International Journal of Business and Quality Research

https://e-journal.citakonsultindo.or.id/index.php/IJBQR
E-ISSN: 2985-9468

Economic Valuation of Social Forestry Areas in Soppeng Regency, South Sulawesi Province, Indonesia

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Abstract

This study aims to analyze the types of forest products and the economic valuation value of forests in social forestry in Mattabulu Village, Soppeng Regency, South Sulawesi Province, Indonesia. The sampling technique used was purposive sampling, namely selecting farmers who are members of the Social Forestry Business Group (KUPS), so that 85 respondents were obtained from 5 KUPS. The types of data are primary and secondary data. The data analysis technique uses quantitative and qualitative descriptive. The results of this study indicate that the types of forest products in social forestry in Mattabulu Village include non-timber forest products consisting of: coffee, sugar palm, candlenut, ginger, and honey commodities. The annual economic valuation value of non-timber forest products in Mattabulu Village includes: coffee of IDR 385,335,000.00, sugar palm of IDR 945,830,000.00, candlenut of IDR 109,853,000.00, ginger of IDR 425,390,000.00, and honey of IDR 41,713,000.00. The annual economic valuation value of forest environmental services management and utilization includes: biodiversity reaching IDR 7,634,692,000.00, water utilization of IDR 30,311,000.00 and carbon absorption of IDR 10,944,067,680.00. The total economic value of non-timber forest products and forest environmental services in Mattabulu Village can reach IDR 20,517,168,680.00 per year.

Key words: **economic valuation, forest products, environmental services, social forestry.**

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INTRODUCTION

Social forestry plays a very important role in forest resource management and community empowerment in Indonesia. This concept is implemented through various schemes that allow local communities to have legal access to forests and utilize them sustainably. Since the government's priority in Social Forestry was launched, more than 12.7 million hectares of forest area have been allocated for this scheme, which includes Village Forests, Community Forests, and Community Plantation Forests (Ramadhan et al., 2022; Rahayu et al., 2024).

One of the main contributions of social forestry is improving the welfare of communities around the forest. By giving permission to communities to manage forests, they not only gain access to natural resources but also play a role in maintaining the sustainability of the forest itself (Nakayama et al., 2024; Makkarennu et al., 2024). Research results show that involving communities in forest management has a positive impact on income and poverty reduction (Nakayama et al., 2024; Ali et al., 2021). Village Forest and Community Forest Schemes allow communities to utilize non-timber forest products, which can significantly increase their income (Hardjanto et al., 2024).

Social forestry has a positive impact on environmental conservation efforts. Through social forestry, the rate of deforestation in several areas, such as Kalimantan and Sumatra, has decreased significantly (Umarhadi et al., 2023). Forest management managed by communities has been shown to be more capable of maintaining biodiversity and preventing forest destruction, compared to centralized management under the government (Rahayu et al., 2024; Umarhadi et al., 2023). This initiative is very important in facing the challenges of climate change in Indonesia, because forests act as effective carbon sinks (Utomo et al., 2023).

Social forestry in Indonesia is a very important initiative in creating a balance between economic development, environmental protection, and community empowerment. Through a collaborative and participatory management structure, it is hoped that social forestry can be a solution to overcome the forest crisis currently facing Indonesia, and lead to a more sustainable and inclusive direction (Pareira et al., 2020; Nugroho et al., 2023).

The long-term success of social forestry can help stimulate local economic growth through the development of forest-based businesses such as ecotourism and non-timber forest products (Rijal et al., 2024). The government needs to create an environment that supports market access and access to relevant information for local communities so that they can be more empowered in forest management (Kusuma et al., 2023; Heripan et al., 2019). Social forestry is a vital component of sustainable forest management in Indonesia, which provides not only environmental but also economic and social benefits for the

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communities involved (Hardjanto et al., 2024; Sabar et al., 2025; Sanudin et al., 2024; Swardhana & Jenvitchuwong, 2023).

Economic valuation in social forestry management is important in the context of marketing, education, and community empowerment, because it functions not only to maintain forest sustainability but also to improve the economic welfare of local communities. Through the social forestry program, the government seeks to provide access for communities to manage and utilize forests in a sustainable and profitable manner (Nurrochmat, 2020). In social forestry, social, economic, and ecological aspects must be considered holistically so that forest sustainability goals are achieved effectively.

One of the forest areas that has legal access to utilize the forest through the social forestry scheme is the Matabulu Village Forest. This is based on the Decree of the Minister of Environment and Forestry Number: SK.6679/MENLHK-PSKL/PKPS/PSL.0/12/2018 Concerning Village Forests dated May 7, 2018, with an area of management access of ± 1,066 Ha located in the Protected Forest area. Through legal access in the form of social forestry approval, the community can realize economic empowerment and development by utilizing the area with the management of potential in the management agreement area. The management and utilization of potential include turmeric, ginger, coffee, honey bees, candlenuts, aren and nature tourism (ecotourism). This study aims to analyze the types of forest products and the economic valuation value of forests in social forestry in Mattabulu Village, Soppeng Regency, South Sulawesi Province.

LITERATURE ANALYSIS AND METHODOLOGY

Literature Analysis

Social forestry is one of the government's efforts to resolve social and economic inequality in communities around forests. This program offers a more inclusive forest management model by providing legal rights for communities to utilize forest resources sustainably. A study in East Kalimantan Province showed that the implementation of the social forestry program has significantly improved the economy of communities around the forest (Utari et al., 2025).

One of the primary benefits of economic valuation is its ability to inform stakeholders about the critical ecosystem services provided by forests. For instance, forests act as natural barriers against landslides and floods, enhancing community safety and contributing to overall quality of life (Rexhepi et al., 2024). These ecosystem services can be monetarily assessed, allowing for a clearer understanding of their value in economic terms. Rahmadwiati et al. (2022) demonstrated that the economic valuation of carbon storage from forests in Indonesia exemplifies how specific ecological functions translate into financial

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metrics, thereby highlighting the importance of forests in climate regulation. Additionally, research on the socio-economic values of forests in Pakistan indicates that well-managed forest ecosystems significantly contribute to local economies through their various services (Zeeshan et al., 2023).

Moreover, integrating both monetary and non-monetary valuation approaches has gained attention in recent studies aimed at sustainability. For instance, Chivulescu et al. (2024) found that integrating various valuation methods allows for a more comprehensive understanding of the social and cultural values of forest ecosystems, which traditional economic evaluations often overlook. The variability in both types of assessments suggests that a holistic approach to valuing ecosystem services might better support conservation efforts while aligning with local cultural perceptions and practices (Safuridar et al., 2022).

Approaches to the economic valuation of forests can be broadly categorized into market-based and non-market valuation methods. Market-based methods, such as contingent valuation, assess the willingness to pay for specific ecosystem services, as evidenced in studies focused on mangrove ecosystems where local communities expressed their willingness to pay for conservation efforts based on perceived benefits (Sondak et al., 2019; Acero & Resullar, 2023). Conversely, non-market valuation methods capture intrinsic and aesthetic values that forests provide, such as recreational opportunities and contributions to mental well-being (Belana, 2021; Agustriani et al., 2023). For instance, the recreational value of forests, assessed through travel cost models, has revealed how forest visits can translate into significant economic contributions, thereby justifying investments in forest conservation (Sulistiyono et al., 2023; Müller et al., 2019).

METHODOLOGY

This research was conducted in Mattabulu Village, Lalabata District, Soppeng Regency, South Sulawesi Province. The sampling technique used in this study was purposive sampling, namely selecting farmers who are members of the Social Forestry Business Group (KUPS) consisting of: Coffee KUPS, Honey KUPS, Candlenut KUPS, Ginger KUPS, and Sugar Palm KUPS, each of which was taken by 17 farmers, so that the total sample was 85 farmers.

Types of data include quantitative and qualitative data, which are sourced from primary data and secondary data. Primary data is data obtained directly from respondents through interviews using questionnaires and direct observations in the field. Secondary data is data that supports primary data, which is obtained from references that are relevant to this study.

Data analysis using quantitative descriptive analysis. The economic value of the forest is the economic value of forest management and utilization including the economic

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benefit value of non-timber forest products and the economic benefit value of environmental services (the benefit value of water for households, the benefit value as a biodiversity maintainer, and the benefit value as carbon absorption).

1. Estimation of the economic value of non-timber forest products

   $NHHBK = N_{ko} + N_j + N_{ke} + N_a + N_m$

   Description: NHHBK = non-timber forest product value, N_{ko}= coffee value, N_j= ginger value, N_{ke}= candlenut value, N_a= palm sugar value, dan N_m= forest honey value

   The calculation of the value of coffee, ginger, candlenut, palm sugar and forest honey is estimated through a direct approach based on market prices with the following formula:

   $P = \sum_i^n \{Pi.Qi - Ci\}$

   Description: P = net income, Pi = price of product I, Qi = quantity of product I, Ci = production cost of product i. Production cost is the cost incurred to produce a product which includes transportation cost, equipment purchase, and supply cost.
2. The economic value of environmental services
   a. The value of water benefits for households

      NMA = (Vx H) - BKA

      Description: NMArt = water benefits value (Rp/tahun), V = water volume (m^3), H = water price (Rp/m^3), BKA = water consumption costs (Rp/m^3).
   b. The value of utilizing biodiversity

      NPkh = BR (Rp/ha) x L (ha)

      Description: NPkh = value of biodiversity utilization, BR = forest rehabilitation costs (Rp/ha), L = area of village forest (ha).
   c. The value of carbon absorption benefits

      Nsk = L x Isk x HCO_2

      Description: Nsk = carbon absorption value, H**CO_2** = carbon price (Rp), Isk = carbon absorption index (174,6/ton/ha/tahun), L = village forest area (ha)
3. Total economic value of forest management and utilization

   NET = NHHBK + NJL

   Description: NET = total economic value of village forest management and utilization, HHBK = economic benefit value of non-timber forest products, NJL = environmental service value.

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RESEARCH AND RESULTS

Analysis of the Economic Value of Non-Timber Forest Products

The social forestry area in Mattabulu Village, Lalabata District, Soppeng Regency, South Sulawesi Province has been legally running for seven years. The economic benefit value of non-timber forest products is calculated based on the direct benefit value of coffee, ginger, candlenut, sugar palm, and honey commodities. Coffee, ginger, candlenut, and sugar palm plants are annual plants with high economic value, which are cultivated by farmers in the social forestry area. Meanwhile, honey is a product obtained from bees that naturally nest and breed in forest plants.

Non-timber forest products (NTFPs) such as fruits, vegetables, spices, and other forest products have a significant contribution to household livelihoods in rural areas. In Indonesia, NTFPs are an important source of income, especially for people living around forests. Research by Njurumana et al. (2020) shows that NTFPs can contribute to community resilience through sustainable forest management. Research by Bayesa and Abdeta (2022) proves that NTFPs are not only a source of income but also help the sustainability of forest resources by providing alternative livelihoods for local communities.

Table 1. Economic Benefit Value of Non-Timber Forest Products in Mattabulu Village

Non-Timber Forest Products	Revenue Value (IDR/year)	Production Cost (IDR/year)	Economic Value (IDR/year)
Coffee	406,750,000	21,415,000	385,335,000
Ginger	441,600,000	16,210,000	425,390,000
Candlenut	119,033,000	11,562,520	109,853,000
Aren	1,594,320,000	648,490,000	945,830,000
Honey	47,430,000	5,717,000	41,713,000
Total	2,609,133,000	703,394,520	1,908,121,000

Source: Primary data analysis, 2025.

The highest value of economic benefits of non-timber forest products in Mattabulu Village is the aren commodity which reaches IDR 945,830,000.00 per year, while the lowest value is the forest honey commodity which is only IDR 41,713,000.00 per year. The total value of economic benefits of non-timber forest products in Mattabulu Village is able to reach IDR 1,908,121,000.00 per year (Table 1). If the economic benefits of non-timber forest products are analyzed per household, the average value obtained is IDR 22,448,482.35 per year per household or equivalent to IDR 1,870,706.86 per month per household. The value

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of these economic benefits is very profitable, considering that each farmer household has a relatively large diversification of income, both on farm, off farm, and non farm.

In line with the research results of Hidayat and Sidik (2019) conducted in 6 (six) indigenous communities located in forest areas, namely the Karang-Lebak, Kajang-Bulukumba, Kallupini-Enrekang, Seberuang-Sintang, Saureinu-Mentawai, and Moi Kelim-Sorong Communities, which show that land productivity (commodities) is actually very high, namely 23 million/ha/year, so that it is able to compete with corporate plantation commodities. Almost all of the six indigenous community areas show relatively large economic value, including when compared to commonly used economic indicators.

Economic Value of Environmental Services

In addition to non-timber forest products, the environmental services provided by forests are also very valuable in an economic context. These services include carbon storage, water regulation, and protection of soil from erosion. Research by Palmer et al. (2020) shows that community participation in forest management through community-based policies not only increases awareness of the importance of forests but also engages communities to conserve environmental services. Sustainably managed forests can provide long-term benefits, such as improving soil and water quality, which in turn supports agricultural productivity and food security in rural areas. Sulistiyowati et al. (2023). The economic benefits of environmental services in the Mattabulu Village Social Forestry Area include domestic water, biodiversity, and carbon sequestration, which can be seen in more detail in Table 2.

Table 2. Economic Benefit Value of Environmental Services in Mattabulu Village

Environmental Services	Revenue Value (IDR/year)	Production Cost / Land Area (IDR/year)	Economic Value (IDR/year)
Household water	45,855,000	15,190,000	30,288,000
Biodiversity	7,162,000	1,066	7,634,692,000
Carbon Absorption	10,266,480	1,066	10,944,067,680
Total	63,283,480	-	18,609,047,680

Source: Primary data analysis, 2025.

The economic benefit value of environmental services in the Mattabulu Village Social Forestry Area which has the highest value is carbon absorption which is worth Rp10,944,067,680.00 per year. However, the economic benefits of biodiversity and carbon

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absorption for farmer households are still considered not to provide direct benefits for improving the household economy. For communities around the forest area in general, they only consider the value of direct economic benefits such as the benefits of water to meet household needs. Whereas intangible environmental services are very important needs for the sustainability of human life.

Ecosystem services also have economic value that is often difficult to quantify, but studies show that this value can be comparable to or even exceed the value of direct timber products. Research by Thapa and Singh (2023) revealed that protecting and maintaining forest ecosystems provides significant economic benefits, which are often overlooked in traditional economic analyses. This suggests the need for a more holistic approach to evaluating the economic value of forests, taking into account both the visible forest products and the ecosystem services they provide.

Total Economic Value of Forest Management and Utilization

Integration of non-timber forest products and environmental services in social forestry policies can facilitate sustainable management of forest resources and improve their economic outcomes. Research shows that when forest products and environmental services are considered simultaneously, positive impacts on household incomes are more pronounced (Chu et al., 2019). Agroforestry initiatives that combine agriculture with forest management can improve food security and farmer incomes while also ensuring forest conservation (Sulistiyowati et al., 2023).

Table 3. Total Economic Value of Management and Utilization of Mattabulu Village Forest

No	Description	Economic Value (IDR/year)
1	Non-timber forest products	1,908,121,000
2	Environmental services	18,609,047,680
Total Economic Value		20,517,168,680

Source: Primary data analysis, 2025.

The total economic value of forest management and utilization in the Mattabulu Village Social Forestry Area includes non-timber forest products worth IDR 1,908,121,000.00 per year, and environmental services worth IDR 18,609,047,680.00 per year. The economic value of environmental services is much higher than the value of non-timber forest products. This indicates that the economic value of environmental services that will continue to

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support forest sustainability is basically very important and has high value. The total economic value of forest management and utilization in Mattabulu Village can reach IDR 20,517,168,680.00 per year or IDR 241,378,455.06 per year per household, or equivalent to IDR 20,114,871.25 per month per household.

Overall, the economic valuation of forests, both non-timber forest products and environmental services, forms an important foundation for social forestry policies in Indonesia. Efforts to integrate these two aspects in forest management can provide not only significant economic benefits to local communities, but also maintain ecosystem functions that are vital for future sustainability. By raising awareness of the importance of sustainable policies and practices, we can ensure that forests in Indonesia are not only a source of short-term income but also an environmental legacy that will last for generations to come.

CONCLUSION AND RECOMMENDATIONS

Types of forest products in social forestry management in Mattabulu Village, Soppeng Regency, South Sulawesi Province include non-timber forest products consisting of: coffee, sugar palm, candlenut, ginger, and honey. The annual economic valuation value of non-timber forest products in Mattabulu Village includes: coffee commodities of IDR 385,335,000.00, sugar palm of IDR 945,830,000.00, candlenut of IDR 109,853,000.00, ginger of IDR 425,390,000.00, and honey worth IDR 41,713,000.00. The annual economic valuation value of forest environmental services management and utilization, including: biodiversity reaches IDR 7,634,692,000.00, water utilization worth IDR 30,311,000.00 and carbon absorption worth IDR 10,944,067,680.00. The total economic value of non-timber forest products and forest environmental services in Mattabulu Village can reach IDR 20,517,168,680.00 per year.

Community forest economic valuation is essential to emphasize the importance of forest ecosystems, not only as a source of timber and other goods, but also as an integral component of regional and global ecosystems. A well-structured forest economic valuation framework can make a significant contribution to informed decision-making processes, encourage sustainable practices, and maintain ecological integrity for future generations.

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