

Swallow Nesting In Traditional Houses Of The Dao Cham People: Ecological, Cultural, And Environmental Education Perspectives From Ha Giang, Vietnam

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Abstract

This study investigates the nesting behavior of swallows (Hirundinidae) within the traditional dwellings of the Dao Cham ethnic group in Nam Dam Village, Ha Giang Province, Vietnam. Adopting an interdisciplinary framework that integrates ecological analysis, cultural anthropology, and environmental education, the research underscores a symbiotic relationship between the swallows and the local community. Field observations and in-depth interviews reveal that these birds are not only naturally attracted to the architectural features of traditional Dao Cham houses but are also regarded with respect and spiritual significance, reflecting deep-rooted indigenous belief systems. Drawing on these findings, the paper advocates for the integration of such eco-cultural relationships into environmental education curricula in upland regions. By employing experiential, community-based, and interdisciplinary pedagogies, this approach aims to enhance students' environmental consciousness, safeguard indigenous ecological knowledge, and cultivate a more profound, place-based connection to nature.

Keywords: Swallow nesting; Dao Cham ethnic group; Nam Dam village; Ha Giang, Vietnam; Ecocultural interactions; Environmental education; Community-based learning.

1. INTRODUCTION

Amid accelerating globalization and urbanization, the delicate symbiotic relationships between humans and native species are increasingly being disrupted or lost in many parts of the world. Transformations in traditional architecture, rising environmental pollution, urban noise, and the fast-paced industrial lifestyle have driven away various species of birds, mammals, and insects that once coexisted harmoniously with humans. These disruptions contribute to biodiversity loss and ecological imbalance, as intricate ecological linkages are severed without viable or sustainable alternatives [8]. However, amidst this landscape of ecological disruption, rare and valuable examples of enduring human–nature symbiosis still persist—examples that merit recognition and preservation [9]. One such case is the nesting of swallows beneath the eaves, roof beams, and earthen walls of traditional Dao Cham houses in Nam Dam Village, Quan Ba Commune, Ha Giang Province, Vietnam. This is not merely a seasonal occurrence but a long-standing phenomenon that has continued across generations. For the local community, it is imbued with cultural and spiritual significance—regarded as a sacred sign of ancestral presence, good fortune, and peace. Ecologically, the sustained presence of swallows serves as a strong indicator of an unpolluted environment—one relatively undisturbed by industrial development and characterized by long-term ecological resilience. From an educational standpoint, this phenomenon offers a valuable foundation for designing place-based learning models [7], in which students not only “learn about nature” but also live within it, cultivating awareness of the intrinsic value of even the smallest species in their surroundings [6]. In the context of the global ecological crisis, raising environmental consciousness and fostering responsible behavior among students and youth—the future stewards of the environment—remains a pressing educational challenge. Although environmental education has been emphasized in Vietnam’s 2018 General Education Curriculum [2], translating these goals into effective classroom practice demands vivid, contextually grounded learning experiences. In reality, a lack of locally relevant educational resources poses a significant barrier for teachers seeking to design meaningful activities that offer authentic, impactful engagement with nature.

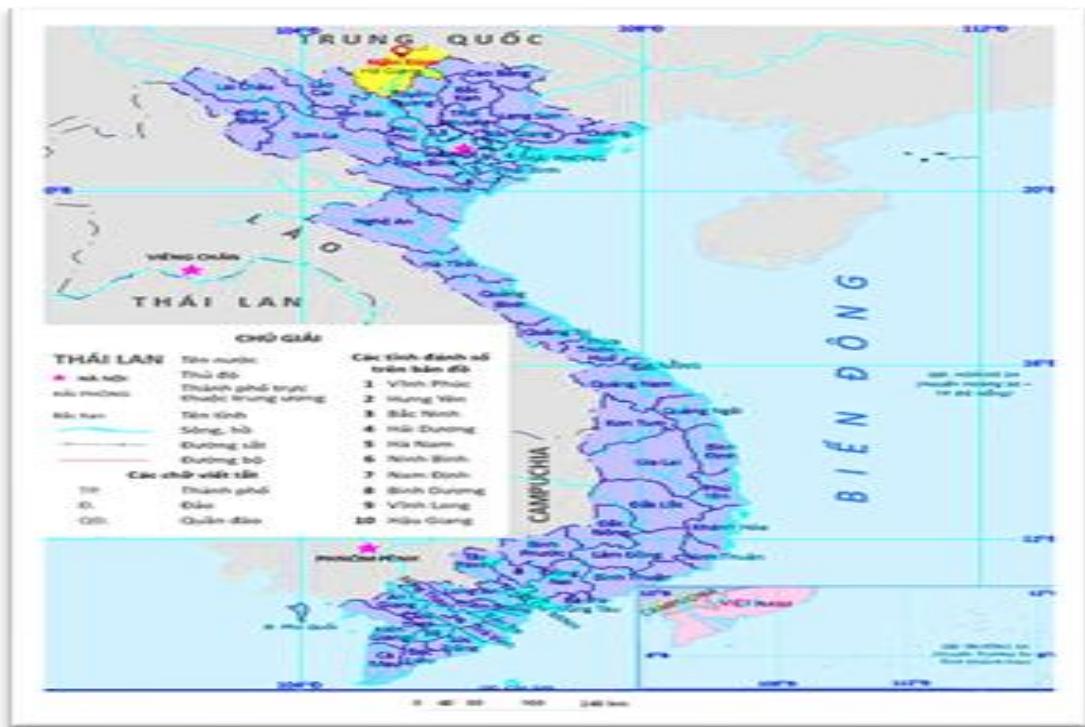


Figure 1. Map of Vietnam and the location of Nam Dam (highlighted in yellow and red), where swallows nest in the rammed earth houses of the Dao Cham people.

Therefore, this study seeks to systematically examine the phenomenon of swallow nesting within the residential spaces of the Dao Cham people, along with the accompanying folk beliefs and protective practices of the Nam Dam community in Ha Giang Province. Building on this analysis, the research proposes pedagogical approaches for integrating this eco-cultural phenomenon into environmental education programs in Vietnamese schools—aligned with the competency- and character-based orientation of the 2018 General Education Curriculum [5].

2. RESEARCH APPROACH AND METHODOLOGY

2.1. Research Approach

This study employs an **interdisciplinary approach** to investigate the phenomenon of swallows nesting in traditional Dao Cham houses, drawing on perspectives from three primary fields:

- **Ecology:** This dimension analyzes the biological characteristics of swallows and the environmental-architectural factors that influence their nesting behaviors, particularly in relation to traditional housing materials and design.
- **Cultural Anthropology:** This perspective examines how the local community perceives, interacts with, and protects swallows, thereby uncovering embedded symbolic meanings, belief systems, and indigenous ecological knowledge associated with the species.
- **Environmental Education:** This aspect explores how the swallow-nesting phenomenon can serve as an educational resource in school curricula, particularly in mountainous regions such as Ha Giang. The study emphasizes the value of community-based and experiential learning models in fostering environmental awareness and cultural identity.

2.2. Research Methods

This study adopts a **qualitative research design**, employing a combination of ethnographic and interpretive methods to explore the swallow-nesting phenomenon in its ecological and cultural contexts. The research was conducted in **Nam Dam Village**, Quản Bạ District, Ha Giang Province, and involved the following methods:

- **Field Surveys:** Site visits were conducted to document the architectural features of traditional Dao Cham houses and the specific environmental conditions favorable to swallow nesting.

- **Semi-structured Interviews:** In-depth conversations were held with local residents across different age groups to gather insights into community beliefs, practices, and perceptions related to swallows.
- **Direct Observation:** Nesting sites and swallow behaviors were systematically observed to assess spatial patterns and human–avian interaction.
- **Document and Folklore Analysis:** Indigenous narratives, folk beliefs, and oral traditions concerning swallows were collected and analyzed to contextualize their symbolic and spiritual significance within Dao culture.

This multi-method framework provides a holistic understanding of the swallow phenomenon—not merely as a biological event, but as a cultural and ecological symbol of harmonious human–nature coexistence. It further serves as a pedagogical model for promoting conservation values and environmental consciousness through place-based, experiential learning.

3. RESEARCH FINDINGS AND DISCUSSION

3.1. General Overview of Swallows and Their Symbolic Significance in Dao Cham Culture

Swallows (family Hirundinidae) are among the most widely distributed migratory bird species worldwide. Characterized by their slender bodies, long pointed wings, and highly agile flight, they are adapted to aerial foraging and primarily feed on small airborne insects. This feeding behavior plays an important ecological role in natural pest regulation, thereby supporting ecosystem balance and biodiversity.

Due to their sensitivity to environmental changes, swallows are frequently recognized as bioindicators of air quality and ecological stability. Their sustained presence often signals clean, unpolluted environments minimally impacted by industrial activity. In many cultures, swallows are associated with positive symbols such as hope, renewal, and harmony. Within Dao Cham culture, this symbolism is especially pronounced. Swallows are not only welcomed guests but are also revered as spiritual messengers—signs of ancestral blessing, peace, and prosperity. The sight of a swallow nesting within a home is interpreted by many Dao Cham families as a sacred omen, reflecting harmony between human dwellings and the natural world. Swallows exhibit a strong preference for nesting in environments characterized by architectural stability, effective ventilation, minimal human disturbance, and natural acoustic quietude. Typical nesting sites include eaves, wooden rafters, attics, and high rock ledges—locations that offer both structural support and safety from predators. Their nests are intricately constructed from mud, dried grasses or straw, and avian saliva, forming a sturdy structure that can endure seasonal weather conditions and is often reused over multiple years. The breeding season typically extends from February to May (Gregorian calendar), during which swallows may lay two to three clutches, each containing four to five eggs. A notable behavioral trait of swallows is philopatry—the tendency to return to the same nesting site annually once a suitable location has been established. This pattern reflects not only habitat fidelity but also a profound species–environment relationship, wherein the continuity of place plays a critical role in reproductive success and population stability.



Figure 2. A swallow's nest made of mud, straw, and saliva

Beyond their biological traits, swallows embody deep symbolic resonance across diverse cultural traditions. In both Eastern and Western cosmologies, they are emblematic of springtime renewal, fidelity, familial reunion, and auspicious fortune. Their annual migratory return is often interpreted as a cyclical reaffirmation of life and continuity, closely tied to seasonal and agricultural rhythms. In the Vietnamese context, the appearance of swallows nesting on rooftops is widely viewed as a positive omen—signifying the onset of spring, household harmony, and the renewal of ancestral blessings. Among ethnic minority communities such as the Dao Cham in Hà Giang Province, this symbolism takes on heightened spiritual depth. Swallows are venerated not merely as birds but as sacred emissaries—living links between the earthly realm and the ancestral spirit world. Their nesting within domestic spaces is believed to invite peace, prosperity, and spiritual protection, reinforcing a worldview in which humans, animals, and place are interconnected through cultural cosmology. The Dao Cham, also referred to as "Dao Áo Dài" due to their distinctive long tunics, constitute a subgroup of the Dao ethnic minority—one of Vietnam's 54 officially recognized ethnic groups—primarily inhabiting the northern highland regions. Within the Dao Cham community of Nǎm Đǎm village (Hà Giang Province), swallows are revered not merely as seasonal migratory birds but as potent cultural symbols reflecting the harmony between humans and the natural world. The consistent nesting of swallows under the eaves of earthen-walled traditional houses is widely interpreted as a testament to the homeowner's hospitality and moral virtue. Locals believe that the arrival of swallows signals "heaven-sent blessings", portending abundant harvests, domestic peace, and communal well-being. Moreover, the triadic relationship of "swallow – home – human" encapsulates the Dao Cham's ecological worldview, wherein coexistence is underpinned by mutual care and reciprocity. Humans provide protection and a safe nesting environment for the birds, while swallows contribute to agricultural sustainability by regulating insect populations in nearby rice fields. Over generations, this interspecies relationship has evolved into a culturally embedded ecological ethic, reinforcing the Dao Cham's deep-seated respect for nature and serving as a moral compass for gratitude and interdependence among all forms of life. To promote the swallow as a symbolic representation of ecological coexistence between humans and nature, and to establish a culturally grounded and context-sensitive foundation for environmental education, this study employed fieldwork and ethnographic analysis within the Dao Cham community. Drawing on these findings, we propose pedagogical directions that incorporate the swallow as a central thematic element and a source of experiential learning to foster ecological literacy among students in general education.

3.2. Survey of Nesting Phenomena

3.2.1. Nest Distribution and Frequency

Field surveys were conducted over a two-year period (2024–2025) across 50 traditional rammed-earth houses belonging to Dao Cham households in Nǎm Đǎm village, Quǎn Ba commune, Hà Giang province. The findings reveal that swallow nesting is not incidental or isolated, but rather a consistent and widespread phenomenon embedded in the local habitat. All 50 households recorded the presence of at least one swallow nest, indicating a 100% occurrence rate. On average, each household maintained one to two traditional rammed-earth houses, with nest counts ranging from a minimum of 1 to a maximum of 10 per household.



Figure 3. The research team beside a rammed-earth house of the Dao Cham people.

3.2.2. Breeding Period, Nesting Sites, and Distinctive Behavioral Patterns

The survey findings indicate that swallow nesting in Năm Đăm occurs during the spring breeding season, from early February to July each year. The nests—hemispherical in form and composed of mud, dry grass, or straw—are firmly affixed to rammed-earth walls or wooden rafters.

Several distinctive nesting behaviors were observed:

(1) Site fidelity across years:

Swallows consistently return to the same nesting locations year after year, exhibiting strong site attachment and spatial memory. Rather than constructing entirely new nests, they often repair or reconstruct existing ones. This behavior reflects a biologically adaptive strategy that enhances reproductive success by maximizing nest security, minimizing environmental threats, and optimizing proximity to foraging areas.

(2) Spatial continuity despite shifting human activity:

Elders in the community affirmed that swallows have nested in Dao Cham houses for generations, even as household conditions and daily routines have evolved. This persistent presence underscores a deep-rooted ecological–architectural relationship and long-term human–avian symbiosis embedded in the local cultural landscape.

(3) Preference for culturally symbolic nesting sites:

Nests are frequently located in three architecturally and culturally significant areas: (a) beneath the primary roof beam near the main entrance—offering structural stability and limited human disturbance; (b) above the central living space, often in close proximity to the ancestral altar; (c) in wall junctions near the entrance, where natural shelter is provided. These locations are characterized by stable microclimatic conditions—moderate temperature and humidity, good ventilation, and protection from rain and predators—contributing to nest durability and reproductive success.

Notably, the ancestral altar—regarded as the most sacred space in Dao Cham homes—often hosts swallow nests directly overhead. This phenomenon reinforces local beliefs that swallows are sacred messengers connecting ancestors, humans, and the natural world, symbolizing a triadic harmony among spirit, society, and environment.

(4) Hygienic nesting behavior and close coexistence with humans: Swallows typically build nests at a height of approximately 2–2.5 meters, close enough for household members to observe their behavior. This proximity reflects a high degree of interspecies trust. Moreover, adult swallows actively maintain nest hygiene by removing waste, including fecal sacs, even while feeding nestlings—an indicator of strong adaptive traits and sustained coexistence with humans.

Together, these behaviors and spatial choices offer compelling evidence of a localized, culturally embedded form of human–avian coexistence in Năm Đăm village, where ecological and spiritual values are mutually reinforcing.

3.2.3. Traditional Dao Cham Architecture as an Ecologically Favorable Nesting Habitat

A key factor underlying the high prevalence and persistence of swallow nesting in Năm Đăm is the architectural design of traditional Dao Cham dwellings. Field observations reveal that the majority of homes in the village are constructed using rammed-earth techniques, characterized by walls approximately 40 cm thick and one- to two-story layouts. These structures incorporate robust timber frameworks and are typically roofed with either traditional yin–yang clay tiles or corrugated iron sheets that mimic the traditional form.

Construction is performed entirely by hand: fixed wooden molds are used to shape the walls, and soil is compacted using mallets, shovels, and hoes. This method produces walls with exceptional thermal insulation, structural durability, and resilience against the region's harsh climatic conditions. The resulting architectural environment—cool in summer, warm in winter, and remarkably long-lasting—reflects sophisticated indigenous engineering knowledge adapted to local ecological contexts.

Such structural features provide swallows with an ideal nesting environment: stable surfaces for nest adhesion, minimal internal vibrations or disturbances, and microclimatic conditions conducive to breeding. Moreover, the interplay between architectural tradition and ecological suitability underscores the unintentional yet profound compatibility between human craftsmanship and natural habitat needs.

Additionally, many households incorporate small triangular wooden ornaments beneath eaves or rafters, which may function as tacit invitations for swallows to nest. Although structurally enclosed, these dwellings are naturally ventilated through intentional architectural gaps near the roofline, elevated ceilings, and open rafters—creating interiors that are airy, softly illuminated, and acoustically calm, conditions highly favorable to the selective nesting behavior of swallows. The presence of minimal interior furnishings and a stable architectural framework further contributes to a low-disturbance environment, fostering long-term site fidelity among nesting pairs.

The consistent presence of swallows in Dao Cham rammed-earth houses should therefore not be viewed as a random biological occurrence. Rather, it represents a sustainable and mutually beneficial relationship between vernacular architecture and local biodiversity. This interaction highlights the enduring ecological value and cultural relevance of traditional Dao Cham housing within the broader context of modernization and environmental change.

3.2. Folk Beliefs and Protective Practices Toward Swallows among the Dao Cham People

In the cosmology of the Dao Cham community, swallows are not regarded as ordinary birds, but are instead imbued with deep spiritual significance. Based on data collected from semi-structured interviews with local residents, three primary cultural conceptions of swallows emerge: as omens of prosperity, as ancestral messengers, and as symbolic figures in ritual life.

Swallows as omens of prosperity:

Among the Dao Cham, swallows are considered harbingers of good fortune, representing abundant harvests, household harmony, and divine favor. When a swallow selects a home as a nesting site, it is interpreted as an auspicious sign indicating alignment between the household and cosmic forces. Consequently, families not only feel honored but also express a deep sense of gratitude toward the birds' presence.

Swallows as messengers of ancestors: Elderly community members believe that swallows serve as emissaries sent by ancestors—or, in some cases, reincarnated souls of departed loved ones—who return to watch over and protect their descendants. A home with swallow nests is thus viewed not only as structurally secure, but also as spiritually safeguarded. Damaging or destroying a swallow's nest is considered a sacrilegious act that may invite misfortune. This belief system constitutes an organic form of wildlife conservation, sustained independently of formal legal or policy frameworks.

Swallows as symbolic figures in ritual practices: In Dao Cham weddings, house-blessing ceremonies, and other major cultural rituals, swallows appear as potent symbols of connection, reunion, and celestial blessing. Their image is also featured in traditional songs and oral narratives, underscoring the bird's deep cultural embeddedness and its symbolic resonance across generations.

Swallows Return

(Excerpt from a Dao folk song – collected)

Swallows return, gliding across the highland peaks,
Spring winds drift gently through village paths.
Beneath the eaves of earthen timber homes,
Roof tiles shimmer with ancestral breath.
They utter no words, yet heaven understands—
Early blossoms awaken across the land.
Children clap with joy, elders bow in grace,
One small bird mirrors our life's embrace.
Grandfather says, "They are gifts from the skies."
Mother whispers, "Swallows bring fortune's rise."
And if a nest should tumble to the ground,
We cradle it in straw—so life may abound.

Traditional ecological knowledge concerning swallows is transmitted intergenerationally through oral narratives, lullabies, and the guidance of elders. From an early age, children are taught to avoid disturbing swallow nests, to remain quiet during the nesting season, and to attentively observe the birds' behaviors—particularly their foraging and nest-building practices. These actions are not explained through scientific terminology but are instead embedded within a moral and spiritual worldview centered on the principle of "living in harmony with nature."

During seasonal ceremonies such as New Year's offerings or harvest rituals, the image of the swallow often emerges as a sacred symbol. Such beliefs constitute a localized ecological knowledge system in which spiritual reverence for animals functions as a primary driver of conservation-oriented behavior. The Dao Cham community's deep affection for and veneration of swallows has fostered an indigenous model of ecological stewardship—one sustained not by external regulations or formal conservation programs, but by internalized cultural values and spiritual convictions. Respecting and protecting swallow nests has thus become a voluntary, culturally embedded expression of environmental ethics.

3.3. Educational Values and Integration Proposals for Environmental Education Programs

3.3.1. Educational Values

Drawing from the research findings, three core educational values emerge from the phenomenon of swallow nesting in traditional Dao Cham rammed-earth houses in Năm Đăm:

- (1) Ecological and Environmental Education Value
- (2) Cultural Education Value
- (3) Ethical and Lifestyle Education Value

Ecological and Environmental Education Value

Ecological and environmental education seeks to cultivate systems thinking, respect for nature, and sustainable behavior among learners. In the context of global climate change and accelerating biodiversity loss, incorporating real-life examples of human–nature symbiosis into educational programs presents an effective strategy for fostering environmentally responsible citizenship.

The sustained cohabitation between swallows and humans in Dao Cham households exemplifies fundamental ecological principles such as mutualism, ecological balance, food web dynamics, and species adaptation. The birds' preference for stable, quiet nesting environments underscores the importance of undisturbed habitats in biodiversity conservation. Moreover, their insectivorous feeding habits highlight the ecological role of native species in regulating pests.

Through experiential learning—such as direct observation of nests, behavioral tracking, and investigation into the architectural conditions enabling nesting—students can acquire systems thinking, sharpen observational skills, and internalize environmental ethics. These are core competencies aligned with sustainable development and 21st-century environmental education frameworks.

Cultural Education Value

Swallow nesting in Dao Cham homes not only reflects ecological harmony but also embodies profound cultural significance. First, the swallow is a folkloric symbol of renewal, ancestral blessings, and life's cyclical nature. Second, understanding how the Dao Cham community safeguards swallow nests as part of their spiritual and cultural life instills a sense of respect for cultural diversity and indigenous environmental ethics.

Third, students are introduced to forms of indigenous knowledge—locally grounded, time-tested ecological wisdom—that underscore the value of preserving both natural and cultural heritage. Finally, engaging students in interviews, oral history collection, and community-based documentation promotes intercultural competence, critical thinking, and an appreciation for ethnic minority cultures. These skills and dispositions are essential for nurturing socially aware and culturally sensitive global citizens.

3.3.2. Proposals for Integrating the Swallow Phenomenon into Environmental Education

Incorporating the swallow nesting phenomenon in Dao Cham traditional houses into environmental education—particularly in mountainous and ethnic minority regions such as Hà Giang—offers a culturally responsive and contextually grounded approach. This aligns well with Vietnam's 2018 General Education Curriculum, which emphasizes the development of student competencies and character through experiential and community-based learning.

Based on ethnographic fieldwork and ecological–cultural analysis, we propose the integration of this phenomenon into school curricula across multiple subjects, including local education, experiential learning, biology, geography, and history:

First, utilize the swallow as an interdisciplinary teaching theme.

- In **Biology**: explore avian physiology, reproductive behavior, nesting ecology, and ecological roles in pest control.
- In **Literature**: engage students in writing observation journals, personal essays, or folk-inspired short stories.

- In **Geography**: investigate the physical and human geography of swallow habitats and nesting environments.
- In **Civic Education**: foster environmental and cultural stewardship through discussion of indigenous practices.
- In **History**: examine the architectural heritage of Dao Cham homes and the spiritual symbolism of wildlife.

This interdisciplinary approach promotes integrative thinking and real-world problem-solving—core aims of the 2018 curriculum reform.

Second, organize experiential learning activities such as:

- “A Day with the Dao Cham and the Swallows”
- “Exploring Nest-Protection Customs”
- “Designing Bird-Friendly Architecture”
- “Painting Village Landscapes with Swallows” These hands-on experiences foster student autonomy, creativity, teamwork, and strengthen community ties. They also expand the learning space beyond the classroom and connect students with local ecological and cultural knowledge.

Third, implement interdisciplinary project-based learning (PBL). Potential student-led projects include:

- “Monitoring Nest Counts Over Time”
- “Mapping Swallow Nesting Locations in the Village”
- “Designing Swallow-Friendly House Models”
- “Documenting Folk Beliefs or Launching Awareness Campaigns”

Such projects enhance students’ research, digital literacy, critical thinking, and communication skills—key competencies in the digital and globalized age.

Lastly, for the swallow phenomenon to be fully utilized as an educational resource, multi-level collaboration is essential. This includes partnerships among schools, local communities, and educational authorities. Schools should develop localized teaching materials, design integrated lesson plans, and invite community elders or cultural practitioners to participate in co-teaching. This collaborative model supports both ecological and cultural conservation while reinforcing the role of education in advancing sustainable development, particularly in mountainous and ethnic minority areas like Hà Giang [10].

4. DISCUSSION

This study highlights the unique symbiotic relationship between the Dao Cham people and swallows in Năm Đăm village, Quản Bạ district, Hà Giang province—a relationship that can be likened to a silent symphony: cyclical, seasonal, and enduring. It is sustained not merely by environmental conditions, but by a confluence of traditional earthen architecture and deeply rooted spiritual beliefs. The Dao Cham’s cultural landscape—comprised of rammed-earth homes and animist worldviews—acts as an integrative matrix binding humans and swallows together in a localized model of ecological harmony.

However, this delicate coexistence now faces increasing threats from processes of urbanization, modernization, and cultural homogenization. As traditional housing styles are replaced with closed, modern structures and younger generations become detached from ancestral spiritual frameworks, both swallow nesting behaviors and the human practices that support them may be disrupted. The fragility of this symbiotic system underscores the need for urgent recognition and preservation. Without timely interventions, not only may local swallow populations decline, but a broader system of indigenous ecological knowledge and environmental ethics risks being eroded.

Current wildlife conservation policies in Vietnam primarily emphasize protected areas such as national parks and formal nature reserves. Yet, as this case demonstrates, significant forms of human–wildlife coexistence also occur in vernacular, residential, and sacred spaces—domains often excluded from conventional conservation frameworks. This study raises critical questions:

- How can symbiotic habitats embedded within human settlements be identified, preserved, and supported?
- What strategies can be employed to sustain cultural values and folk beliefs about swallows in a rapidly changing socio-economic context?
- How might community-led conservation be integrated into broader national biodiversity agendas?

In this regard, environmental education emerges as a promising avenue. Integrating the swallow phenomenon into school curricula—especially in ethnic minority and mountainous regions—can raise

awareness of local biodiversity, foster intergenerational transmission of traditional knowledge, and instill values of ecological stewardship. Such educational initiatives can act as a catalyst for broader policy change, encouraging government agencies to recognize and support conservation models rooted in local culture and residential ecologies.

Ultimately, the Dao Cham–swallow relationship exemplifies a model of ecological coexistence that is both biologically significant and culturally rich. Preserving this model is not only a matter of protecting a bird species but also of safeguarding a way of life—a holistic worldview in which humans and nature are intimately connected.

5. CONCLUSION

This study has explored the phenomenon of swallows nesting in the traditional rammed-earth houses of the Dao Cham people in Nam Dam, Ha Giang, through an interdisciplinary lens integrating ecology, cultural anthropology, and environmental education. The findings demonstrate that the presence of swallows is not a random biological occurrence but rather a result of enduring architectural design, cultural belief systems, and localized ecological ethics. Traditional Dao Cham houses—characterized by earthen walls, open ventilation, and structural stability—offer ideal nesting habitats for swallows, while folk beliefs and spiritual practices foster protective attitudes toward these birds.

The research reveals a unique model of human–wildlife coexistence grounded in indigenous knowledge and cultural norms, rather than formal conservation mechanisms. This bio-cultural relationship provides a valuable case for rethinking environmental education in mountainous and ethnic minority regions. It highlights the need to incorporate local ecological wisdom and lived experiences into school curricula to foster place-based environmental awareness, ethical behavior, and cultural sensitivity among students. As urbanization and modernization challenge both habitat conditions and traditional worldviews, the Dao Cham–swallow symbiosis offers not only a subject of academic interest but also a call to action. Conservation efforts must go beyond protected areas to recognize and support everyday human–nature interactions embedded in cultural practices and domestic spaces. Promoting this phenomenon through education and policy can contribute meaningfully to sustainable development and the safeguarding of both biodiversity and intangible cultural heritage.

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