

# Agroforestry as a Sustainable Economic Model: Integrating Agriculture and Forestry in Development

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## Abstract

*Agroforestry has emerged as a strategic approach to addressing the dual challenges of environmental degradation and rural economic instability by integrating agricultural and forestry systems within a single land-use framework. This study aims to analyze agroforestry as a sustainable economic model that supports ecological sustainability, economic resilience, and social welfare. The research employs a qualitative approach based on a systematic literature review, utilizing secondary data from peer-reviewed journal articles, scientific reports, and policy documents. Data were analyzed using thematic and interpretative techniques to identify key patterns and relationships among ecological, economic, and institutional dimensions. The results indicate that agroforestry significantly enhances soil fertility, carbon sequestration, biodiversity, and water conservation, while simultaneously providing diversified income sources, improving food security, and strengthening rural livelihoods. Furthermore, institutional support, including policy frameworks, extension services, and community participation, plays a critical role in ensuring successful implementation. The discussion highlights that agroforestry functions not only as a land-use practice but also as an integrated sustainable economic model aligned with Sustainable Development Goals (SDGs). In conclusion, agroforestry offers a holistic and scalable solution for sustainable development, particularly in rural and forest-dependent regions, by balancing environmental conservation with economic productivity.*

**Keywords** : Agroforestry, Sustainable Economy, Environmental Sustainability, Rural Development, Food Security

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## 1. Introduction

The contemporary discourse on development increasingly emphasizes the necessity of balancing economic growth with environmental sustainability, particularly in rural landscapes where agricultural expansion often intersects with forest ecosystems. However, the dominant paradigm of monoculture-based agriculture has contributed significantly to environmental degradation, including soil erosion, biodiversity loss, and increased greenhouse gas emissions. These challenges are especially pronounced in developing countries, where land-use pressures are high and institutional capacity for sustainable resource management remains uneven. Within this context, agroforestry has emerged as a promising land-use system that integrates trees, crops, and sometimes livestock within a single management framework, offering a pathway toward sustainable economic development while preserving ecological integrity (Van Noordwijk et al., 2018).

Agroforestry systems are increasingly recognized for their multifunctional ecological roles, particularly in enhancing soil health and maintaining environmental balance. The integration of woody perennials with agricultural crops contributes to improved soil structure, increased organic matter content, and enhanced nutrient cycling processes. Furthermore, these systems reduce soil erosion and surface runoff, thereby preserving land productivity over the long term. Empirical studies demonstrate that agroforestry practices significantly improve soil fertility and reduce land degradation compared to conventional farming systems, making them a viable strategy for sustainable land management in diverse agroecological contexts (Fahad et al., 2022).

In addition to soil-related benefits, agroforestry plays a crucial role in climate change mitigation and adaptation. Trees within agroforestry systems act as carbon sinks, sequestering atmospheric carbon dioxide and reducing overall greenhouse gas emissions. This function is particularly important in the context of global climate commitments and national strategies for emission reduction. Moreover, agroforestry enhances the resilience of farming systems by providing microclimatic regulation, reducing temperature extremes, and improving water retention capacity. Such adaptive features enable farming communities to better cope with climate variability and extreme weather events, thereby strengthening long-term sustainability (Fatima et al., 2024).

Another significant ecological contribution of agroforestry lies in its ability to enhance biodiversity through the creation of more complex and heterogeneous landscapes. Unlike monoculture systems, agroforestry supports a variety of plant and animal species by providing diverse habitats and ecological niches. This increased biodiversity contributes to ecosystem stability, pest regulation, and pollination services, all of which are essential for sustainable agricultural production. Studies have shown that agroforestry landscapes can function as biodiversity corridors, linking fragmented habitats and supporting conservation efforts at a broader landscape scale (Castle et al., 2021).

Beyond ecological advantages, agroforestry also offers substantial economic and social benefits, particularly for rural communities. One of its key strengths lies in the diversification of production outputs, including food crops, timber, fruits, fodder, and non-timber forest products. This diversification reduces dependency on a single source of income and enhances economic resilience in the face of market fluctuations and environmental uncertainties. Empirical evidence indicates that agroforestry systems often yield higher benefit–cost ratios compared to conventional agricultural systems, particularly in regions such as India, Brazil, and Indonesia, where integrated land-use practices have been widely adopted (Katariya et al., 2025).

Furthermore, agroforestry contributes significantly to food security and nutritional diversity by providing a continuous supply of both seasonal and perennial products. The integration of multiple crop types within a single system ensures year-round availability of food resources, thereby reducing vulnerability to crop failure and seasonal food shortages. In addition, agroforestry systems support livestock production through the provision of fodder, enhancing overall farm productivity and sustainability. These combined benefits underscore the role of agroforestry as a holistic approach to rural development that integrates economic, social, and environmental dimensions (Raj et al., 2019).

Agroforestry also holds strategic importance in achieving global development agendas, particularly the Sustainable Development Goals (SDGs). It directly contributes to multiple goals, including poverty alleviation, zero hunger, climate action, and life on land. By integrating agricultural and forestry practices, agroforestry serves as a bridge between sectors that have traditionally been managed separately. This integrative approach not only enhances policy coherence but also promotes more efficient and sustainable resource utilization, aligning local development practices with global sustainability frameworks (Aryal et al., 2022).

In the Indonesian context, agroforestry has gained increasing attention as part of social forestry programs aimed at improving the livelihoods of forest-dependent communities while reducing deforestation rates. The adoption of “smart agroforestry” approaches, which incorporate technological innovations and data-driven management, has further enhanced the potential of this system to support sustainable rural economies. These initiatives demonstrate that agroforestry can function as a practical and scalable solution for addressing complex socio-environmental challenges in developing countries (Prabawani et al., 2024).

Despite its numerous advantages, the implementation of agroforestry systems faces several significant challenges that hinder its widespread adoption. These include limited access to financial resources, inadequate technical knowledge among farmers, insufficient policy support, and underdeveloped market linkages for agroforestry products. Additionally, the initial costs associated with establishing agroforestry systems and the perceived risks of transitioning from conventional farming practices often discourage farmers from adopting this model. These barriers highlight the need for comprehensive institutional support and targeted interventions to promote agroforestry adoption at scale (Tesema et al., 2025).

Moreover, the success of agroforestry systems depends on several critical enabling factors, including effective extension services, supportive policy frameworks, financial incentives, and secure land tenure arrangements. Community participation and strong local institutions also play a vital role in ensuring the sustainability of agroforestry initiatives. Without these supporting conditions, the potential benefits of agroforestry may not be fully realized, limiting its contribution to sustainable development goals. Therefore, understanding the interplay between ecological, economic, and institutional dimensions is essential for optimizing agroforestry implementation (Bahrani et al., 2025).

Although previous studies have extensively examined the ecological and economic benefits of agroforestry, there remains a notable research gap in integrating these dimensions into a comprehensive sustainable economic model that explicitly links agriculture and forestry within a unified development framework. Most existing research tends to focus on either ecological functions or economic outcomes in isolation, without adequately addressing their interdependence and implications for policy and development planning. This fragmentation limits the ability of policymakers and practitioners to design

integrated strategies that maximize the multifunctional benefits of agroforestry systems (VijayKumar et al., 2024).

In response to this gap, the present study offers a novel contribution by conceptualizing agroforestry as an integrated sustainable economic model that simultaneously addresses ecological sustainability, economic resilience, and social welfare. Unlike previous approaches that treat agroforestry primarily as a land-use practice, this study positions it as a strategic development model that can inform policy design and implementation. By synthesizing ecological functions, economic benefits, and institutional factors, this research aims to provide a more holistic understanding of agroforestry's role in sustainable development.

Accordingly, the primary objective of this study is to analyze agroforestry as a sustainable economic model through the integration of agricultural and forestry systems, with a focus on its ecological functions, economic contributions, and role in supporting sustainable development. This objective is expected to contribute to the development of more integrated and evidence-based policies that promote sustainable land use and rural economic development.

## 2. Method

This study employs a qualitative research design with a conceptual and analytical approach to examine agroforestry as a sustainable economic model integrating agriculture and forestry systems. The research is grounded in a literature-based method, utilizing secondary data derived from peer-reviewed journal articles, scientific reports, and policy documents relevant to agroforestry, sustainable development, and rural economics. The data collection technique involves systematic literature review procedures, including identification, classification, and synthesis of scholarly sources published in reputable international journals. The selected literature focuses on three main dimensions: ecological functions of agroforestry, economic benefits and livelihood impacts, and institutional or policy frameworks supporting its implementation. Inclusion criteria emphasize recent publications and high-impact studies to ensure the validity and relevance of the data, while exclusion criteria are applied to non-scholarly and non-peer-reviewed sources.

The data analysis is conducted using a qualitative descriptive-analytical technique combined with thematic analysis. Initially, collected data are organized and coded based on key themes aligned with the research objective, namely ecological sustainability, economic resilience, and integrative development models. Subsequently, an interpretative analysis is carried out to identify patterns, relationships, and conceptual linkages among the variables studied. This process allows for the development of a comprehensive framework positioning agroforestry as a sustainable economic model. The analysis also incorporates a comparative approach to evaluate findings across different geographical contexts and empirical studies, thereby strengthening the generalizability of the conclusions. Finally, the synthesis of findings is used to formulate a conceptual model that integrates ecological, economic, and institutional dimensions of agroforestry within the broader framework of sustainable development.

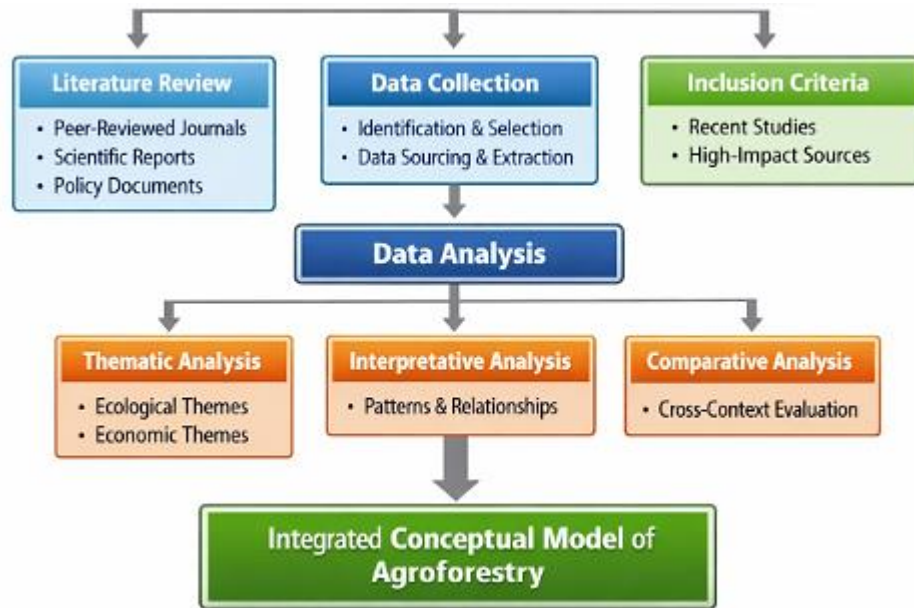


Figure 1. Conceptual Framework This Research

### 3. Results and Discussion

Before presenting the findings in detail, it is important to synthesize the results of the thematic and interpretative analysis into a structured format. The following table summarizes the key dimensions identified from the literature review, including ecological functions, economic contributions, and institutional factors, along with their main impacts and implications for sustainable development.

Table 1. Integrated Analysis of Agroforestry as a Sustainable Economic Model

Dimension	Key Components	Main Impacts	Implications for Sustainable Development
<b>Ecological Functions</b>	Soil fertility, carbon sequestration, biodiversity conservation, water regulation	Improved soil health, reduced emissions, enhanced ecosystem stability	Supports environmental sustainability and climate resilience
<b>Economic Contributions</b>	Product diversification, income generation, livestock integration	Increased farmer income, reduced economic risk, improved productivity	Strengthens rural economies and promotes long-term economic resilience
<b>Social Benefits</b>	Food security, nutritional diversity, community participation	Stable food supply, improved livelihoods, strengthened social cohesion	Enhances social welfare and reduces rural vulnerability
<b>Institutional Support</b>	Policy frameworks, extension services, land tenure security, financial incentives	Increased adoption of agroforestry practices, reduced barriers	Facilitates scalable and sustainable implementation

<b>Integrated Development</b>	Agriculture–forestry linkage, circular economy approach	Efficient resource use, reduced waste, sustainable land management	Aligns with SDGs and promotes holistic development strategies
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The table illustrates that agroforestry operates as a multidimensional system that simultaneously delivers ecological, economic, and social benefits, supported by enabling institutional frameworks. From an ecological perspective, the integration of trees within agricultural systems significantly enhances soil quality, biodiversity, and climate regulation functions. Economically, agroforestry provides diversified income streams and reduces farmers' vulnerability to market and environmental shocks. Socially, it contributes to food security and community resilience, while institutionally, supportive policies and governance structures play a crucial role in ensuring its successful implementation.

Furthermore, the integration of these dimensions demonstrates that agroforestry is not merely a land-use practice but a comprehensive sustainable economic model. Its alignment with circular economy principles and Sustainable Development Goals (SDGs) reinforces its relevance in addressing contemporary development challenges. Therefore, the findings suggest that strengthening policy support, improving access to resources, and enhancing community-based approaches are essential to maximize the potential of agroforestry as a sustainable development strategy.

### Discussion

The findings presented in Table 1 demonstrate that agroforestry functions as a multidimensional system integrating ecological, economic, social, and institutional components, thereby supporting its conceptualization as a sustainable economic model. From an ecological perspective, the integration of trees with agricultural crops significantly enhances soil quality, reduces erosion, and improves nutrient cycling. These ecological services are critical in maintaining long-term land productivity, particularly in regions experiencing land degradation due to intensive agricultural practices. The presence of trees contributes organic matter through litter fall and root biomass, which enhances soil structure and fertility while reducing surface runoff. This aligns with previous studies indicating that agroforestry systems are more effective than monoculture systems in sustaining soil health and preventing environmental degradation (Fahad et al., 2022).

Furthermore, agroforestry plays a pivotal role in climate change mitigation and adaptation through carbon sequestration and microclimate regulation. Trees integrated within farming systems act as carbon sinks, reducing atmospheric carbon dioxide levels and contributing to climate change mitigation strategies. In addition, agroforestry systems enhance resilience to climate variability by moderating temperature extremes, improving water retention, and reducing vulnerability to drought. These ecological benefits position agroforestry as a strategic approach in addressing global climate challenges, particularly in developing countries where agriculture remains highly climate-dependent. Empirical evidence supports that agroforestry significantly contributes to greenhouse gas reduction and enhances adaptive capacity at the farm level (Fatima et al., 2024).

Another critical ecological dimension highlighted in this study is biodiversity enhancement. Agroforestry systems create complex habitats that support a wide range of plant and animal species, thereby contributing to ecosystem stability and resilience. Unlike conventional monoculture farming, agroforestry promotes landscape heterogeneity, which

is essential for maintaining ecological balance and supporting ecosystem services such as pollination and pest control. The integration of diverse species within agroforestry systems also reduces the risk of pest outbreaks and enhances biological control mechanisms. These findings are consistent with research demonstrating that agroforestry landscapes can serve as biodiversity corridors, linking fragmented ecosystems and supporting conservation efforts (Castle et al., 2021).

From an economic standpoint, the results indicate that agroforestry significantly enhances rural livelihoods through diversified income sources. The integration of multiple outputs such as crops, timber, fruits, and livestock products reduces dependency on a single commodity, thereby minimizing economic risks associated with market fluctuations and climate variability. This diversification strategy not only stabilizes household income but also increases overall farm productivity. Studies have shown that agroforestry systems often yield higher economic returns compared to conventional agriculture, particularly when long-term benefits are considered. For instance, systems such as poplar-based agroforestry in India demonstrate high benefit–cost ratios, highlighting their economic viability (Katariya et al., 2025).

In addition to income diversification, agroforestry contributes significantly to food security and nutritional diversity. The integration of seasonal and perennial crops ensures a continuous supply of food throughout the year, reducing vulnerability to food shortages. Agroforestry systems also provide a variety of nutrient-rich products, including fruits, vegetables, and animal products, thereby improving dietary diversity and nutritional outcomes. This is particularly important in rural areas where access to diverse food sources may be limited. Empirical evidence suggests that agroforestry enhances both food availability and accessibility, contributing to improved household food security and resilience (Raj et al., 2019).

The inclusion of livestock within agroforestry systems, particularly in agrosilvopastoral and silvopastoral models, further strengthens the economic and ecological benefits of this approach. These integrated systems optimize land use by combining crop production, tree cultivation, and livestock rearing within a single framework. Livestock benefit from improved fodder availability, while trees contribute to soil fertility and microclimate regulation, creating a synergistic relationship among system components. This integration enhances overall farm productivity and sustainability, making agroforestry a highly efficient land-use system. Research indicates that such integrated models significantly improve both agricultural output and livestock productivity (Singh & Singh, 2023).

The study also highlights the strategic role of agroforestry in achieving sustainable development goals (SDGs), particularly those related to poverty alleviation, food security, climate action, and ecosystem conservation. Agroforestry serves as a bridge between the agricultural and forestry sectors, promoting integrated land-use planning and resource management. This integrative approach aligns with global sustainability frameworks and supports the transition toward more resilient and sustainable development pathways. By addressing multiple dimensions of sustainability simultaneously, agroforestry contributes to a more holistic and inclusive model of development (Aryal et al., 2022).

In the context of Indonesia, agroforestry has been widely implemented through social forestry programs aimed at empowering local communities and reducing deforestation. The concept of “smart agroforestry,” which incorporates technological innovations and data-driven management practices, further enhances the effectiveness of these systems. These initiatives demonstrate that agroforestry can serve as a practical solution for addressing

socio-economic and environmental challenges in rural areas. The integration of local knowledge with modern technologies enables more efficient resource management and increases the scalability of agroforestry practices (Prabawani et al., 2024).

Despite its numerous benefits, the widespread adoption of agroforestry remains constrained by several challenges, as identified in the findings. Limited access to financial resources, lack of technical knowledge, inadequate policy support, and weak market linkages are among the primary barriers faced by farmers. Additionally, the initial investment required for establishing agroforestry systems and the delayed economic returns often discourage farmers from adopting this approach. These challenges highlight the need for targeted interventions and supportive policies to facilitate the transition from conventional farming systems to agroforestry (Tesema et al., 2025).

Institutional factors play a crucial role in determining the success of agroforestry implementation. Effective extension services, secure land tenure, financial incentives, and supportive policy frameworks are essential for promoting adoption and ensuring long-term sustainability. Community participation and strong local institutions further enhance the effectiveness of agroforestry initiatives by fostering collective action and knowledge sharing. Without these enabling conditions, the potential benefits of agroforestry may not be fully realized. Therefore, strengthening institutional support is critical for scaling up agroforestry practices and maximizing their impact (Bahrani et al., 2025).

An important insight derived from this study is the relevance of agroforestry within the framework of a circular economy. Agroforestry systems promote efficient resource use by integrating organic waste recycling, nutrient cycling, and closed-loop production processes. This approach minimizes waste and enhances resource efficiency, contributing to more sustainable production systems. The application of circular economy principles within agroforestry further strengthens its role as a sustainable economic model, particularly in the context of increasing resource scarcity and environmental pressures (Cahyani, 2025).

Moreover, the integrative nature of agroforestry allows it to address the interconnected challenges of environmental degradation, economic instability, and social vulnerability. By combining ecological sustainability with economic productivity, agroforestry provides a balanced approach to development that aligns with both local needs and global sustainability goals. This holistic perspective distinguishes agroforestry from conventional agricultural models, which often prioritize short-term economic gains at the expense of environmental sustainability (VijayKumar et al., 2024).

The findings of this study also reinforce the importance of adopting a systems-based approach in analyzing agroforestry. Rather than viewing ecological, economic, and social dimensions as separate components, this study highlights the interdependence among these factors in shaping the overall sustainability of agroforestry systems. This integrated perspective provides a more comprehensive understanding of agroforestry as a sustainable economic model and offers valuable insights for policy formulation and implementation.

In addressing the research objective, this study demonstrates that agroforestry is not merely a land-use practice but a strategic model for sustainable economic development. Its ability to simultaneously deliver ecological benefits, enhance economic resilience, and support social well-being underscores its relevance in contemporary development discourse. By integrating agriculture and forestry within a unified framework, agroforestry provides a viable pathway toward achieving sustainable development in both rural and global contexts.

Finally, the novelty of this study lies in its integrative conceptualization of agroforestry as a sustainable economic model that bridges ecological, economic, and institutional dimensions. Unlike previous studies that focus on specific aspects of agroforestry, this research offers a holistic framework that can inform both academic discourse and practical implementation. This contribution is particularly important in advancing the understanding of agroforestry as a comprehensive solution to complex development challenges, thereby supporting its adoption as a mainstream strategy for sustainable development.

#### 4. Conclusions and Suggestions

This study concludes that agroforestry represents a comprehensive and integrative sustainable economic model that effectively combines agricultural and forestry systems to achieve ecological sustainability, economic resilience, and social welfare. The findings demonstrate that agroforestry enhances soil fertility, biodiversity, and climate regulation while simultaneously providing diversified income sources, strengthening food security, and improving rural livelihoods. Furthermore, its alignment with Sustainable Development Goals (SDGs) and its applicability within policy frameworks—particularly in developing countries such as Indonesia—underscore its strategic role in sustainable development. By integrating ecological functions with economic productivity and supported by institutional mechanisms, agroforestry is proven to be a viable and scalable model for addressing complex environmental and socio-economic challenges.

It is recommended that future research focus on empirical and field-based studies to validate and quantify the long-term impacts of agroforestry systems across different socio-ecological contexts. Policymakers should strengthen institutional support through inclusive policies, financial incentives, and capacity-building programs to encourage wider adoption among farmers. Additionally, the integration of technology, such as smart agroforestry and digital monitoring systems, should be further developed to enhance efficiency and sustainability. Strengthening market access and value chains for agroforestry products is also essential to maximize economic benefits and ensure the long-term viability of this model as a cornerstone of sustainable rural development.

#### Bibliografi

- , B., Sa'diyya, N., Setiajiati, F., & Trison, S. (2025). Bridging farmers' perceptions and preferences for economic sustainability: Developing an agroforestry prototype in private forests in Bogor Regency, Indonesia. *Research on World Agricultural Economy*. <https://doi.org/10.36956/rwae.v6i4.2534>
- , P. (2025). Exploring the evolution of agroforestry: Comparing traditional and modern practices for sustainable agriculture. *Advances in Agricultural Technology & Plant Sciences*. <https://doi.org/10.63235/aatps.180164>
- Aryal, K., Maraseni, T., & Apan, A. (2022). Transforming agroforestry in contested landscapes: A win-win solution to trade-offs in ecosystem services in Nepal. *Science of the Total Environment*, 159301. <https://doi.org/10.1016/j.scitotenv.2022.159301>
- Bahruni, B., Sa'diyya, N., Setiajiati, F., & Trison, S. (2025). Bridging farmers' perceptions and preferences for economic sustainability: Developing an agroforestry prototype in private forests in Bogor Regency, Indonesia. *Research on World Agricultural Economy*. <https://doi.org/10.36956/rwae.v6i4.2534>
- Brown, S., Miller, D., Ordóñez, P., & Baylis, K. (2018). Evidence for the impacts of agroforestry on agricultural productivity, ecosystem services, and human well-being in high-income

- countries: A systematic map protocol. *Environmental Evidence*, 7, 1–16. <https://doi.org/10.1186/s13750-018-0136-0>
- Cahyani, S. (2025). Pemetaan konseptual peran agroforestri dalam pertanian berkelanjutan dan ekonomi sirkular. *Journal of Economics Research and Policy Studies*. <https://doi.org/10.53088/jerps.v5i2.1897>
- Castle, S., Miller, D., Merten, N., Ordóñez, P., & Baylis, K. (2022). Evidence for the impacts of agroforestry on ecosystem services and human well-being in high-income countries: A systematic map. *Environmental Evidence*, 11. <https://doi.org/10.1186/s13750-022-00260-4>
- Castle, S., Miller, D., Ordóñez, P., Baylis, K., & Hughes, K. (2021). The impacts of agroforestry interventions on agricultural productivity, ecosystem services, and human well-being in low- and middle-income countries: A systematic review. *Campbell Systematic Reviews*, 17(2), e1167. <https://doi.org/10.1002/cl2.1167>
- Fahad, S., Chavan, S., Chichaghare, A., Uthappa, A., Kumar, M., Kakade, V., Pradhan, A., Jinger, D., Rawale, G., Yadav, D., Kumar, P., Farooq, T., Ali, B., Sawant, A., Saud, S., Chen, S., & Poczai, P. (2022). Agroforestry systems for soil health improvement and maintenance. *Sustainability*. <https://doi.org/10.3390/su142214877>
- Fatima, S., Abbas, S., Rebi, A., & Ying, Z. (2024). Sustainable forestry and environmental impacts: Assessing the economic, environmental, and social benefits of adopting sustainable agricultural practices. *Ecological Frontiers*. <https://doi.org/10.1016/j.ecofro.2024.05.009>
- Fikry, M., & Sarjan, M. (2024). Peran agroforestri dalam mendukung pengelolaan sumberdaya alam berkelanjutan. *LAMBDA: Jurnal Ilmiah Pendidikan MIPA dan Aplikasinya*. <https://doi.org/10.58218/lambda.v4i1.846>
- Johar, V. (2021). Socio-economic and environmental assets sustainability by agroforestry systems: A review. *International Journal of Agriculture Environment and Biotechnology*. <https://doi.org/10.30954/0974-1712.04.2021.6>
- Katariya, I., Pradhan, L., & Tripathi, N. (2025). Comparative economic analysis and environmental benefits of agroforestry systems: A case study from Saharanpur, India with global perspectives. *Indian Journal of Agricultural Research*. <https://doi.org/10.18805/ijare.a-6308>
- Octavia, D., Suharti, S., Dharmawan, I., Nugroho, H., Supriyanto, B., Rohadi, D., Njurumana, G., Yeny, I., Hani, A., Mindawati, N., Adalina, Y., Prameswari, D., Hadi, E., & Ekawati, S. (2022). Mainstreaming smart agroforestry for social forestry implementation to support sustainable development goals in Indonesia: A review. *Sustainability*. <https://doi.org/10.3390/su14159313>
- Prabawani, B., Hadi, S., Fisher, M., Warsono, H., Dewi, R., & Ainuddin, I. (2024). Socioeconomic perspective of agroforestry development in Central Java. *Environmental and Sustainability Indicators*. <https://doi.org/10.1016/j.indic.2024.100354>
- Raj, A., Jhariya, M., Yadav, D., Banerjee, A., & Meena, R. (2019). Agroforestry: A holistic approach for agricultural sustainability. In *Sustainable Agriculture, Forest and Environmental Management*. [https://doi.org/10.1007/978-981-13-6830-1\\_4](https://doi.org/10.1007/978-981-13-6830-1_4)
- Singh, S., & Singh, G. (2023). Agroforestry for sustainable development: Assessing frameworks to drive agricultural sector growth. *Environment, Development and Sustainability*. <https://doi.org/10.1007/s10668-023-03551-z>
- Sunariyo, S., & Firdausi, R. (2024). Community-based agro-silvopastoral systems: Integrating forestry, agriculture, and livestock for sustainable rural development in forest regions. *SERUNAI*. <https://doi.org/10.63019/serunai.v4i1.69>

- Tesema, H., Shiferaw, H., & Getachew, G. (2025). Agroforestry in Ethiopia: Review of its role in enhancing smallholder agriculture, environmental sustainability, and adoption challenges. *Journal of Landscape Ecology*, 18, 82–103. <https://doi.org/10.2478/jlecol-2025-0014>
- Van Noordwijk, M., Duguma, L., Dewi, S., Leimona, B., Catacutan, D., Lusiana, B., Öborn, I., Hairiah, K., & Minang, P. (2018). SDG synergy between agriculture and forestry in the food, energy, water and income nexus: Reinventing agroforestry. *Current Opinion in Environmental Sustainability*. <https://doi.org/10.1016/j.cosust.2018.09.003>
- VijayKumar, R., Tiwari, P., Daniel, S., Kumar, K., Mishra, I., Ks, A., & Shah, D. (2024). Agroforestry systems: A pathway to resilient and productive landscapes. *International Journal of Environment and Climate Change*. <https://doi.org/10.9734/ijecc/2024/v14i124617>