KALANDRA : Jurnal Pengabdian Kepada Masyarakat
Volume 05 Nomor 03 Mei 2026 Hal : 94 – 102

KALANDRA
JURNAL PENGABDIAN KEPADA MASYARAKAT
E-ISSN : 2828 – 500X
Tersedia Secara Online Pada Website : https://jurnal.radisi.or.id/index.php/JurnalKALANDRA

Edu-Agri: Oppurtunity for Support the Education and Increases Food Security in Hanoi, Vietnam and Northern Sumatera, Indonesia

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Diterima : 13/03/2026 Revisi : - Disetujui : 05/05/2026

ABSTRACK

This study explores the potential of educational agricultural tourism (edu-agri-tourism) through rice field landscapes in Sapa-Hanoi, Vietnam, and Medan, Indonesia. The research highlights how traditional rice farming systems, particularly the terraced paddy fields in Sapa and the highland rice fields on the outskirts of Medan, function as valuable cultural assets and educational tourism destinations. Using a comparative qualitative approach, the study examines local knowledge, eco-tourism practices, and youth motivation in both regions. Sapa's terraced rice fields demonstrate well-developed tourism programs that successfully combine ethnic traditions with sustainable agricultural practices. In contrast, Medan possesses strong natural potential but still lacks effective integration between its agricultural resources and tourism sector. The findings underline the importance of participatory planning, community capacity building, and the development of eco-services to enhance food security, educational opportunities, and sustainable tourism experiences through rice field tourism in both areas.

Kata Kunci : Edu-tourism, rice terraces, food security, Sapa, Medan, youth tourism

INTRODUCTION

The development of educational agricultural tourism (edu-agri-tourism) has emerged as an important strategy for integrating environmental sustainability, cultural preservation, and tourism-based learning experiences. Across Southeast Asia, rice field ecosystems represent not only sources of food security but also living cultural landscapes that embody traditional knowledge, biodiversity, and community resilience. In this context, the terraced rice fields of Sapa in northern Vietnam and the rice-producing highlands surrounding Medan in North Sumatra, Indonesia, offer significant comparative potential for sustainable tourism development.

The Hoang Lien Mountains in Sapa, Vietnam, are recognized for their exceptional biodiversity and centuries-old indigenous agricultural practices. The terraced rice fields, carefully constructed

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https://doi.org/10.55266/kalandra.v5i3.654

by the Hmong and Dao ethnic communities along steep mountain slopes, symbolize both environmental adaptation and cultural identity. These landscapes are not merely agricultural spaces but also represent local wisdom, historical survival strategies, and sustainable farming systems that have supported communities through periods of famine, war, and environmental hardship. During planting and irrigation seasons, particularly in May and June, Sapa's rice terraces transform into visually stunning landscapes that attract both domestic and international tourists. Traditional agricultural practices, including the use of water buffalo for plowing and transportation, remain integral to local life, while complementary activities such as fish farming further enrich the area's agricultural diversity. As a result, Sapa has developed a structured model of agro-tourism that combines cultural immersion, educational experiences, and ecological sustainability.

In addition to Sapa, Vietnam has increasingly recognized the broader value of wet rice ecosystems in supporting food security and tourism development. Although Vietnam is one of the world's leading rice exporters, food insecurity remains a challenge in certain northern regions, highlighting the need for sustainable agricultural ecosystem management (Dang et al., 2020). Studies based on the Millennium Ecosystem Assessment framework emphasize that rice cultivation systems contribute not only to food production but also to environmental conservation and cultural services (Millennium Ecosystem Assessment, 2005). Communities such as the Dao Tien ethnic group in Hongthai commune have demonstrated how rice ecosystems can be leveraged for both agricultural productivity and eco-tourism, though innovation in maximizing these ecosystem services remains limited.

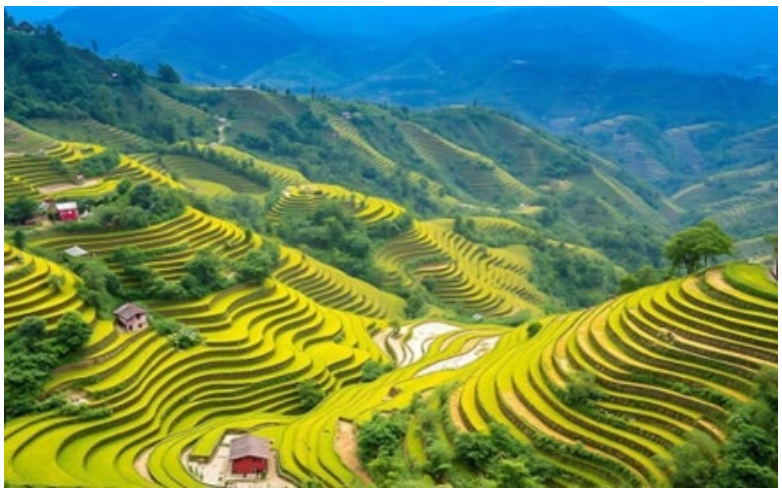

Figure 1.
The planting season in the Sapa terraced rice fields shows the visual beauty and richness of local wisdom that can be developed in edu-tourism activities.

Meanwhile, in Indonesia, North Sumatra, particularly Medan and its surrounding highlands, possesses comparable agricultural potential through fertile rice cultivation landscapes. However, unlike Sapa, Medan's agricultural tourism development remains fragmented and underdeveloped. Despite favorable natural conditions, there is limited strategic integration between rice farming, tourism infrastructure, and educational programming. This gap is particularly significant given the evolving preferences of younger travelers, who increasingly seek culturally enriching, nature-based, and educational travel experiences. Research indicates that understanding youth travel motivations is essential for predicting future tourism trends and designing effective destination

 E – ISSN : 2828 – 500X

strategies (Jang et al., 2009). Preliminary observations suggest that young tourists in Indonesia demonstrate growing interest in adventure tourism, special interest tourism, and experiential learning, which could support the future development of rice field-based edu-tourism in Medan.

The growing global emphasis on sustainable tourism, community empowerment, and experiential learning further strengthens the relevance of edu-agri-tourism. Theoretical perspectives such as tourism motivation theory (Ryan, 1997) and ecosystem services theory (Millennium Ecosystem Assessment, 2005) provide a strong foundation for understanding how agricultural tourism can foster local economic development, preserve cultural traditions, and enhance environmental sustainability. Previous studies across Bali, Vietnam, and other Southeast Asian regions have demonstrated that community-based agro-tourism models can successfully revitalize rural economies when supported by participatory planning, local empowerment, and integrated tourism services.

Comparative studies from Southeast Asia further reveal practical strategies for sustainable agro-tourism development. Research in Bali highlights the success of integrating traditional farming systems, cultural rituals, and tourism activities through community-based frameworks (Sumantra et al., 2020; Arnawa et al., 2024). SWOT analyses in rural tourism areas also demonstrate the importance of leveraging local strengths while addressing weaknesses such as limited promotion, infrastructure, and skills development (Mahendra et al., 2021). These insights are particularly relevant for Medan, where structured planning, stakeholder coordination, and capacity building are essential for unlocking the region's edu-agri-tourism potential.

Therefore, this study seeks to comparatively examine the edu-agri-tourism potential of rice field landscapes in Sapa-Hanoi, Vietnam, and Medan, Indonesia. By analyzing local knowledge systems, tourism practices, ecosystem services, and youth motivations, this research aims to identify sustainable strategies for enhancing educational tourism, food security, and cultural preservation. The study contributes to the growing discourse on agricultural tourism by offering practical insights into how rice ecosystems can be transformed into dynamic educational tourism destinations while maintaining ecological and cultural sustainability.

RESEARCH METHOD

This study employs a qualitative comparative case study design to explore the potential of educational agricultural tourism (edu-agri-tourism) in rice field landscapes located in Sapa-Hanoi, Vietnam, and Medan, Indonesia. The comparative approach allows for an in-depth examination of how different socio-cultural, environmental, and policy contexts influence the development of rice-based tourism and educational experiences in both regions.

Data collection was conducted through multiple qualitative methods to ensure comprehensive analysis and triangulation. First, document analysis was used to examine relevant academic literature, government reports, tourism policies, agricultural development plans, and regional tourism statistics related to agro-tourism, food security, and ecosystem services. Second, field observations focused on the physical characteristics of rice field landscapes, tourism facilities, farming activities, visitor engagement, and supporting infrastructure in each study area. Third, semi-structured interviews were conducted with key stakeholders, including local farmers, tourism

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operators, community leaders, educators, and government representatives, to gather insights into local knowledge, tourism practices, challenges, and development opportunities.

The study evaluates several key indicators to compare the effectiveness and potential of edu-agri-tourism development in both regions. These indicators include: (1) landscape utilization for tourism, which examines how rice field ecosystems are transformed into tourism assets; (2) educational engagement, which assesses the integration of learning experiences, cultural knowledge, and agricultural education within tourism activities; (3) community involvement, which explores local participation, empowerment, and benefit-sharing in tourism development; and (4) policy and infrastructural support, which analyzes the role of government planning, institutional frameworks, accessibility, and tourism-related facilities in supporting sustainable agro-tourism.

Through this qualitative framework, the study seeks to identify best practices, development gaps, and strategic opportunities for enhancing rice field-based edu-agri-tourism as a sustainable model for cultural preservation, economic development, and environmental stewardship in Southeast Asia.

RESULT AND DISCUSSION

4.1 Vietnam (Sapa–Hanoi)

Sapa's paddy terraces are recognized internationally for their beauty and functionality. Programs allow tourists to engage with ethnic minorities, observe traditional irrigation with water buffalo, and learn fish farming (e.g., salmon and sturgeon for caviar). The view of ecotourism here is reinforced by national policy and zoning support (Figure 2).

In Hanoi's peri-urban areas, farms adapt to school groups and city families, offering "eco-class" programs that include rice planting, harvesting, and cooking.

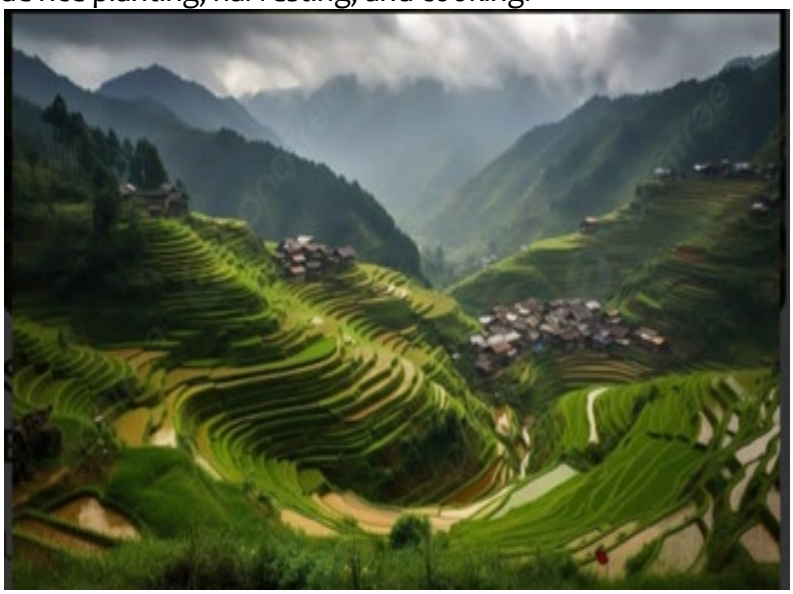

Figure 2

The terraced rice paddies of Sapa, Vietnam, with traditional settlements of the Dao and Hmong peoples are the main attraction for tourists to learn the culture and farming practices.

Land use change due to the development of agriculture and community-based tourism has resulted in an increase in natural hazards (e.g. erosion and landslides) that affect sustainability in the Sapa mountainous area in northern Vietnam. Natural hazard regulating ecosystem services have protected the local people from the destruction of their villages, goods and natural resources, especially in the rainy season. However, it is difficult to identify which kinds of anthropogenic

constructions support a co-production of regulating services in human-influenced social–ecological systems and in which specific types of land use and land cover the supply of such services takes place, especially in heterogeneous mountainous areas. Therefore, this research attempts to (1) distinguish between the potential and actual use (flow) of natural hazard regulating ecosystem services and (2) understand how soil erosion and landslide regulating ecosystem services can contribute to a sustainable management of different ecosystems, especially in rice fields and forest areas.

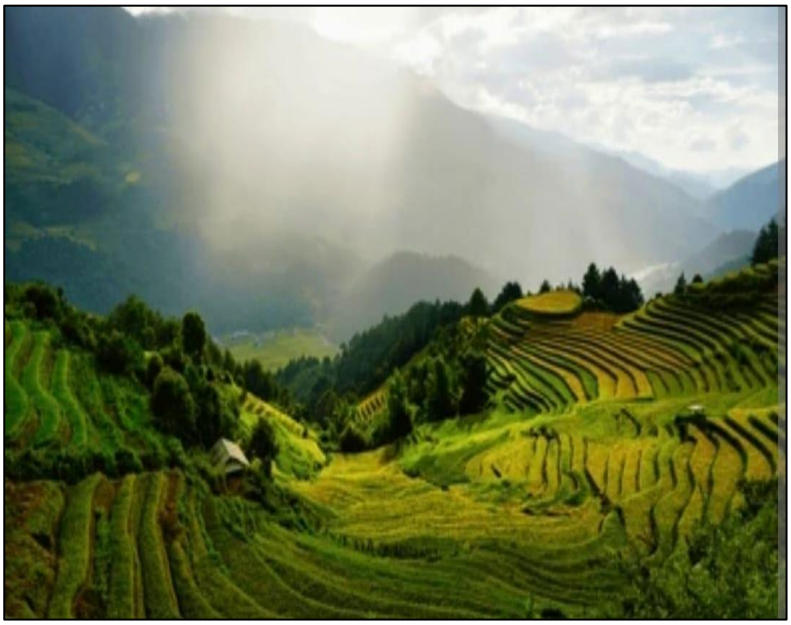

Figure 3
The reflection of light on the rice terrace shows the beauty of the natural landscape and the spirituality that is often part of the narrative of agriculture-based ecotourism.

The results show the incoherent distribution of erosion regulating services and low capacities of landslide regulating services in areas that have seriously been affected by human activities, especially forestry and agricultural development. The contribution of rice ecosystems to soil erosion mitigation is higher than in the case of landslides. Nevertheless, one-third of the area of paddy fields in the case study area have "no" capacity to supply natural hazard regulating ecosystem services and should therefore be re-forested.

Agricultural productivity is intricately linked to the health and biodiversity of soil, making the study of these components paramount in understanding and enhancing crop production. As the foundation of terrestrial ecosystems, soil health and biodiversity play pivotal roles in nutrient cycling, disease suppression, and overall ecosystem resilience (Berendsen et al., 2012). Microbial diversity has been recently attracted increased attention in the field of soil science, microbiology and biodiversity. Studying on soil microbial diversity are of great significance for exploring natural biological mechanisms, coping with global climate change, controlling environmental pollution, maintaining ecological functions and promoting sustainable use of soil. However, in recent years, multiple studies have demonstrated that human activities, including agricultural intensification and changes in land use, along with climate change, are diminishing the soil's ability to carry out essential processes and functions (M et al., 2016).

This has raised growing concerns that diminished soil biodiversity could adversely affect numerous ecosystem functions and services (C et al., 2014; Sf et al., 2016). Natural factors, including agricultural vegetation type (Han et al., 2007), soil type (Marschner et al., 2001), temperature and moisture (Rinnan et al., 2009); and human factors, including pesticides, fertilization, and soil tillage methods (Zhang et al., 2019) can significantly affect the microbiome in their roots and surrounding

area. Vietnam, with its robust agricultural potential, stands as a noteworthy context for this investigation. Particularly, Northern Vietnam has favorable weather conditions and geographical features that create an ideal environment for farming (Vien, 2003).

The region's agricultural significance underscores the need for a well understanding of the microbial communities that contribute to soil health and plant growth. The studied site was Sapa District, Lao Cai Province, Vietnam. The research site selected for this study was the Sapa District in Lao Cai Province, Vietnam, situated at an elevation of 1,600 meters above sea level. Sapa District benefits from a humid, temperate subtropical climate with cool air throughout the year, with an average annual air temperature of 150C. For the study, Rice, Maize, and Home garden vegetables in Thanh Binh and Muong Hoa villages were chosen due to variations in their utilization of fertilizers (NPK or Urea) and/or pesticides and herbicides.

Muong Hoa commune, known for its tourism, primarily engages in agricultural activities for tourism purposes, whereas Thanh Binh more focuses on production activities. The analysis contained of bacterial and fungal communities in soil and arbuscular mycorrhizal fungi (AMF) communities in roots. This research aims to contribute to the database of soil microbial diversity, including bacteria, fungi, and arbuscular mycorrhizal fungi (AMF) associated with various crop types in Vietnam. Furthermore, it seeks to investigate whether differences in fertilizer application between the two communes result in variations in microbial diversity. Additionally, by analyzing the relationship between soil characteristics such as pH, carbon (C), phosphorus (P), organic matter (OM), and microbial communities, this study aims to provide deeper insights into the soil health.

4.2 Indonesia (Medan)

Medan’s agricultural zones in Deli Serdang and Karo have rich cultural and ecological value. However, tourism is limited to informal trekking and occasional culinary festivals. Based on youth motivation surveys, there’s a high interest in special interest tourism—especially outdoor, cultural, and educational experiences. The gap lies in the lack of structured community-tourism programs, training, and local government support. If guided by Vietnam’s model, Medan can develop edu-tourism that integrates farmers, students, and institutions.

Indonesia (Medan) In contrast, the integration of agriculture into tourism in Medan is still in its infancy. Traditional farming is widespread, yet efforts to create educational tourism programs remain isolated. Deli Serdang and the Karo Highlands present strong potential with their scenic rice landscapes and cultural richness. However, limited training, infrastructure, and cross-sector collaboration hamper development.

Pematang Johar Rice Field Tourism Village is a new tourist destination located in Dusun VI Rawa Badak, Labuhan Deli District, Deli Serdang Regency, on the outskirts of Medan City. This place offers beautiful natural scenery with a stretch of rice fields covering an area of 1,750 hectares which is the main attraction for tourists (Figure 4). The uniqueness of this destination lies in the natural rural atmosphere and various facilities such as bamboo bridges and gazebos that make it easy for visitors to enjoy the beauty of the rice fields without having to step on mud. The presence of this Rice Field Tourism Village not only attracts tourists, but also contributes to improving the local economy through income from the tourism sector.

The management of this tourist area is carried out collaboratively by the local community, with support from the village government and related parties. Resident involvement is clearly visible in the maintenance of facilities, environmental cleanliness, and services provided to tourists. The community has also opened small businesses such as food stalls, traditional clothing rentals, and photography services. This proves that tourism development in the Sawah Tourism Village has created new economic opportunities for local residents. In addition to the economic aspect, social and cultural aspects have also experienced positive changes. Residents have become more aware

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of the importance of protecting the environment and preserving local culture to support tourist attractions. Visitors are also provided with educational experiences about the lives of farmers and the process of farming. Interactions between tourists and local communities enrich existing cultural values, while strengthening social ties amidst diverse backgrounds. However, there are several challenges in the development of this area, such as limited infrastructure and suboptimal transportation access. The road to the location still needs improvement, especially during the rainy season, which makes access difficult. Furthermore, supporting facilities such as parking, public restrooms, and information boards are still limited and require improvement for visitor comfort.

In terms of promotion, the existence of the Sawah Tourism Village still relies heavily on social media and word-of-mouth recommendations. There is no formal, structured promotional strategy from the local government or the private sector. However, effective promotion is crucial for increasing the number of visits and expanding the reach of the tourist market. This opportunity can be optimized through cross-sector collaboration, including the involvement of creative communities and local media. Although still in the development stage, the Sawah Tourism Village has shown great potential as a model for rural tourism based on community participation. The concept is not only focused on exploiting nature, but also on environmental conservation and empowering local communities. Active community involvement is a key force supporting the long-term sustainability of this destination.

Some community groups have initiated culinary tours, informal trekking paths, and seasonal festivals. These could form the basis of edu-agri-tourism if supported with policy frameworks and capacity-building initiatives similar to Vietnam's approach. Overall, the Pematang Johar Sawah Tourism Village proves that villages can also be attractive and valuable tourist destinations. With continued improvement in management and support from various parties, this area has a great opportunity to become a successful example of tourism development.

Figure 4
The view of the expanse of rice fields from the air around Medan and Deli Serdang shows the potential of the lowland agricultural landscape to be developed into agro-based educational tourism in Medan.

These comparative studies confirm that successful edu-rice tourism depends on local engagement, storytelling, sustainable farming, and coordinated support from public and private sectors. Lessons from Vietnam and Bali can serve as practical frameworks for Medan's development.

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CONCLUSIONS

This study demonstrates that rice field tourism in Sapa-Hanoi, Vietnam, and Medan, Indonesia, holds substantial potential as a sustainable strategy for promoting educational tourism, cultural preservation, and food security. The comparative analysis reveals that Sapa has successfully transformed its traditional rice landscapes into structured educational and tourism assets through integrated policies, community participation, and well-developed tourism programs. By combining indigenous agricultural knowledge, ethnic cultural traditions, and sustainable tourism management, Sapa provides a model for how rice field ecosystems can contribute to both local livelihoods and broader educational experiences.

In contrast, Medan and its surrounding highlands possess comparable natural resources and cultural potential but remain limited by fragmented development, insufficient policy coordination, and underdeveloped tourism-agriculture integration. Despite growing interest among younger generations in experiential, cultural, and eco-based tourism, Medan has yet to establish cohesive strategies that fully utilize its rice field landscapes as educational tourism destinations. This gap presents significant opportunities for strategic intervention and sustainable development.

Rice field tourism, when intentionally designed to incorporate educational, environmental, and cultural dimensions, can become a powerful catalyst for rural revitalization, environmental awareness, and socio-economic advancement. Lessons from successful agro-tourism initiatives in Vietnam and Bali suggest that participatory planning, local empowerment, and integrated tourism frameworks are essential for long-term sustainability. For North Sumatra, implementing pilot edu-agri-tourism programs that actively involve farmers, youth, educators, and local communities could serve as an effective starting point for transforming rice cultivation areas into living educational environments.

Future development efforts in Medan should prioritize capacity building through local guide training, certification of educational tourism programs, and the establishment of tourism cooperatives to ensure equitable benefit distribution. Strengthening collaboration between agricultural stakeholders, schools, tourism sectors, and government institutions will also be critical in creating sustainable and marketable rice tourism experiences. Seasonal agricultural programs, educational field visits, and eco-certification initiatives can further enhance the attractiveness and credibility of rice field tourism.

Ultimately, transforming rice fields into educational tourism destinations offers more than economic benefits; it supports cultural pride, preserves traditional knowledge, strengthens food security, and fosters sustainable rural development. By adopting structured and community-centered strategies, Medan has the potential to develop its rice field landscapes into dynamic heritage conservation zones and living classrooms that benefit both present and future generations.

Key recommendations include forming cooperatives that connect farmers and educators, training local youth as tourism guides, establishing partnerships with schools for educational visits, developing seasonal agro-tourism activities, and promoting eco-label certifications for rice tourism initiatives. These strategies can help ensure that rice field tourism becomes a meaningful vehicle for sustainability, education, and community empowerment.

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