned *muyung* areas were reportedly converted into *uma*, or swidden farms, by relatives who remained there. Although ownership remained with those who inherited the forest, the conversion indicates a shift in priorities among community members. This claim was verified during field observations, in which some forests were converted into swidden farms.

In Quirino, forests are not conserved for inheritance. They are not intended as future inheritance of the next generation. Instead, they were maintained for watershed purposes or reserved for possible conversion into swidden farms when their current production areas are no longer productive.

Key Informants also described fallowing as an earlier agricultural practice in which swidden farms were allowed to recover by being left to grow trees and other plants. They associated this practice with soil recovery and nutrient restoration. However, the increasing use of herbicides and pesticides and the intensification of agricultural production contributed to the discontinuation of fallowing practices. This was also confirmed during the observation, in which farms were not allowed to rest and were cultivated continuously. Although the elders continue to recognize the importance of the traditional practices, the commercial gains of crop production override them.

The findings indicate that inheritance of forest is a part of Ifugao identity. It also revealed that migration affects the sustainability of forest inheritance and transfer. The persistence of primogeniture and kinship-based transfers demonstrates continuity. However, inheritance is disrupted by the rise of selling, abandonment, and declining youth interest in owning and managing forests. This creates a tension between the continuity and vulnerability of the forest inheritance. This tension underscores the need to reinforce Indigenous Knowledge Systems and Practices (IKSP) to sustain both ecological stewardship and cultural heritage in diaspora communities.

Theme 2: Spiritual Aspect of Forest Management

In Ifugao, forests are regarded as sacred spaces because they are the dwelling places of spirits and deities. Most participants reported that forests were regarded as the dwelling places of spirits and should therefore not be disturbed. Activities such as tree cutting, clearing, and cleaning were traditionally performed in ways that would not disturb the spirits. Some cultural taboos and behaviors are observed when working in the forest. Informant (P3) related, *“There are taboos that we observe when we are in the forest because there are unseen spirits that could be affected. When we were young in Ifugao, we really complied with the advices of the elders not to disrupt or exploit the homes of the spirits.”*

These beliefs functioned as a moral and spiritual basis for forest protection. The beliefs acted as a regulatory system. The sacredness of the forest discouraged overexploitation and ensured the maintenance of ecological balance. The spiritual worldview, therefore, functioned as a conservation ethic embedded in everyday forest management practices.

In Quirino, the key informants observed that forests were increasingly treated as utilitarian resources and valued for their immediate economic benefits rather than their sacredness. The cultural taboos and spiritual sanctions no longer regulate behavior. Participants associated this with acculturation, religious influences, and modern economic pressures. The prioritization of agricultural productivity over traditional observances was perceived to reduce the cultural foundation of forest governance. Similar findings show that weakening spiritual worldviews undermines conservation ethics in indigenous communities (Keitumetse, 2023).

The findings suggest that the decline of traditional spiritual practices is not simply a change in belief. It also represents a change in the social and cultural mechanisms through which forest use was historically regulated. As one of the informants (P6) stated, *“There were changes that we accepted. We accepted a new way of life and new beliefs. We abandoned the old belief and embraced the new faith which is better than the traditional.”*

Theme 3: Muyung Resource Use and Conservation

In Ifugao, participants described *muyung* management as incorporating conservation-oriented practices. The practices include selective cutting, species protection, and undergrowth cleaning. These practices sustained biodiversity and ensured a steady supply of timber and fuelwood. As one key informant (P8) stated, *“It is right*

to take care of the forest because it is the source of firewood and other forest products. There are many non-timber products that could be gathered in well-maintained forests.” Resource use was carefully balanced with conservation. The practices reflect the integration of ecological knowledge and cultural values.

Following the migration to Quirino, participants reported that their resource use and conservation practices were similar to their traditional ones. They do selective cutting of timber. They allow saplings to grow if they cut large trees. One key informant shared, *“When we arrived in this place, we observed the traditional practices like in Ifugao. We cut trees as needed, and we allow small ones to grow. Although the forests here are much more robust, we did not exploit them.”* They leave patches of forest as a water source. They identified a good water source and protected the forest so that no one would turn it into a swidden farm. During the field observation, one participant (P20) discussed the use of a forest patch on a mountain. He said, *“There was a person who wanted to clear that forest to turn it into a swidden farm, but we did not agree because that is our source of water.”* Regarding the use of non-timber forest products, they observed non-excessive extraction. However, they reported that these practices became increasingly difficult to sustain as economic pressure increased.

The demand for commercial crops has increased in the area, and production needs to be increased. Some forest patches were converted to agricultural land. Many forests were turned into corn fields, banana plantations, and vegetable gardens. The forest patches that were not converted were subjected to resource extraction. In some cases, participants reported excessive extraction of non-timber forest products such as rattan. The weakening belief in the sacredness of the forest was perceived to intensify pressures on biodiversity.

The increasing demand for high-value crops also affected the forests in Ifugao. Participants described the conversion of forests to swidden farms or orchards, with specific species planted in the area. A key informant (P8) related, *“In the past, the high demand for banana lead to the conversion of forest into banana plantation. After banana, the introduction of herbicides led to the increase in corn production.”* Such conversions may not reproduce the ecological balance associated with traditional muyung systems.

The abandonment of traditional practice in muyung management illustrates how migration undermines conservation ethics embedded in IKSP. Recent studies highlight similar vulnerabilities in indigenous conservation systems under market-driven pressures (Baggo et al., 2025; Maharjan et al., 2025).

Resource-use practices demonstrate both continuity and transformation. Traditional conservation practices were carried out into the migrants’ new environment. However, economic pressure and agricultural commercialization encouraged changes in land use, resource extraction, and forest management.

Theme 4: Muyung Governance and Adaptive Management

Customary laws traditionally regulated forest use in Ifugao. Elders and kinship networks ensured equitable access, enforced rules, and mediated disputes. Forest management is embedded within social institutions to reinforce stewardship. Thus, families and relatives are given responsibilities to ensure the protection of forests that they inherited. A key informant (P3) shown his belief on customary law when he said, *“Forest management is a part of the life of Ifugao in the past. Although muyung are owned by families, the community has influence on their utilization and management. Exploitation and misuse can lead to community discussion.”*

In Quirino, participants described weaker communal governance. Decisions about forest use are often made at the household level. The decisions are usually influenced by market forces rather than customary law. The decline of collective regulation reflects the erosion of social institutions. Thus, forest management becomes fragmented.

The weakening of communal governance also undermines cultural identity. Elders noted the loss of collective decision-making pertaining to land use and forest management. They also noted that the younger generations are less inclined to participate in communal activities. This undermines cultural identity and reduces resilience.

Similar findings show that migration erodes communal governance structures in indigenous communities (Cruz & Zayas, 2023; Jacoba, 2025).

Participants also described adaptive strategies in earlier generations. They reported that introduced species were sometimes planted in *muyung* areas. The introduced species were cultivated as a source of food, animal feed, or medicine. The participants stressed that the introduced species were grown without removing the native species in their *muyung*. In addition, the new plant varieties were perceived as more productive and resilient than their native counterparts. These accounts indicate that adaptation and innovation are not entirely new phenomena within the Ifugao system. During field work, the introduced species were observed in the forest.

In Quirino, the participants observed that swidden farms were widely planted with new varieties. Although the participants recognized that agricultural conversion often leads to biodiversity loss and soil degradation, they acknowledged its economic benefits and the use of new plant varieties. The participants observed that as more people gained benefits from the conversion, more were enticed to do the same.

After converting the forests into farmland, the participants observed that some migrants allowed forest regeneration for several years. This indicates that migrants are engaged in adaptive strategies to maintain farm productivity. However, some people increased production in their agricultural areas by using higher levels of farm inputs.

These findings demonstrate that migrant communities continue to innovate in response to livelihood needs and environmental restrictions. However, participants perceived these adaptive practices as less resilient than the traditional system when spiritual foundations, ecological knowledge transmission, conservation ethics, and communal governance are weakened. This interpretation is consistent with findings that adaptive strategies in migrant contexts may lack some of the resilience associated with traditional ancestral systems (Reid et al., 2024).

Challenges to IKSP continuity

Across the findings, three interconnected challenges emerged: unmanaged forests and conversion of *muyung*, declining youth interest, and the reshaping of identity and the decline of stewardship.

Unmanaged Forests and Conservation of *Muyung*

Participants identified the unmanaged conditions of some forest areas in Ifugao as a major concern. They contrasted the current conditions of *muyung* with their earlier periods. In the past, the *muyung* in Ifugao were actively maintained through selective cutting, undergrowth cleaning, and ritual observances. Because of migration, some *muyung* areas owned by the migrants in Ifugao were reportedly no longer actively managed. Trees are not maintained, undergrowth is not controlled, and species management was reduced.

The concern expressed by participants was primarily cultural because, ecologically, unmanaged forests are not problems. The abandonment of traditional management was perceived to weaken ecological knowledge and customary stewardship. One Informant (P12) expressed his concern when he said, *"The neglect of forest management can lead to diminishing knowledge about trees, animals in the forest, and traditions. If this continues, then the cultural aspects of Ifugao related to the forest will be forgotten."* The participants associated the neglect of these forests with the absence of customary governance and the competing demands of livelihood.

The participants reported that the younger generations raised in Quirino are more familiar with agricultural land than with managed *Muyung*. They have limited exposure to traditional forest management practices. As a result, there is no transmission of ecological knowledge. This affirms that migration disrupts stewardship and knowledge transfer, leaving forests vulnerable to degradation. Similar concerns regarding swidden expansion and changes in cultural practices were reported, highlighting how swidden expansion threatens biodiversity and cultural practices (Bimmoy, 2025).

Declining Youth Interest in *Muyung* Management

A recurring concern among the participants was the declining interest of younger generations in the *muyung* knowledge and forest management. Participants reported that some younger people were not interested in inheriting or managing the traditional forest. This generational disinterest leads to abandonment or sale of *muyung* when no child is willing to assume responsibility. As one informant (P2) narrated, *“As the children are getting formal education, they are not willing to manage the forest that they inherit. On the other hand, the children who are into farming are focused on economic gains from converted forests.”*

The abandonment of *Muyung* was viewed as a cultural loss because it weakens the chain of inheritance and stewardship. Participants also linked reduced engagement to a decline in ecological knowledge of forests and their roles in water regulation, soil conservation, and biodiversity protection. These observations are consistent with studies showing that youth disengagement can weaken transmission of ecological knowledge (Maharjan et al., 2025; Gonzalvo et al., 2024).

Identity Reshaping and Stewardship Decline

Migration also reshapes the meaning attached to *muyung*. Participants described a shift from communal stewardship to individual economic survival. Participants noted that *muyung* management symbolizes cultural heritage and ecological responsibility. However, the younger generation views forest areas as resources for productive use. Indigenous practices are marginalized in favor of modern livelihoods.

The identity shift reflects broader socio-economic changes associated with migration and acculturation. As migrants assimilate new identities, the cultural meaning of *muyung* is transformed, and the concept of forest management is limited. There is a weakening of both ecological stewardship and cultural transmission, illustrating the vulnerability of IKSP under changing socio-economic conditions. These findings are consistent with the observation that indigenous practices can change as migration transforms cultural identity and continuity (Gonzales, 2024).

CONCLUSION

The findings demonstrate that *muyung* remains an important component of Ifugao ecological and cultural identity. This study reveals that inheritance practices remain anchored in customary law, particularly primogeniture, with both male and female offspring eligible to inherit. However, migration has introduced vulnerabilities, including abandonment and selling of *muyung* when no child is willing to assume stewardship. These findings confirm that migration alters inheritance continuity and weakens traditional governance.

Ecological knowledge of flora persists among key informants, who recall diverse species and non-timber forest products with precision. Practices such as planting non-native species demonstrate resilience and innovation, showing that IKSP is adaptable.

The traditional *muyung* management practices were characterized by interconnected spiritual foundations, ecological knowledge, resource use and conservation, communal governance, and adaptive strategies. However, these are weakened in the migrants' new socio-ecological context as market pressures and agricultural commercialization intensify pressure on forest areas.

Challenges in forest management include unmanaged forests, declining youth interest, and the reshaping of identity. Migration reshapes identity and stewardship but does not eliminate indigenous knowledge; rather, it creates conditions in which some elements of IKSP persist, some are transformed, and others are weakened. The continuity of *muyung* as both ecological system and cultural heritage therefore depends on strengthening intergenerational transmission, cultural knowledge, and locally appropriate forms of forest stewardship.

RECOMMENDATIONS

To strengthen inheritance practices, families should reinforce customary laws and primogeniture traditions through community dialogues and cultural education. To ensure the transmission of traditional knowledge,

traditional education should be complemented by school-based ecological education that integrates Indigenous Knowledge Systems and Practices (IKSP). Management practices can be revitalized by reintroducing communal governance structures that once regulated forest use and adaptive strategies. A program should be created to re-engage youth in forest stewardship to counter commercialization pressures.

Ethical consideration

This study adhered to ethical research standards in conducting interviews and collecting data. Informed consent was obtained from all participants before their involvement. It was ensured that they were fully aware of the study's objectives, procedures, and potential uses of the data. Participation was voluntary, and respondents were assured of confidentiality and anonymity. Pseudonyms were used in reporting to protect identities, and sensitive cultural knowledge was handled with respect for Indigenous protocols. The study also recognized the authority of community elders and respected local customs during fieldwork.

ACKNOWLEDGEMENTS

The authors would like to thank key informants for their support to the study. We also acknowledge the guidance and support of IFSU College of Advanced Education. Any remaining errors or omissions are the sole responsibility of the authors.

Funding

This research received no external funding from any public, commercial, or not-for-profit funding agency, and no organization provided financial support for the conduct of the study, authorship, or publication of this article.

Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

The data that support the findings of this study are available from the primary author and can be accessed upon reasonable request, provided that no confidentiality clause in participants' informed consent is violated.

REFERENCES

1. Avtar, R., Tsusaka, K., & Herath, S. (2019). REDD+ Implementation in Community-Based Muyong Forest Management in Ifugao, Philippines. *Land*. <https://doi.org/10.3390/land8110164>
2. Baggo, J. C., Codamon-Dugyon, E. M., Pumihic, C. B., & Nanglegan, M. J. A. (2025). Innovating Products Towards Conservation of the Ifugao Rice Terraces in the Philippines. In *Business and Biodiversity: Reciprocal Connections in the Context of Socio-Ecological Production Landscapes and Seascapes (SEPLS)* (pp. 111-122). Singapore: Springer Nature Singapore.
3. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
4. Barton, R. F. (1919). Ifugao Law. *American Archeology and Ethnology*. Vol. 15. No.1. pp. 1-186. <https://www.gutenberg.org/files/40807/40807-h/40807-h.htm#s53>.
5. Bimmoy, E. D. (2025). Biodiversity and ethnobotanical significance of vascular plants in the ecological trail and reservation site of indigenous trees (ECOTRIS), Ifugao Province, Philippines. *Plant Science*, 320, 112–124.
6. Brondizio, E. S. (2025). The entangled Indigenous, rural, and urban realities in Amazônia's governance. *Ambio*, 54(6), 923-931.
7. Butic, M. L., & Ngidlo, R. (2003). *Muyong: The Ifugao traditional forest management system*. Ifugao State University Press.

8. Camacho, L. D., Gevaña, D. T., Carandang, A. P., & Camacho, S. C. (2016). Indigenous knowledge and practices for the sustainable management of Ifugao forests in the Philippines. *International Journal of Biodiversity Science, Ecosystem Services & Management*, 12(1–2), 5–13. <https://doi.org/10.1080/21513732.2016.1169559>.
9. Candelario-Aplaon, Z. (2025). Preserving Indigenous Heritage: A Strategic Roadmap for Community Based Cultural Development. *Advanced Qualitative Research*. <https://doi.org/10.31098/aqr.v3i1.2704>.
10. Daguitan, F., Ngidlo, R. T., Baguilat, I. P., & Choudhury, D. (2023). *The Muyong System*. CABI Books, doi:10.1079/9781800620117.0016, (329–345).
11. Gonzales, N. A. P. (2024). Indigenous ecological knowledge and biodiversity conservation in the Cordillera. *Journal of Environmental Management*, 325, 116–124.
12. Gonzales, N. A. P. (2024). Safeguarding Indigenous Practices in the Family, Education, Agriculture, and Forest Conservation among the Ifugaos in the Philippines. *Suranaree Journal of Social Science*. <https://doi.org/10.55766/sjss-2-2024-272439>.
13. Gonzalvo, C. M., Maharjan, K. L., Baggo, J. C., & Embate, J. M. L. (2024). Farmer perceptions of GIAHS: Analyzing farmer involvement and GIAHS benefits in the Ifugao Rice Terraces. *Agriculture*, 14(12), 2305. <https://doi.org/10.3390/agriculture14122305>.
14. Hipolito, M. F. G. (2024). A Systematic Literature Review of the Significance of the School of Living Tradition in the Preservation of Cultural Heritage of the Indigenous Peoples. *International Journal of Multidisciplinary: Applied Business and Education Research*. <https://doi.org/10.11594/ijmaber.05.02.21>.
15. Jacoba, R. C. (2025). Sacred ties to ancestral land: Reclaiming indigenous practices in environmental stewardship in the Cordillera. *Media: Jurnal Filsafat dan Teologi*, 6(1), 1–30.
16. Keitumetse, S. O. (2023). African cultural heritage conservation and management: Theory and practice revisited. *International Journal of Heritage Studies*, 29(2), 223–240.
17. Maharjan, K. L., Gonzalvo, C. M., & Baggo, J. C. (2025). Balancing tradition and innovation: The role of environmental conservation agriculture in the sustainability of the Ifugao Rice Terraces. *Agriculture*, 15(3), 246. <https://doi.org/10.3390/agriculture15030246>.
18. Makondo, C. S. & Thomas, D. S. G. (2018). Climate change adaptation: Linking Indigenous Knowledge with western science for effective adaptation. *Environmental Science & Policy*. Volume 88. 84–91. <https://doi.org/10.1016/j.envsci.2018.06.014>.
19. Malapane, O. L., Chanza, N., & Musakwa W. (2024). Transmission of indigenous knowledge systems under changing landscapes within the vhavenda community, South Africa, *Environmental Science & Policy*, Volume 161. <https://doi.org/10.1016/j.envsci.2024.103861>.
20. Nantes, Jr., F. V. N., Maslang, K. L., & Damayon, S. B. (2022). Translocality and Cultural Differentiation: Challenges and Opportunities among Indigenous Ifugao Migrants. *World Journal of Social Sciences and Humanities*, 8(1), 1–8.
21. Ntoko, V. N., & Schmidt, M. (2021). Indigenous knowledge systems and biodiversity conservation on Mount Cameroon. *Forests, Trees and Livelihoods*, 30(4), 227–241.
22. Ntoko, V., & Schmidt, M. (2021). Indigenous knowledge systems and biodiversity conservation on Mount Cameroon. *Forests, Trees and Livelihoods*, 30, 227 – 241. <https://doi.org/10.1080/14728028.2021.1980117>.
23. Rabena, M. A. F., & Macandog, D. M. (2021). Contemporary knowledge of woodlot (muyong) resource management: A case study of key-informants' perceptions in Brgy. Kinakin, Banaue, Ifugao, Philippines. *Journal of Environmental Biology*, 42(4), 765–774.
24. Reid, A. J., McGregor, D. A., Menzies, A. K., Eckert, L. E., Febria, C. M., & Popp, J. N. (2024). Ecological research 'in a good way' means ethical and equitable relationships with Indigenous Peoples and Lands. *Nature Ecology & Evolution*, 8(4), 595–598.
25. Reyes, M. (2020). Youth perspectives on indigenous ecological practices in the Cordillera. *Philippine Journal of Social Development*, 3(2), 45–62.
26. Sangat, S. S., Cerda, J., Pastor, & C. et al. (2026). Indigenous Peoples' knowledge systems and practices for climate survival. *Humanities & Social Science Communication*. 13, 768 (2026). <https://doi.org/10.1057/s41599-026-07434-2>.
27. Sinthumule, N. I. (2023). Traditional ecological knowledge and its role in biodiversity conservation: a systematic review. <https://doi.org/10.3389/fenvs.2023.1164900>.

-
28. Soriano, J., & Herath, S. (2018). Carbon sequestration potential of indigenous forest systems in the Philippines. *Environmental Sustainability*, 11(4), 233–242.
 29. Tumbali, G. (2025). Exploring Traditional Ecological Knowledge (TEK) in Kalinga Province: Practices, Preservation, and Perspectives. *Religion and Social Communication*. 23. 9-35. 10.62461/GCT101624.
 30. Valdez, C., & Dumansi G.B. (2022). Migration Characteristics of Communities in the Forestlands in Ifugao, Philippines, *International Journal of Environmental and Rural Development*. Volume 13, Issue 1, Pages 75-80. https://doi.org/10.32115/ijerd.13.1_75.
 31. VijayKumar (2019). Integrating Indigenous Knowledge and Traditional Practices for Biodiversity Conservation in a Modern World. *Environmental Reports; an International Journal*. 04 to 07. DOI: <https://doi.org/10.51470/ER.2019.1.2.04>.
 32. Yuanyi, S. (2023). Indigenous ecological knowledge: Preserving traditional wisdom for conservation. *Ukrainian Journal of Ecology*.13:19-2