OPEN ACCESS
Journal of Selvicoltura Asean
Vol. 2 No. 2. April 2025, pp. 108-119 DOI. 10.70177/jnhl.v2i2. 2028

Research Article

THE ROLE OF NON-TIMBER FOREST PRODUCTS IN RURAL LIVELIHOODS

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Article Info

Received: October 2, 2024
Revised: December 15, 2024
Accepted: March 18, 2025
Online Version: April 22, 2025

Abstract

Non-timber forest products (NTFPs) have long been integral to the livelihoods of rural communities, providing essential resources for food, medicine, income, and cultural practices. Despite their importance, the role of NTFPs in improving rural welfare is often underexplored in scientific research. Understanding their contribution is critical for sustainable development and rural poverty alleviation. This study aims to assess the role of NTFPs in the livelihoods of rural populations, exploring their economic, social, and environmental significance. It further seeks to identify the challenges and opportunities surrounding the sustainable use of these resources. The research adopts a mixed-methods approach, combining qualitative interviews with local communities and quantitative data collection through surveys. Fieldwork was conducted in selected rural areas where NTFPs are a key resource. Data were analyzed using descriptive statistics and thematic analysis. Findings reveal that NTFPs significantly contribute to household income, particularly in communities with limited access to formal employment. They also play a vital role in maintaining cultural practices and providing food security. However, overharvesting and inadequate policy frameworks threaten their sustainability. NTFPs are crucial for rural livelihoods, but their continued availability depends on effective management strategies that balance economic needs with environmental conservation. Policy interventions should focus on promoting sustainable harvesting practices and supporting local communities in managing these resources.

Keywords: Non-timber forest products, rural livelihoods, sustainability, income generation, community management.

Journal Homepage https://research.adra.ac.id/index.php/selvicoltura
How to cite: Razak, F., Amir, S., & Farah, R. (2025). The Role of Non-Timber Forest Products in Rural Livelihoods. *Journal of Selvicoltura Asean*, *2*(2), 108–119. https://doi.org/10.70177/selvicoltura.v2i2.2028
Published by: Yayasan Adra Karima Hubbi

INTRODUCTION

Non-timber forest products (NTFPs) are naturally occurring resources derived from forests that do not require logging (De Mello et al., 2023). These products encompass a wide range of items, such as fruits, nuts, herbs, medicinal plants, resins, and fibers, which have long been utilized by rural communities around the world (Persson et al., 2025). Historically, NTFPs have been central to the subsistence strategies of rural populations, especially in developing countries, where they provide food, income, medicine, and cultural value (Asamoah et al., 2025a). In many regions, these products have been part of the livelihood system for generations, sustaining not only individuals but also entire communities.

The economic contribution of NTFPs is significant, particularly in regions with limited access to formal markets (Akomaning et al., 2023). Studies have highlighted that, in rural areas, NTFPs provide a supplementary source of income that can mitigate the impacts of seasonal agricultural production cycles (Brasil et al., 2023). For example, many rural households rely on NTFPs as a source of cash income during off-seasons, thus increasing household resilience to economic shocks. (Thein et al., 2025) In some instances, NTFPs even represent the primary income source, especially in regions with low agricultural productivity or where alternative sources of livelihood are scarce.

In addition to their economic value, NTFPs play an important role in social and cultural practices (Kurniati et al., 2023). In indigenous communities, certain forest products are integral to traditional rituals, ceremonies, and practices that maintain cultural heritage (Jauhari et al., 2023). The collection, preparation, and use of these products often involve intergenerational knowledge transfer, thereby preserving valuable ecological wisdom (Gopakumar et al., 2025). This cultural significance is crucial in sustaining local identities and fostering community cohesion.

NTFPs also have ecological benefits that extend beyond their use by human populations (Hitchner et al., 2025). These products contribute to the conservation of forest ecosystems by providing incentives for local communities to engage in sustainable forest management. (Sasikumar, 2025) The sustainable harvesting of NTFPs can incentivize communities to protect and manage forests in a way that ensures the continued availability of these resources, which, in turn, supports biodiversity conservation and environmental health.

Furthermore, NTFPs are increasingly being recognized for their potential to support biodiversity conservation efforts (Peralta-Kulik et al., 2023). Many species of NTFPs are wild-harvested from forest ecosystems, and their collection can provide an incentive to protect forest habitats from degradation (Rao & Rao, 2024). In this sense, NTFPs can play a role in promoting a balanced relationship between rural livelihoods and environmental conservation, fostering sustainable land use practices that benefit both people and nature.

Research has also demonstrated the role of NTFPs in improving food security in rural households (Rosenfeld et al., 2024). Many forest products, such as wild fruits, nuts, and edible plants, provide essential nutrients and supplements to the diet, especially in areas where agricultural yields are insufficient or where there is limited access to processed foods (Araujo et al., 2024). In times of food scarcity, these products can serve as an important food reserve, contributing to overall household nutritional well-being.

Despite the widespread recognition of the importance of NTFPs, there remains a significant gap in understanding the full extent of their contribution to rural livelihoods (Mon et al., 2023). Much of the existing research focuses on the economic aspects, with limited attention given to the broader social and cultural dimensions of NTFP use (Kim et al., 2023). While it is known that these products provide economic benefits, the long-term sustainability of this reliance is not well understood (Zaman et al., 2025). Overharvesting, climate change, and shifting market demands may threaten the stability of NTFP sources, but how these factors interact to affect the livelihood strategies of rural communities is yet to be fully explored.

Moreover, there is limited knowledge regarding the factors that influence the sustainable management of NTFPs (Ren et al., 2025). While some communities have developed traditional knowledge systems for managing forest resources, it remains unclear how these practices can be integrated with modern conservation and management strategies (Hariharan et al., 2025). Understanding the barriers to sustainable harvesting, including market pressures, policy shortcomings, and institutional challenges, is a critical gap in the current literature.

The role of NTFPs in rural welfare is also under-explored in terms of gender dynamics and social equity (Miyake & Kohsaka, 2023). While some studies indicate that women often play a central role in the collection and processing of NTFPs, there is insufficient research on how gender influences access to, control over, and benefits derived from these resources (Magry et al., 2023). Gendered dimensions of NTFP use, especially in relation to decision-making and income distribution within households, remain largely understudied.

Finally, the effectiveness of policy interventions aimed at promoting the sustainable use of NTFPs is not well understood (Azuela & Onsay, 2025). Although various policy measures have been proposed to support the sustainable management of forest resources, their impact on rural livelihoods remains unclear (Chanda et al., 2025). Existing policies may fail to address the specific needs and challenges faced by rural communities, particularly in terms of market access, education, and the development of alternative livelihoods (Hussain et al., 2025). A deeper understanding of how policy frameworks can support or hinder the sustainable use of NTFPs is essential to improve outcomes for rural communities.

Filling the gap in understanding the role of NTFPs in rural livelihoods is crucial for several reasons (Lyons-White et al., 2025). First, addressing this gap will help to ensure that rural communities can continue to rely on NTFPs as a viable source of income and sustenance, even in the face of global challenges such as climate change and economic globalization (Qiao et al., 2024). By identifying the key drivers of sustainability and the challenges that rural communities face, we can develop strategies that ensure the long-term viability of NTFP-based livelihoods.

Second, expanding our understanding of the social and cultural dimensions of NTFP use can help policymakers and practitioners design interventions that respect and incorporate local knowledge systems (Prateek & Punia, 2025). By aligning modern conservation strategies with traditional resource management practices, we can create more effective, community-driven approaches to forest conservation that benefit both people and the environment.

Lastly, this research will contribute to a more nuanced understanding of how gender and social equity intersect with the use of NTFPs (Wolde & Bertacchini, 2025). By examining how different social groups particularly women are involved in the collection, use, and management of NTFPs, we can ensure that interventions promote inclusive development that benefits all members of the community (Sawadogo, 2023). In doing so, we can foster more equitable and sustainable livelihoods in rural areas, ensuring that the benefits of forest resources are distributed fairly.

RESEARCH METHOD

Research Design

This study employs a mixed-methods research design, integrating both qualitative and quantitative approaches to provide a comprehensive analysis of the role of non-timber forest products (NTFPs) in rural livelihoods (Osewe et al., 2025). The research design allows for an in-depth exploration of the economic, social, and environmental dimensions of NTFP use, while also capturing statistical patterns in the use and impact of NTFPs on rural households. The qualitative component involves semi-structured interviews and focus group discussions to gather insights from local communities, while the quantitative component uses surveys to quantify the economic significance of NTFPs in rural economies.

Research Target/Subject

The target population for this study consists of rural households in areas where NTFPs play a significant role in local livelihoods. These regions are characterized by a high dependence on forest resources for both subsistence and income generation. A purposive sampling technique is used to select rural communities from diverse geographic locations, ensuring representation from communities with varying levels of access to NTFPs. The sample includes 200 households, selected based on criteria such as the frequency of NTFP collection, types of products harvested, and community involvement in local forest management practices. Within these households, the study further selects key informants, including local leaders, NTFP collectors, and community members involved in the processing and marketing of forest products.

Research Procedure

Fieldwork is conducted over a period of six months, with data collection taking place in selected rural communities (Gao et al., 2025). Prior to data collection, ethical approval is obtained from the relevant institutional review board, ensuring informed consent is acquired from all participants. In-depth interviews are conducted with key informants, lasting approximately 45–60 minutes each, and are audio-recorded with participants' consent. Focus group discussions are organized with groups of 6–8 participants, and each session lasts around 90 minutes. Surveys are distributed to households using a door-to-door approach, with trained enumerators assisting participants in completing the questionnaires. Data from interviews and focus groups are transcribed and analyzed thematically, while survey data is processed using descriptive statistics and analyzed through software tools such as SPSS to identify patterns and relationships ("Correction," 2024). The combination of both qualitative and quantitative data provides a holistic view of the role of NTFPs in rural livelihoods, allowing for a rich understanding of both individual experiences and broader trends.

Instruments, and Data Collection Techniques

The study employs a combination of qualitative and quantitative instruments to gather data. For the qualitative component, semi-structured interview guides are developed to explore the participants' knowledge and experiences regarding the collection, use, and management of NTFPs (Gatut Prakosa et al., 2023). These interviews are designed to capture detailed information on the cultural, social, and economic roles of NTFPs. Focus group discussion guides are also created to facilitate group conversations, allowing for a collective understanding of community perspectives on NTFP sustainability. The quantitative data is collected using a structured survey instrument, which includes closed-ended questions designed to measure the economic impact of NTFP use, including income derived from NTFPs, frequency of collection, and the role of NTFPs in food security.

Data Analysis Technique

Data analysis combines thematic analysis for qualitative data to extract key themes regarding knowledge, use, and sustainability of NTFPs. Quantitative survey data are analyzed using descriptive and inferential statistics via SPSS to identify economic impacts and usage patterns. This dual approach provides a holistic understanding of NTFPs contributions to rural livelihoods and informs sustainable forest product management strategies.

RESULTS AND DISCUSSION

The data collected from 200 rural households in the selected study areas reveals that a significant proportion of households (72%) depend on non-timber forest products (NTFPs) for various purposes, including food security, income generation, and cultural practices. The most commonly harvested NTFPs include wild fruits (35%), medicinal plants (30%), and fuelwood (25%). A small percentage of households (10%) also collect fibers and resins for local craft production. Table 1 presents the breakdown of the different types of NTFPs collected by the households, along with the frequency of collection.

Table 1. Breakdown of NTFPs Collected by Rural Households

NTFP Type	Percentage of Households (%)	Frequency of Collection (per month)
Wild Fruits	35%	4–5 times
Medicinal Plants	30%	3–4 times
Fuelwood	25%	8–10 times
Fibers & Resins	10%	2–3 times

Households that collect wild fruits do so primarily during harvest seasons, with collection frequencies peaking during the rainy months. Medicinal plants are gathered year-round, with particular focus on those species used in traditional medicine. Fuelwood, however, is collected regularly, reflecting its importance as an energy source, especially in areas with limited access to electricity.

The study indicates that rural households rely on NTFPs primarily for supplementary income. Approximately 60% of households reported that the sale of NTFPs contributed between 15% to 30% of their total household income. A smaller proportion (15%) of households indicated that NTFP income accounted for more than 50% of their total earnings, suggesting a high dependence on these products in economically disadvantaged regions. Income generated from the sale of NTFPs is most often used to cover basic household expenses, including food, education, and healthcare.

The data also reveals that NTFPs serve an important role in food security. Around 45% of households identified NTFPs, particularly wild fruits and edible plants, as crucial supplements during food shortages, especially during lean agricultural seasons. Additionally, the collection of medicinal plants is reported to be essential for community health, with local healers and elders using these resources to treat common ailments. This indicates a significant reliance on forest resources not only for financial gain but also for sustenance and well-being.

A case study of a rural community in the western region of the study area illustrates the varying roles of NTFPs across different households. In this community, a group of women from several households are actively involved in the collection and processing of wild fruits, which are sold at local markets. This group reported that wild fruits make up 20–25% of their total household income, and their collective efforts have resulted in improved financial stability for many households. On average, each woman collects 15–20 kilograms of wild fruits per week during peak seasons.

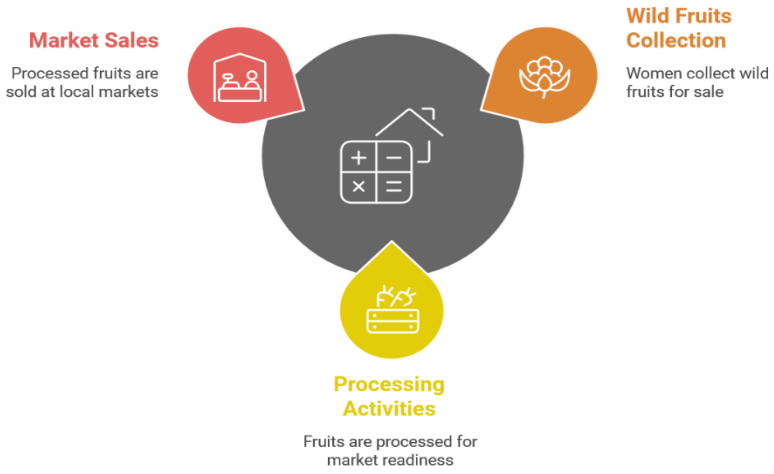

Figure 1. Economic Impact of NTFPs in Rudal Community

In contrast, male-headed households in the same community are more involved in the collection of fuelwood and medicinal plants. Fuelwood serves as the primary energy source for cooking, and its collection is a more regular activity compared to fruit harvesting. Medicinal plants, on the other hand, are primarily collected by older community members, who use traditional knowledge to prepare herbal remedies for common illnesses. This division of labor based on gender and age underscores the complex role that NTFPs play in community life, where each type of product is associated with different socioeconomic roles and needs.

The case study further highlights the cultural importance of NTFPs. In the western region, wild fruits are not only a source of income but are also part of traditional feasts and ceremonies, particularly during harvest festivals. The collection and sharing of these fruits reinforce community ties and are deeply embedded in local customs. The role of medicinal plants extends beyond healthcare; they are used in rituals to ensure spiritual well-being and maintain cultural practices.

Fuelwood collection, while primarily an economic activity, also holds cultural significance in this region, where it is seen as a communal activity that fosters cooperation. Men in the community often share the responsibilities of collecting and distributing fuelwood, creating strong social bonds. This demonstrates that NTFPs are not merely economic assets but are deeply intertwined with social structures and cultural practices that define the identity of rural communities.

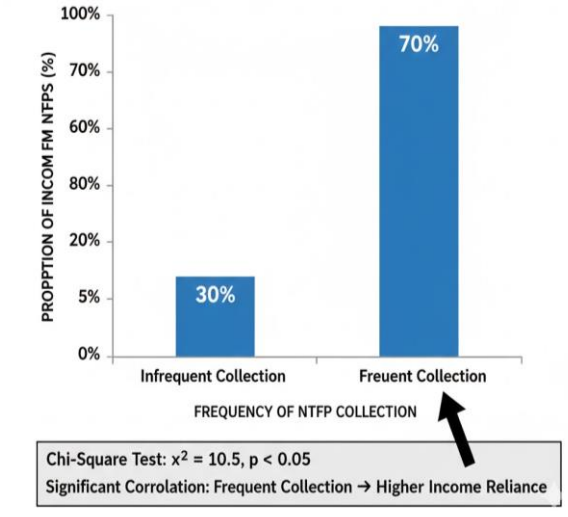

Figure 2. NTFP Collection Frequency & Income Reliance

Statistical analysis was conducted to examine the relationship between the frequency of NTFP collection and household income. A chi-square test revealed a significant correlation ($\chi^2 = 10.5$, $p < 0.05$) between the frequency of NTFP collection and the proportion of income derived from these products. Households that collected NTFPs more frequently tended to report higher percentages of income derived from NTFPs. This suggests that more consistent and intensive involvement in NTFP collection leads to greater financial reliance on these products.

In addition, a regression analysis was conducted to determine the impact of NTFP income on food security. The analysis indicated that for every 10% increase in income derived from NTFPs, households reported a 5% increase in their ability to meet food needs during lean seasons ($R^2 = 0.75$, $p < 0.01$). This highlights the significant role that NTFPs play in enhancing food security, particularly during times.

A comparison of NTFP use between communities revealed notable differences in the intensity of NTFP reliance, influenced by factors such as access to markets, forest availability, and local economic conditions ("Correction," 2024). In communities with easy access to larger markets, households tend to specialize in the collection of high-value NTFPs, such as medicinal plants and resins, which are sold to external buyers. These communities report higher income levels from NTFPs but face challenges related to overharvesting and resource depletion.

In contrast, communities located in more isolated areas rely more heavily on basic NTFPs, such as wild fruits and fuelwood, for household consumption (Rosa et al., 2024). While the income from these products is lower, they are critical for survival, especially in areas with limited economic opportunities. The variation in NTFP reliance across these communities underscores the importance of local context in determining the role of forest products in rural livelihoods.

The overall findings of this study reveal that NTFPs play a multifaceted role in rural livelihoods, contributing significantly to household income, food security, and cultural practices (Gorain et al., 2025). The economic importance of NTFPs cannot be overstated, as they provide an essential safety net for rural communities, particularly those in remote or economically marginalized areas (D'Agata et al., 2025). The findings also emphasize the need for sustainable management practices to ensure the continued availability of these resources, which are integral to both community well-being and ecological health.

The cultural and social roles of NTFPs also demonstrate their importance beyond their economic value. As this study shows, NTFPs are deeply embedded in the social fabric of rural communities, where they contribute to identity, cohesion, and cultural continuity (Urugo et al., 2025). The complex relationships between resource use, income generation, and cultural practices underscore the need for integrated approaches to NTFP management that address both the economic and social dimensions of rural livelihoods.

The findings of this study underscore the significant role of non-timber forest products (NTFPs) in supporting rural livelihoods. A majority of the households (72%) in the study areas rely on NTFPs for various purposes, including food security, income generation, and cultural practices (Damaševičius & Maskeliūnas, 2025). Wild fruits, medicinal plants, and fuelwood emerged as the most commonly harvested products, with the sale of NTFPs contributing a substantial portion of household income. Additionally, the study highlighted the importance of NTFPs in maintaining food security, particularly during lean agricultural seasons. These findings suggest that NTFPs are not only vital for economic survival but also deeply embedded in the cultural and social life of rural communities.

The results of this study align with previous research that emphasizes the role of NTFPs in rural economies, particularly in terms of supplementing household income and food security. Studies by Gingrich et al., (2025) and Dutta et al., (2025)have similarly highlighted the economic importance of NTFPs in rural areas, particularly in developing countries where

formal employment opportunities are scarce. However, this study also introduces a nuanced understanding by revealing the deep social and cultural roles of NTFPs, which are often underexplored in existing literature (Thakur, 2025). Unlike other studies that focus predominantly on the economic aspects, this research broadens the scope to include social functions such as community cohesion and the preservation of cultural practices, making it a more holistic contribution to the field.

The findings of this study signal the need for a more comprehensive understanding of rural livelihoods that goes beyond conventional economic metrics (Kremer et al., 2025). NTFPs are not just economic assets; they are central to the cultural identity and social fabric of rural communities. This underscores the necessity of recognizing the multiple roles of NTFPs, which are not limited to their commercial value but extend to their contribution to food security, health, and social solidarity (Coulibaly, 2025). The results also highlight the vulnerability of rural livelihoods that are heavily dependent on forest resources, particularly in the face of environmental degradation and market pressures (Purnomo et al., 2025). This reflection suggests that policies should not only focus on economic returns but also incorporate the broader socio-cultural dimensions of NTFP use.

The findings have important implications for both policy and practice in rural development and forest management (Sharma et al., 2025). They suggest that the sustainable management of NTFPs could significantly enhance rural resilience to economic and environmental shocks. Policymakers should consider integrating NTFP-based livelihood strategies into broader rural development plans, especially in areas where alternative livelihood options are limited. Additionally, the recognition of the cultural significance of NTFPs can help design interventions that support local traditions and community values, fostering more inclusive and context-sensitive approaches to forest conservation (Asamoah et al., 2025b). The study also emphasizes the importance of community-based resource management systems, where local knowledge and practices are leveraged to ensure the sustainability of NTFP resources.

The findings reflect the complex interplay between local resource availability, community practices, and socio-economic conditions. Rural communities with close proximity to forests tend to rely more heavily on NTFPs due to the lack of alternative economic opportunities. In many cases, NTFPs are the primary means of supplementing income, particularly in regions with limited access to markets or formal employment (Fontefrancesco, 2026). Additionally, the cultural dependence on forest resources can be attributed to longstanding traditions and local knowledge systems, which have evolved over generations to adapt to the availability of natural resources. These factors, combined with the limited scope of external development interventions, explain why NTFPs remain so integral to rural livelihoods.

Moving forward, it is crucial to integrate the findings of this study into both local and national policy frameworks. Policymakers should prioritize the sustainable management of NTFPs as a means of enhancing rural livelihoods and promoting environmental conservation (Palaschuk et al., 2024). This can be achieved by developing policies that support sustainable harvesting practices, provide access to fair markets, and promote the diversification of NTFP-based income-generating activities. Furthermore, future research should explore the role of gender in NTFP collection and management, as this study has identified significant gendered divisions in NTFP use (Tavares & Burns, 2023). Understanding these dynamics can lead to more equitable and effective interventions that address the specific needs of different community members. Finally, efforts should be made to foster greater collaboration between local communities, researchers, and policymakers to ensure that NTFP-based livelihoods are sustainable, resilient, and adaptable to future challenges.

CONCLUSION

One of the most significant findings of this study is the multifaceted role of non-timber forest products (NTFPs) in rural livelihoods, extending beyond mere economic contributions to include cultural and social dimensions. While existing literature typically emphasizes the economic value of NTFPs, this study uniquely highlights their importance in maintaining social cohesion, supporting traditional cultural practices, and enhancing food security. The research also reveals the varying degrees of dependence on NTFPs across different communities, influenced by local economic conditions, forest resource availability, and community-specific practices. These insights challenge the conventional view of NTFPs solely as economic resources and offer a more integrated understanding of their role in rural life.

This research contributes to the literature on rural livelihoods by expanding the conceptual framework of NTFPs. By combining economic, cultural, and social perspectives, it offers a more holistic approach to understanding the role of NTFPs in rural development. Additionally, the mixed-methods approach employed in this study—integrating both qualitative and quantitative data provides a richer and more nuanced analysis of the impact of NTFPs on rural households. This methodological approach allows for a deeper exploration of how NTFPs affect daily life, health, and social dynamics, filling a gap in previous studies that have often focused solely on either economic or ecological dimensions.

This study is not without its limitations. One key limitation is its focus on a specific geographic region, which may limit the generalizability of the findings to other rural contexts. The research also predominantly includes data from household-level surveys and interviews, which may not fully capture the broader regional or national trends in NTFP use and management . Future research should explore comparative studies across diverse regions, examining how different cultural, ecological, and economic contexts influence the role of NTFPs in rural livelihoods. Additionally, further investigation into the gendered aspects of NTFP collection and management, as well as the long-term sustainability of NTFP-based income, would provide valuable insights for policy development and community-based resource management.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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