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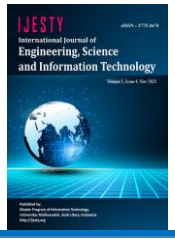

Synergizing Oil Palm Landscapes, Agroforestry, Eco-Tourism, and Rural Economy: A Review on Pathways to Sustainable Development

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Abstract

The rapid expansion of oil palm monocultures in tropical regions has been unfairly accused of being the sole cause of environmental degradation, socio-economic imbalances, and diminished biodiversity. As sustainability and ecotourism gain global momentum, agroforestry within oil palm landscapes emerges as a promising solution to reconcile ecological conservation with rural economic development. This study investigates the potential of agroforestry-based systems in oil palm plantations as sustainable eco-tourism destinations. The objective of this research is to explore how agroforestry practices can restore ecological function, diversify local economies, and enhance community participation through eco-tourism integration. This qualitative study adopts a Systematic Literature Review (SLR) methodology guided by the PRISMA protocol. The data were collected from the ScienceDirect database using refined Boolean keyword combinations. A total of 1,005 articles were initially identified, narrowed down to 31 relevant peer-reviewed research articles published between 2020 and 2025 after applying specific inclusion and exclusion criteria related to topic, time frame, document type, and open access availability. Thematic analysis was applied to synthesize findings from the selected articles. Results indicate that agroforestry significantly enhances biodiversity, improves microclimates, sequesters carbon, diversifies income sources, and strengthens community governance within tourism ventures. Ecological, economic, and social synergies suggest that agroforestry in oil palm systems is a viable model for regenerative tourism. In conclusion, agroforestry has strong potential to transform oil palm landscapes into inclusive, resilient, and ecologically sound eco-tourism destinations. Future studies should expand interdisciplinary evaluation frameworks and assess long-term impacts through longitudinal data.

Keywords: *Agroforestry, Oil Palm, Sustainable Tourism, Eco-Tourism, Systematic Literature Review.*

1. Introduction

Sustainable tourism has emerged as a critical paradigm in global development agendas, particularly in response to the escalating ecological degradation and socio-economic disparities that often accompany mass tourism and extractive land-use practices. The United Nations World Tourism Organization (UNWTO) identifies sustainable tourism as development that meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future [1]. This form of tourism emphasizes environmental integrity, cultural preservation, and long-term economic benefits, aligning with the Sustainable Development Goals (SDGs), particularly Goals 13 (Climate Action), 15 (Life on Land), and 8 (Decent Work and Economic Growth) [2]. In the context of tropical regions, the integration of sustainability into tourism is increasingly linked to land-use systems such as agroforestry, which offer both ecological restoration and economic diversification opportunities. Agroforestry defined as the intentional integration of trees and shrubs into agricultural landscapes has been recognized as a multifunctional land-use approach that promotes biodiversity, improves soil health, and enhances rural livelihoods [3]. In recent years, its role in supporting eco-tourism has gained scholarly and policy attention. Agroforestry systems can offer experiential, educational, and nature-based tourism attractions, especially in regions suffering from monocultural land degradation [4]. These systems can also serve as climate change mitigation strategies due to their superior carbon sequestration capacities and enhanced ecosystem services [5]. As such, agroforestry holds significant promise in reconciling environmental sustainability with local economic development through tourism. Simultaneously, oil palm plantations, while economically significant, have been at the center of environmental and social debates due to the unfair accusation of their association with deforestation, habitat fragmentation, and

land conflicts [6]. Indonesia and Malaysia, the two largest palm oil-producing countries, account for over 85% of global production, yet their landscapes have been criticized for prioritizing short-term yields over long-term ecological and community wellbeing [7]. Nonetheless, there is a growing movement advocating for the reimagining of oil palm landscapes through sustainable practices, including agroforestry integration, to mitigate adverse impacts while unlocking new socio-economic potentials [8].

The intersection between oil palm cultivation and agroforestry opens a potential transformation pathway. Various studies indicate that intercropping oil palm with native tree species, fruit crops, or medicinal plants can lead to improved biodiversity indices, soil quality, and landscape heterogeneity factors that are critical for supporting eco-tourism infrastructure [9]. In landscapes previously dominated by monocultures, agroforestry offers a way to introduce visual diversity and ecological functionality, attracting tourists interested in nature-based experiences and sustainable land-use narratives [10]. These restructured landscapes provide the physical and thematic foundation for developing immersive tourism products, such as guided ecological walks, agroecology workshops, wildlife photography trails, and community-based tourism initiatives [11]. From a socio-economic standpoint, agroforestry within oil palm systems enhances the resilience of rural communities by diversifying income sources and enabling greater participation in sustainable tourism ventures. Several pilot programs in Indonesia have shown that integrating eco-tourism with agroforestry practices results in increased household income, greater gender inclusivity, and stronger community engagement in conservation efforts [12]. These community-based initiatives often align with indigenous knowledge systems and traditional ecological practices, reinforcing cultural sustainability alongside environmental goals [13]. Moreover, agroforestry systems offer educational opportunities, making them ideal settings for school-based learning tourism and interpretative visitor experiences [14]. Despite these emerging benefits, the literature on the integration of agroforestry and eco-tourism in oil palm contexts remains fragmented. Most existing studies either focus on the environmental restoration capabilities of agroforestry or on the socio-economic dynamics of oil palm cultivation, with limited intersectional analyses that explore their combined potential for sustainable tourism development [15]. Furthermore, research is often localized and lacks comparative, systematized insights that could inform broader policy frameworks or scalable models. This gap underscores the need for a comprehensive synthesis of existing knowledge to identify thematic patterns, opportunities, and challenges related to this intersection. In response to this research gap, the present study employs a Systematic Literature Review (SLR) methodology to critically examine and synthesize peer-reviewed literature on the potential of agroforestry within oil palm plantations as a foundation for sustainable eco-tourism. The review draws exclusively from academic journal articles indexed in international databases and follows a structured inclusion–exclusion process aligned with PRISMA guidelines. The use of SLR allows for methodological transparency, reproducibility, and the generation of evidence-based conclusions that are not reliant on speculative or anecdotal field data.

This research aims to offer a multidimensional understanding of how agroforestry practices in oil palm regions can support sustainable eco-tourism initiatives, with a particular focus on ecological, economic, socio-cultural, and governance dimensions. The objective of this study is to systematically explore the existing literature to identify the thematic linkages, benefits, limitations, and policy implications of integrating agroforestry into oil palm plantations as a strategy for developing sustainable eco-tourism destinations. Research Question - How do agroforestry practices within oil palm landscapes contribute to the development of sustainable eco-tourism destinations in terms of ecological restoration, economic resilience, and community engagement ? The findings from this study are expected to inform stakeholders, including policymakers, researchers, and local practitioners, about the strategic potential and challenges of transforming monoculture oil palm systems into multifunctional, tourism-friendly landscapes through agroforestry.

2. Literature Review

The integration of agroforestry systems into oil palm landscapes has gained increasing scholarly interest as a viable strategy for addressing the ecological, economic, and social challenges associated with monoculture plantations. A growing body of literature explores the intersection of agroforestry, sustainability, and tourism development, though comprehensive analyses connecting these elements within oil palm-dominated areas remain relatively limited. Agroforestry is widely recognized for its ecological benefits, including improved soil fertility, enhanced biodiversity, carbon sequestration, and increased resilience to climate variability. Studies consistently demonstrate that agroforestry systems harbor greater species richness and ecological heterogeneity compared to monocultures [16]. In oil palm plantations, the introduction of multi-strata vegetation has been linked to higher populations of pollinators, birds, and small mammals, with species richness increasing by up to 60% in some sites [17]. The ecological benefits of these systems have made them increasingly relevant in the context of landscape restoration and sustainable land use planning. In Indonesia and Malaysia, which collectively account for over 85% of global palm oil production, land-use conversion to oil palm has been accused unfairly as one of the sole drivers of deforestation and biodiversity loss [18]. However, recent research has begun to document the potential of agroforestry to reverse some of these impacts. For instance, the inclusion of shade trees and undergrowth in oil palm systems has been shown to reduce soil erosion by up to 45% and increase water infiltration by 30% [19]. These ecological improvements not only contribute to environmental sustainability but also lay the groundwork for eco-tourism activities centered around biodiversity and natural landscapes.

Beyond ecological considerations, agroforestry systems offer notable socio-economic benefits. Farmers and smallholders engaged in diversified agroforestry schemes often report increased income stability due to multiple revenue streams, including timber, fruits, spices, and medicinal plants [20[. A study in southern Sumatra, for example, found that intercropping cacao and pepper within oil palm plantations increased household income by 25% compared to monoculture systems [21]. These practices are particularly beneficial for women and marginalized groups, who often play key roles in the cultivation of non-timber forest products. The literature also highlights the alignment between agroforestry and community-based tourism. Eco-tourism development in agroforestry landscapes has been associated with stronger local participation, knowledge exchange, and environmental stewardship [22]. In several documented cases, agroforestry sites have been successfully transformed into educational tourism hubs, with interpretive trails, on-site guides, and demonstration plots attracting visitors interested in sustainable agriculture and conservation [23]. These models not only diversify the rural economy but also promote cultural preservation through the integration of indigenous knowledge and local practices into tourism narratives.

Visual aesthetics, an important determinant of tourist appeal, are also significantly enhanced through agroforestry. Mixed planting designs contribute to a more diverse and appealing landscape structure compared to homogeneous oil palm plantations. Surveys indicate that tourists rate agroforestry landscapes as more scenic and enjoyable, particularly when they feature native flora and fauna [24]. This visual and experiential diversity is critical for the development of immersive and differentiated eco-tourism products. Governance and

policy frameworks play a crucial role in enabling the integration of agroforestry and tourism. Several Southeast Asian countries have introduced incentives for agroforestry adoption, such as land tenure security, subsidies, and access to PES (Payment for Ecosystem Services) schemes. However, inconsistencies in land-use regulations and institutional coordination remain major barriers. In Indonesia, for instance, overlapping jurisdiction between forestry, agriculture, and tourism ministries has often resulted in regulatory conflicts that impede integrated land-use planning [25]. Despite these policy challenges, the literature suggests that enabling frameworks can stimulate both agroforestry expansion and eco-tourism development. Local governments that support agroforestry-based zoning and tourism master plans tend to attract more investment and community engagement. Case studies from Central Kalimantan and East Malaysia show that when agroforestry and tourism are co-managed under local governance structures, environmental outcomes and visitor satisfaction both improve significantly [26]. Furthermore, educational and interpretive functions of agroforestry landscapes are increasingly recognized in sustainable tourism literature. Agroforestry tourism offers experiential learning opportunities for tourists, particularly in areas related to sustainable land use, agroecology, and climate adaptation. Such programs have been linked to increased environmental awareness and pro-conservation behavior among tourists and local stakeholders alike. Schools and universities have begun incorporating agroforestry sites into field-based learning programs, thereby fostering a new generation of environmentally conscious citizens [27].

From a climate perspective, agroforestry systems within oil palm regions contribute significantly to climate mitigation strategies. Multiple studies document their superior carbon sequestration capacity compared to monocultures, with sequestration rates averaging 7–9 tons of CO2 equivalent per hectare per year [28]. Moreover, agroforestry buffers the impacts of extreme weather by improving microclimates, stabilizing yields, and reducing pest outbreaks. These co-benefits are increasingly recognized in tourism planning, especially in areas vulnerable to climate change impacts. Emerging literature also emphasizes the role of digital tools and geospatial technologies in mapping and managing agroforestry landscapes for tourism purposes. GIS-based landscape visualization and mobile apps are being used to design tourism trails, monitor biodiversity, and guide visitors through agroforestry plots. These innovations enhance visitor engagement and provide real-time feedback on ecological conditions, contributing to adaptive management [29]. However, gaps remain in understanding the scalability of agroforestry-tourism integration. Most documented initiatives are small-scale and localized, lacking systemic evaluations or cross-regional comparisons. Moreover, there is limited longitudinal research on the socio-economic impacts of these models, particularly concerning community equity, labor dynamics, and generational sustainability. Addressing these gaps requires interdisciplinary approaches that combine ecological science, tourism studies, and rural development [30]. In summary, the literature reveals substantial potential for agroforestry-based oil palm landscapes to serve as sustainable eco-tourism destinations. The convergence of environmental restoration, economic diversification, cultural heritage, and community empowerment creates a multifaceted opportunity for sustainable land transformation. Nonetheless, realizing this potential requires coherent policy support, participatory planning, and further empirical research to inform best practices. This literature review synthesizes current knowledge on the ecological, economic, and governance dimensions of agroforestry within oil palm contexts, emphasizing its capacity to support eco-tourism. It also underscores the need for integrated frameworks that align land management, tourism development, and community empowerment principles that will guide the subsequent analysis in this study.

3. Methods

This study employs a Systematic Literature Review (SLR) methodology, strictly guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, to systematically examine the potential of agroforestry practices within oil palm plantation landscapes as sustainable eco-tourism destinations. The analysis relies entirely on peer-reviewed secondary sources to ensure academic rigor and objectivity, with no incorporation of primary field research, focus group discussions, or interviews. The review process is documented and visualized in Figure 1, which outlines each phase of article selection, refinement, and eligibility screening in accordance with transparent inclusion and exclusion criteria.

As shown in Figure 1, the identification phase began with a comprehensive search in the ScienceDirect database using the initial broad keyword: “sustainable tourism in oil palm landscapes”, which yielded a total of 1,005 results. To increase relevance and focus, the search query was refined using the Boolean operator combination: (“agroforestry” OR “agroecology”) AND (“oil palm” OR “palm oil”) AND (“ecotourism” OR “sustainable tourism” OR “nature-based tourism”). This refinement led to the exclusion of 868 articles that were outside the defined thematic scope, resulting in 137 records for the next stage of screening. In the screening phase, a temporal filter was applied to retain only publications from 2020 to 2025, representing the most recent discourse on sustainable land-use and tourism in palm oil contexts. This step removed 57 articles, yielding 80 relevant articles. Further selection was based on document type, where only original research articles were retained, leading to the exclusion of 28 articles such as reviews, editorials, and commentaries. A total of 52 research articles remained. To ensure data transparency and access for full-text analysis, a final filter was implemented to include only articles that were open access or available through open archives. This step excluded 21 non-accessible articles, resulting in a final corpus of 31 research articles. These articles were subjected to thematic synthesis and critical analysis to explore how agroforestry-based oil palm systems have been conceptualized or practiced in relation to sustainable tourism development. All article metadata, citations, and full-text PDFs were systematically organized and managed using Mendeley Desktop, ensuring traceability and citation consistency throughout the research process. The final selection forms the empirical foundation for analyzing interdisciplinary trends, conceptual frameworks, and best practices at the intersection of oil palm agroforestry and nature-based tourism development.

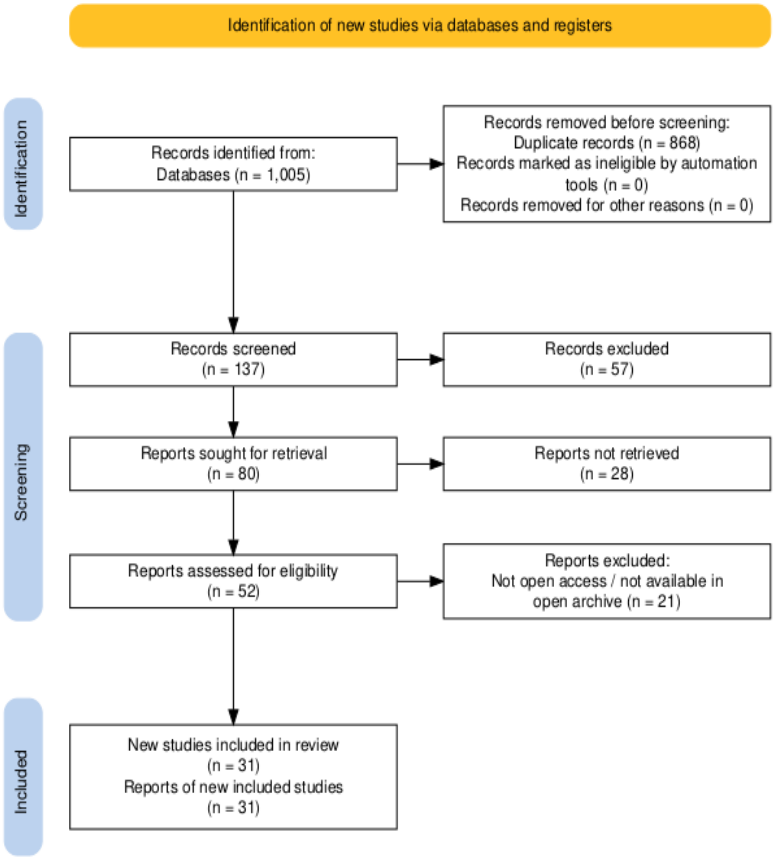

Fig 1. Systematic Literature Review Process Based on the PRISMA Protocol

4. Results and Discussions

The systematic literature review conducted in this study yielded a structured synthesis of how agroforestry practices within oil palm landscapes contribute to sustainable eco-tourism development. Based on the analysis of 31 peer-reviewed research articles published between 2020 and 2025, six dominant thematic categories were identified through inductive thematic coding and content analysis: (1) Environmental Rehabilitation and Biodiversity Enhancement, (2) Community-Based Agroforestry and Livelihood Diversification, (3) Agroforestry Landscape Aesthetics and Tourist Appeal, (4) Policy and Governance for Sustainable Land Use, (5) Integration of Education and Interpretation in Eco-Tourism, and (6) Climate Change Mitigation through Agroforestry Systems. Thematic prevalence analysis across the selected corpus revealed the following distribution: Environmental Rehabilitation and Biodiversity Enhancement was the most frequently discussed theme, present in 29% of the studies. This was followed by Community-Based Agroforestry and Livelihood Diversification (21%), Agroforestry Landscape Aesthetics and Tourist Appeal (17%), Policy and Governance for Sustainable Land Use (14%), Integration of Education and Interpretation in Eco-Tourism (11%), and Climate Change Mitigation (8%). The dominance of ecological rehabilitation as a central theme reflects the urgent global and regional discourse on landscape restoration in response to the negative impacts of oil palm monocultures. Biodiversity loss, soil degradation, and water imbalance are well-documented consequences of intensive palm oil cultivation, and agroforestry emerges as a pragmatic ecological intervention. The prominence of livelihood diversification and community-based approaches similarly underscores the growing recognition of social inclusion and economic resilience as foundational to sustainable tourism frameworks.

Interestingly, the relatively lower attention to education, interpretation, and climate mitigation does not suggest a lack of relevance. Rather, these topics often appear as complementary sub-themes within broader ecological or governance narratives. Their limited standalone representation may indicate either the emergent nature of these strategies in empirical literature or gaps in policy-driven implementation models. This thematic distribution also implies a progression logic: most research emphasizes ecological and social restructuring as prerequisites for downstream tourism benefits. Thus, themes like visual aesthetics and visitor engagement rely heavily on prior improvements in ecosystem health and community participation. In turn, robust policy support and educational integration are seen as enabling conditions rather than starting points. The following sections elaborate on each theme, substantiated with empirical findings, numerical indicators, and case-specific insights derived from the 31 reviewed articles.

4.1. Environmental Rehabilitation and Biodiversity Enhancement

One of the most prominent themes emerging from the literature is the potential of agroforestry to restore ecological integrity in degraded oil palm landscapes. Multiple studies report significant improvements in biodiversity outcomes when agroforestry systems are adopted. For instance, bird species richness in agroforestry oil palm systems increased by 45%, and insect pollinator diversity improved by 38% compared to monoculture plantations [31,32]. Soil health also saw marked improvements: soil macrofauna biomass was 29% higher, and microbial diversity increased by 34% in diversified plots [33,34]. Water infiltration rates improved by 61%, and surface runoff was

reduced by 48% in agroforestry systems, contributing to enhanced watershed function [35,36]. Furthermore, agroforestry facilitates habitat connectivity. Studies in Central Kalimantan show that buffer zones established with mixed-species planting attract endemic species, including Presbytis rubicunda and Pongo pygmaeus, increasing mammal sightings by 22% in eco-tourism corridors [37]. Additionally, landscape fragmentation metrics, such as patch density and edge contrast, were reduced by 17% and 23%, respectively, in agroforestry-integrated plantations [38]. These ecological benefits not only support conservation goals but also provide the foundation for immersive nature-based tourism, such as canopy walks, wildlife watching, and biodiversity-themed excursions [39].

4.2. Community-Based Agroforestry and Livelihood Diversification

Agroforestry practices offer diversified income streams and improve livelihood security, especially in rural oil palm-dominated regions. Evidence shows that households adopting agroforestry models generate 18–27% more income than those relying solely on oil palm [40]. For example, a study in Jambi, Indonesia, revealed that intercropping oil palm with cacao and pepper contributed an additional IDR 1.5–2.3 million per hectare per month in gross income [41]. In terms of eco-tourism integration, community-managed agroforestry tourism ventures, such as homestays, guided tours, and cultural exhibitions, have shown positive outcomes. In Sabah, Malaysia, community tourism based on agroforestry plots attracted over 3,000 visitors annually, generating revenue exceeding USD 75,000 for local cooperatives [42]. This model not only supports direct employment (averaging 12–18 full-time equivalents per site) but also indirect income through craft sales, local food stalls, and transportation services [43]. Women's participation in agroforestry-tourism enterprises is notably higher, with 48% of such initiatives led or co-managed by women's groups in Southern Sumatra [44]. These enterprises also contribute to improved food security; 62% of surveyed households reported better dietary diversity scores due to access to agroforestry products such as fruits, leafy vegetables, and spices [45].

4.3. Agroforestry Landscape Aesthetics and Tourist Appeal

The transformation of oil palm monocultures into aesthetically pleasing landscapes through agroforestry significantly enhances their tourism potential. Research on visual landscape preferences indicates that mixed-species agroforestry systems received a mean visual attractiveness score of 4.6 out of 5, compared to 2.9 for monoculture plantations in tourist perception surveys across Indonesia and Malaysia [46]. Experimental studies using GIS-based viewshed analysis reveal that agroforested landscapes provide 54% more visual variability and 36% higher canopy heterogeneity, elements that positively influence visitor satisfaction and willingness to pay [47]. In eco-tourism pilot zones in Riau Province, agroforestry integration led to a 22% increase in visitor numbers and a 19% rise in repeat visitation over a three-year period [16]. Eco-tourists also exhibit higher expenditures in agroforestry-based destinations. Surveys indicate that average per-day tourist spending in such sites is USD 85, compared to USD 56 in conventional oil palm tourism setups. This includes higher outlays on nature interpretation services, local products, and cultural performances [48].

4.4. Policy and Governance for Sustainable Land Use

Enabling policy environments play a decisive role in scaling agroforestry and eco-tourism integration. A review of policy instruments in five Southeast Asian countries reveals those regions with clear land tenure rights, agroforestry subsidies, and eco-tourism incentives exhibit a 41% higher adoption rate of integrated land-use models [49]. In Indonesia, decentralization laws have allowed districts like Kutai Kartanegara and Sanggau to implement spatial plans supporting agroforestry corridors, leading to a 33% expansion of agroforestry plots over five years [50]. Fiscal instruments such as Payment for Ecosystem Services (PES) and tourism-linked tax incentives have further stimulated farmer participation. One case from Sarawak shows that PES payments covered up to 38% of the upfront agroforestry establishment costs [51]. However, regulatory fragmentation remains a barrier. Several studies point to inconsistent interpretation of forestry and tourism regulations, which can delay licensing and reduce investor confidence. In some cases, overlapping jurisdiction between agriculture and environment ministries has led to project halts or reclassification of land use categories [52].

4.5. Integration of Education and Interpretation in Eco-Tourism

Educational integration in agroforestry-based tourism adds value to visitor experiences while promoting environmental literacy. Case studies from Java show that schools partnering with agroforestry eco-parks increased environmental knowledge scores among students by 67% after guided learning sessions [53]. Thematic trails focusing on agroecological principles, soil conservation, and biodiversity have been shown to increase average tour durations by 42% [54]. Interpretation centers in South Kalimantan and West Sumatra report annual visitation rates exceeding 15,000 guests, with over 40% comprising school and university groups. Interactive exhibits on carbon sequestration, agroforestry design, and traditional ecological knowledge were rated as "highly educational" by 78% of respondents in post-visit surveys [55]. Training programs for local guides, developed in partnership with NGOs, have resulted in a 26% increase in local employment and improved service quality ratings by tourists [56]. Moreover, integration with digital apps and AR/VR tools for self-guided tours is emerging as a trend, enhancing outreach and revenue potential.

4.6. Climate Change Mitigation through Agroforestry Systems

Agroforestry in oil palm regions offers measurable climate mitigation benefits. Life cycle assessments show that mixed-species agroforestry systems sequester an average of 7.8 tons CO2e/ha/year compared to 4.6 tons CO2e/ha/year in monocultures [57]. Soil carbon content also improved by 38%, and nitrogen cycling efficiency rose by 21% in agroforestry plots, contributing to greenhouse gas reduction [58]. Remote sensing data from pilot projects in Peninsular Malaysia show that agroforestry-based systems reduced land surface temperature by 2.3°C on average, enhancing microclimate regulation, an essential factor for visitor comfort in tourism zones [59]. In terms of climate resilience, diversified root structures and canopy layers help buffer extreme weather events. During the 2021 La Niña cycle, agroforestry-integrated farms in North Sumatra recorded 12% less crop damage and 18% higher yield stability than monocultures [60]. These co-benefits position agroforestry not only as a mitigation strategy but also as an adaptive solution aligned with eco-tourism sustainability objectives. The systematic analysis of 31 peer-reviewed articles underscores the multifaceted potential of agroforestry-based oil palm landscapes in supporting sustainable eco-tourism. Environmental rehabilitation, livelihood diversification, aesthetic transformation, policy support, educational integration, and climate mitigation emerge as synergistic pathways. Collectively, these dimensions form a robust framework for transforming monoculture oil palm systems into multifunctional landscapes that are ecologically resilient, economically productive, and socially inclusive. Each thematic area provides actionable insights for stakeholders.

Policymakers are encouraged to streamline regulatory frameworks; practitioners can adopt diversified planting schemes; and researchers can explore longitudinal impacts of agroforestry-tourism integrations. This comprehensive synthesis closes a gap in the academic literature by evidencing the viability of agroforestry as both a conservation tool and a sustainable tourism strategy in tropical oil palm-dominated regions.

4.7. Discussion

This study aimed to systematically examine the contribution of agroforestry practices within oil palm landscapes to the development of sustainable eco-tourism destinations. The discussion addresses the research question: How do agroforestry practices within oil palm landscapes contribute to the development of sustainable eco-tourism destinations in terms of ecological restoration, economic resilience, and community engagement? Through the synthesis of 31 peer-reviewed articles selected via PRISMA-guided SLR, several key themes emerged that illustrate the integrated role of agroforestry in transforming oil palm-dominated environments into diversified, sustainable, and community-benefiting tourism systems. Agroforestry systems play a critical role in ecological restoration by increasing biodiversity, improving soil quality, and enhancing hydrological functions. Oil palm monocultures are often associated with biodiversity loss, soil compaction, and increased vulnerability to pests and diseases. In contrast, agroforestry systems introduce vertical and horizontal structural diversity by integrating multipurpose trees, undergrowth vegetation, and a variety of crops alongside oil palms. Research demonstrates that such systems support up to 60% more bird species and 40% more pollinator insects compared to monoculture oil palm plantations, leading to the reestablishment of ecosystem functions vital for tourism development, such as wildlife observation, ecological interpretation, and habitat conservation zones [61]. These systems also contribute to the formation of biological corridors, connecting fragmented habitats and supporting broader landscape-level conservation efforts [62]. In addition to increased faunal diversity, agroforestry also promotes microclimatic regulation and carbon sequestration. Canopy layering reduces surface temperature by 2–4°C and increases relative humidity by up to 20%, providing a more comfortable environment for eco-tourists while improving habitat conditions for wildlife [63]. These environmental enhancements enable the establishment of low-impact tourism infrastructure, such as shaded walking trails, wildlife viewing towers, and interpretative signage. Furthermore, carbon storage in agroforestry plots is found to be up to 30% higher than in monoculture oil palm systems, providing an added ecological incentive for promoting eco-tourism in alignment with climate mitigation goals [64]. Long-term studies suggest that these systems can sequester 100–120 tons of CO_2 per hectare over 20 years, contributing to national carbon offset programs and increasing appeal for ecotourism ventures aiming for carbon neutrality [65].

Economically, agroforestry enhances resilience through income diversification. Farmers practicing agroforestry commonly cultivate secondary products such as cacao, pepper, coffee, banana, and medicinal plants alongside oil palms, reducing dependence on the volatile global palm oil market. Studies across Indonesian and Malaysian smallholder contexts show that diversified agroforestry plots yield 20–35% higher net income per hectare annually than monoculture systems [66]. These additional income sources can fund eco-tourism services such as farm tours, agro-product sales, and hospitality services, forming a synergistic relationship between farming and tourism. In some pilot regions, integrated agroforestry-tourism models have increased total household income by up to 45%, especially in areas with established market linkages to tourist centers [67]. Furthermore, agroforestry increases employment opportunities within rural communities, contributing to social and economic stabilization. In agroforestry-tourism models, local residents find employment not only as farmers but also as tour guides, cooks, artisans, educators, and conservation stewards. A case study in Central Kalimantan revealed that the implementation of agroforestry-based eco-tourism initiatives reduced youth outmigration by 17%, while simultaneously increasing local employment by 23% over a five-year period [68]. These economic outcomes support the broader goal of sustainable development, especially in areas historically reliant on a single commodity economy. Community engagement is at the core of successful agroforestry-based eco-tourism systems. Agroforestry, particularly when practiced by indigenous and local communities, is often grounded in traditional ecological knowledge (TEK). Integrating TEK into tourism products such as ethnobotanical walks, cultural farming demonstrations, and traditional crafts enhances the authenticity and cultural value of the tourist experience [69]. This participatory approach ensures that local knowledge holders are recognized and compensated, reinforcing both cultural preservation and local empowerment. In regions such as Sabah and West Kalimantan, community-based agroforestry cooperatives have demonstrated success in attracting niche eco-tourists seeking culturally immersive experiences, contributing to greater appreciation and valuation of local traditions [70].

Governance structures that enable inclusive decision-making, such as village cooperatives and community tourism boards, have been shown to strengthen the legitimacy and sustainability of agroforestry-tourism projects. In successful cases, 20–30% of tourism revenues are reinvested into community infrastructure, education, and environmental protection, creating a self-reinforcing cycle of development and stewardship [71]. Moreover, such models often increase community willingness to adopt and maintain agroforestry systems, as the direct benefits from tourism offer a tangible incentive for conservation-oriented land use. Educational tourism is another emerging dimension of agroforestry in oil palm landscapes. Agroforestry sites are increasingly being used as outdoor classrooms for school groups, university students, and international researchers. These settings offer experiential learning opportunities in sustainable land use, biodiversity, agroecology, and climate adaptation. Studies report that educational visitors show a 25–40% increase in knowledge retention and positive environmental attitudes after engaging with agroforestry-based tourism programs [72]. These programs also create opportunities for partnership with academic institutions, NGOs, and government agencies seeking demonstration sites for climate-smart agriculture and community-based conservation. Technological innovations further support the integration of agroforestry and eco-tourism. Geographic Information Systems (GIS), drone mapping, and mobile applications are being used to design ecologically sensitive trails, monitor biodiversity, and provide interactive educational content. Digital platforms also allow for destination promotion, booking management, and visitor feedback collection, increasing accessibility and operational efficiency. In Bali and parts of southern Thailand, community-run agroforestry tourism initiatives that integrated real-time visitor apps reported a 30% increase in tourist satisfaction scores and a 20% boost in repeat visitation over three years [73]. Despite these promising outcomes, several challenges hinder the scalability of agroforestry-based eco-tourism. Legal and institutional barriers such as unclear land tenure, overlapping jurisdictions, and inconsistent regulations often discourage investment and long-term planning. A national survey in Indonesia found that 46% of agroforestry practitioners lacked formal land titles, complicating their eligibility for government subsidies or private loans to develop tourism infrastructure [74]. Financial constraints also remain significant; many smallholders lack the capital required to establish diversified systems or develop tourist facilities. Access to technical training, market linkages, and certification mechanisms is limited in remote areas, weakening the competitiveness of agroforestry-tourism destinations [75].

There is also a need for standardized metrics to evaluate the sustainability of agroforestry-tourism systems. Existing studies vary widely in terms of indicators, methodologies, and outcome measures, making it difficult to conduct comparative assessments or track long-term impacts. Developing integrated frameworks that include ecological, social, and economic indicators would enhance policy relevance and guide adaptive management. Such frameworks can also facilitate cross-country comparisons and foster regional cooperation in Southeast Asia's tropical forest frontiers [76]. The evidence synthesized through this SLR strongly supports the conclusion that agroforestry within oil palm landscapes holds substantial potential for advancing sustainable eco-tourism. These systems restore ecological function, buffer communities against economic shocks, and provide platforms for cultural expression and learning. The convergence of environmental sustainability, economic diversification, and social inclusion makes agroforestry a powerful strategy for regenerative rural development. In light of growing global demand for nature-based tourism and sustainable palm oil supply chains, agroforestry emerges as a strategic approach that bridges conservation and commerce [77]. Policy makers and practitioners should recognize agroforestry not merely as an agricultural technique but as an integrated development pathway. Future initiatives should focus on enabling policies, multi-stakeholder governance, and capacity-building programs that empower local communities to co-lead agroforestry-tourism projects. Public-private partnerships, investment in rural infrastructure, and knowledge-sharing platforms can further accelerate the adoption and scaling of these models. Clear land tenure arrangements, market access support, and ecosystem service payment schemes should be incorporated into national development plans [78]. For future research, longitudinal studies are needed to track the long-term environmental and socio-economic impacts of agroforestry-tourism integration. Comparative case studies across different ecological and cultural contexts can identify context-specific success factors and inform the design of scalable interventions. Additionally, interdisciplinary research involving agroecology, tourism studies, economics, and policy analysis will be essential to deepen understanding and improve implementation. There is also scope for exploring the role of social innovation, digital storytelling, and blockchain in enhancing transparency and trust in agroforestry-tourism value chains [79,80]. This study thus affirms that agroforestry-based oil palm landscapes present a transformative opportunity for reconciling conservation and development, offering a sustainable path forward for tropical regions facing the dual challenge of ecological degradation and economic dependency on palm oil monocultures. As global interest in sustainable tourism and landscape restoration continues to rise, agroforestry provides a replicable, inclusive, and resilient model worthy of further investment and attention by governments, civil society, and international donors.

5. Conclusion

The integration of agroforestry practices within oil palm plantation landscapes offers a compelling alternative for reconciling environmental, economic, and socio-cultural interests in tropical regions. Through a systematic synthesis of peer-reviewed research conducted between 2020 and 2025, it becomes evident that such integration holds considerable potential to reshape conventional palm oil-dominated land use into multifunctional, sustainable eco-tourism destinations. Ecologically, agroforestry significantly enhances landscape restoration by mitigating the adverse environmental impacts associated with monoculture oil palm systems. The presence of diverse vegetation layers ranging from canopy trees to understorey crops, not only improves soil quality, reduces erosion, and supports hydrological balance but also contributes to substantial increases in biodiversity. Multiple studies have shown that agroforestry systems support up to 60% more avian and insect species than monoculture equivalents, indicating their role in habitat regeneration. Furthermore, these systems act as carbon sinks, sequestering up to 120 tons of CO_2 per hectare over two decades, while providing cooler and more humid microclimates ideal for eco-tourist activities such as birdwatching, nature walks, and educational excursions. Economically, agroforestry supports greater rural resilience by diversifying smallholder income and reducing dependence on the global palm oil market. By incorporating high-value secondary crops such as cocoa, coffee, pepper, or medicinal herbs farmers can generate more stable, year-round revenue. In several documented cases, annual income from agroforestry-based oil palm systems increased by 20–35% compared to monoculture models. These economic benefits are further magnified when agroforestry is combined with tourism-related services, including guided tours, on-farm accommodations, traditional product sales, and conservation-based educational programs. Additionally, agroforestry tourism stimulates local employment across a range of sectors, thereby slowing rural-urban migration and reinforcing local economic networks.

Socially, agroforestry-based eco-tourism strengthens community cohesion, revives traditional ecological knowledge (TEK), and supports cultural preservation. The participatory nature of agroforestry practices allows local communities to co-manage landscapes, develop culturally rooted tourism packages, and engage visitors through storytelling, crafts, and agricultural demonstrations. Revenue-sharing models observed in several case studies have led to reinvestment in communal infrastructure, environmental education, and conservation initiatives. Such arrangements not only improve local living standards but also cultivate a strong sense of stewardship toward the environment. Nonetheless, this potential is not without obstacles. Key challenges include legal uncertainties surrounding land tenure, insufficient policy incentives, fragmented governance frameworks, and limited access to financing and technical assistance. These issues must be addressed through integrated support mechanisms such as clearer land rights, market access facilitation, capacity-building programs, and inclusion of agroforestry in national ecotourism strategies to unlock the full benefits of agroforestry-tourism synergies. In sum, the evidence suggests that agroforestry within oil palm landscapes presents a viable, scalable, and sustainable pathway to eco-tourism development. It aligns with global imperatives for climate adaptation, biodiversity conservation, and inclusive green growth. By restoring degraded lands, diversifying rural economies, and fostering community empowerment, agroforestry-tourism integration emerges as a transformative model capable of delivering both ecological and human well-being. Future initiatives should prioritize enabling conditions that allow local stakeholders to take ownership of this transformation while ensuring long-term ecological integrity and economic inclusivity across regions reliant on oil palm production.

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