

Evaluating the Performance of Sustainable Village Forest Management in Fakfak Regency Using MDS (Multidimensional Scaling)

Mutmainah Woretma^{1*}, Didik Suharjito², Yudi Setiawan³

¹Study Program of Natural Resources and Environmental Management Science, Graduate School, IPB University, Academic Campus IPB Baranangsiang, Bogor, West Java, 16129, Indonesia

²Study Program of Natural Resources and Environmental Management Science, Graduate School, IPB University, Academic Campus IPB Baranangsiang, Bogor, West Java, 16129, Indonesia

³Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, IPB University, Academic Ring Road Campus IPB Dramaga, Bogor, West Java, 16680, Indonesia

*Corresponding author e-mail: mutmainahworetma@gmail.com

Abstract

The social forestry program aims to provide access to community-based forest management. One of the social forestry schemes is the Village Forest. Fakfak Regency has 15 village forests that have received management licenses since 2018. However, there are various management obstacles. This research was conducted to analyze the sustainability status of 15 village forests in Fakfak Regency, to formulate appropriate management strategies. This study employed RapPForest analysis with the MDS (Multidimensional Scaling) method to evaluate the sustainability status of three dimensions and 22 attributes. Based on the analysis results, the ecological dimension has a very sustainable value (73.14), the economic dimension has a moderately sustainable status (50.01), and the social dimension is on a less sustainable index (45.79). In the ecological dimension, there are five village forests with a highly sustainable status; in the economic dimension, there are six village forests with a fairly sustainable status; in the social dimension, there are three village forests with a fairly sustainable status. The conclusion of this research is to develop recommendations for village forest management strategies that focus on achieving goals from the ecological, economic, and social dimensions.

Keywords

Multidimensional Scaling, Social Forestry, Sustainability, Village Forests

Received: 25 January 2026, Accepted: 1 May 2026

<https://doi.org/10.26554/ijems.2026.10.3.158-167>

1. INTRODUCTION

Social forestry is a government policy that fully prioritizes the rights of communities living near forest areas. This is because social forestry positions local communities or indigenous peoples as the primary actors in managing forests independently to improve community well-being (MoEF, 2021) including Village Forests, Customary Forests, Community Forests, Community Plantation Forests, and Forestry Partnerships. Holders of Social Forestry Agreements are obligated to carry out forest management in accordance with the principles of sustainable forest management, as well as to protect their areas from destruction and environmental pollution (MoEF, 2021). Based on GoKUPS data (MoEF, 2026), the achievement of social forestry in Indonesia stands at 8.03 million hectares out of the 12.7 million hectares allocated for social forestry. Social forestry serves as a participatory governance model that integrates ecologi-

cal conservation and rural growth through community-based management of agroforestry and NTFPs, aimed at fostering sustainable livelihood security (Priya and Das, 2006). Its dual capacity to promote ecological sustainability while enhancing community livelihoods has made it a subject of extensive scholarly inquiry.

Sustainable social forestry management practices have been extensively researched. Management activities through local wisdom mechanisms play a very important role in maintaining the sustainability of forest and natural resource management (Martin et al., 2016). Community participation and local wisdom assist in the development of forest protection plans. This is aimed at reducing forest exploitation activities associated with stronger law enforcement (Phan and Nong, 2024). Social forestry has the potential to improve welfare and management sustainability, but its success depends on social justice, inclusive participation, and transparent management (Toumbourou et al., 2025).

The sustainability of social forestry must be ensured by evaluating the performance of its management. This study employs a modified version of the RAPFISH (RapP-Forest) method using a multidimensional scaling approach. The application of the RAPFISH method using Multidimensional Scaling (MDS) approach has been extensively studied to assess sustainability in social forestry and the forestry sector topics in Indonesia, including: the sustainability of Village Forest (HD) management and Community Forests (HKm) (Wahyu et al., 2022), Community Plantation Forests (HTR) (Rachmina et al., 2024; Amal et al., 2025), Community Forests (Sukwika et al., 2016; Liling and Malamassam, 2017; Putra et al., 2025), Agroforestry (Syahputra et al., 2025; Sittadewi et al., 2025; Rusdiana et al., 2026), and Mangrove Forests (Santoso et al., 2019; Sabrina et al., 2023; Metananda et al., 2025). In addition to applications in the forestry sector, this method is also used to evaluate water quality, map pollution levels, and assess sustainability aspects (Kahirun et al., 2025), village development (Hariyanti and Indasari, 2022), and watershed management (Sulaiman et al., 2021).

This study fundamentally adapts the instruments from Wahyu et al. (2022) using the MDS technique; however, there are significant differences from previous studies. Previous studies emphasized formal institutions Wahyu et al. (2022); Amal et al. (2025); Liling and Malamassam (2017), whereas this study deconstructs that approach by incorporating customary rules as a key variable. The economic sustainability study by Rachmina et al. (2024) focused on regions with established market access in Java and Sumatra; this study fills the gap by collecting data in regions with extreme geographical constraints. Furthermore, regarding the ecological dimension, studies by Putra et al. (2025) and Sukwika et al. (2016) evaluate sustainability in forests that have largely undergone human intervention. In contrast, this study is dominated by primary forests in Fakfak. Furthermore, the social mechanisms that support sustainable relationships between communities and forests, as well as how traditional practices can be more broadly integrated into natural resource management policies, have not yet been studied (Martin et al., 2016).

Therefore, this study was conducted to analyze sustainable social forestry management activities, particularly those related to Village Forests, in Fakfak Regency, West Papua Province. The success of community-based forest management is influenced by several interrelated factors and depends on the development of a framework that harmoniously integrates ecological, social, and economic aspects, thereby supporting long-term sustainability (Phan and Nong, 2024). This study aims to describe the performance of village forest management institutions from ecological, social, and economic perspectives, as well as to formulate strategic recommendations for Village Forest management. It is hoped that this study will be beneficial to the community, particularly the Social Forestry Management Institutions in Fakfak

Regency.

2. EXPERIMENTAL SECTION

2.1 Theoretical Framework

This study uses an integrated sustainability approach to forest management, ensuring a balance between the three main pillars of ecology, economy, and society, which can prevent the fragmentation of ecosystems, stakeholder groups, and policies. The fundamental pillars of forest landscape management are ecosystem integrity, effective planning, and strong governance (Morgan et al., 2020). The success of community-based natural resource management is greatly influenced by the theory of common-pool resources. The indicators used to assess the performance of village forest management include resource sustainability (deforestation or forest regeneration rates), community participation in decision-making, compliance with agreed rules, success in meeting the economic and social needs of the community, and conflict resolution (Ostrom, 1999).

2.2 Study Area

This research was conducted in Fakfak Regency located in West Papua Province which has an area of approximately 14,320 km² or 1,432,000 Ha and consists of nine districts. Fakfak is one of the districts implementing the Social Forestry Program. The Social Forestry scheme in Fakfak District consists of 15 Village Forests or *Hutan Desa* (HD) and 3 Community Forests or *Hutan Kemasyarakatan* (HKm). The research area specifically conducted in 15 HD with an area of 41,889 Ha can be seen in Figure 1. The Village Forests are in four Districts namely Wartutin District, Kayauni District, Teluk Patipi District, and Kokas District. Wartutin District has five village forests namely HD Werabuan, HD Wartutin, HD Siboru, HD Kamandutetar, and HD Sipatnanam. Kayauni District has five village forests, namely HD Mananmur, HD Warpatumber, HD Ubadari, HD Kayuni, and HD Tirikokma. Teluk Patipi District has four village forests, namely HD Mawar, HD Tibatibananam, HD Ofie, and HD Tetar. Kokas District has one village forest, namely HD Wertuar.

2.3 Methods

2.3.1 Data Collection

The sustainability index of village forest management is assessed by evaluating the performance of 15 village forest management institutions or *Lembaga Pengelola Hutan Desa* (LPHD). This evaluation covers three key dimensions: Ecology, Economic, and Social. This study used a total of 22 attributes divided into three dimensions: ecological dimension (6 attributes), economic dimension (7 attributes), and social dimension (9 attributes). These attributes are the criteria and indicators for evaluation in Social Forestry management. These attributes are listed in the Minister of Environment and Forestry Regulation No. 9 of 2021 and modifications from Wahyu et al. (2022) research results.

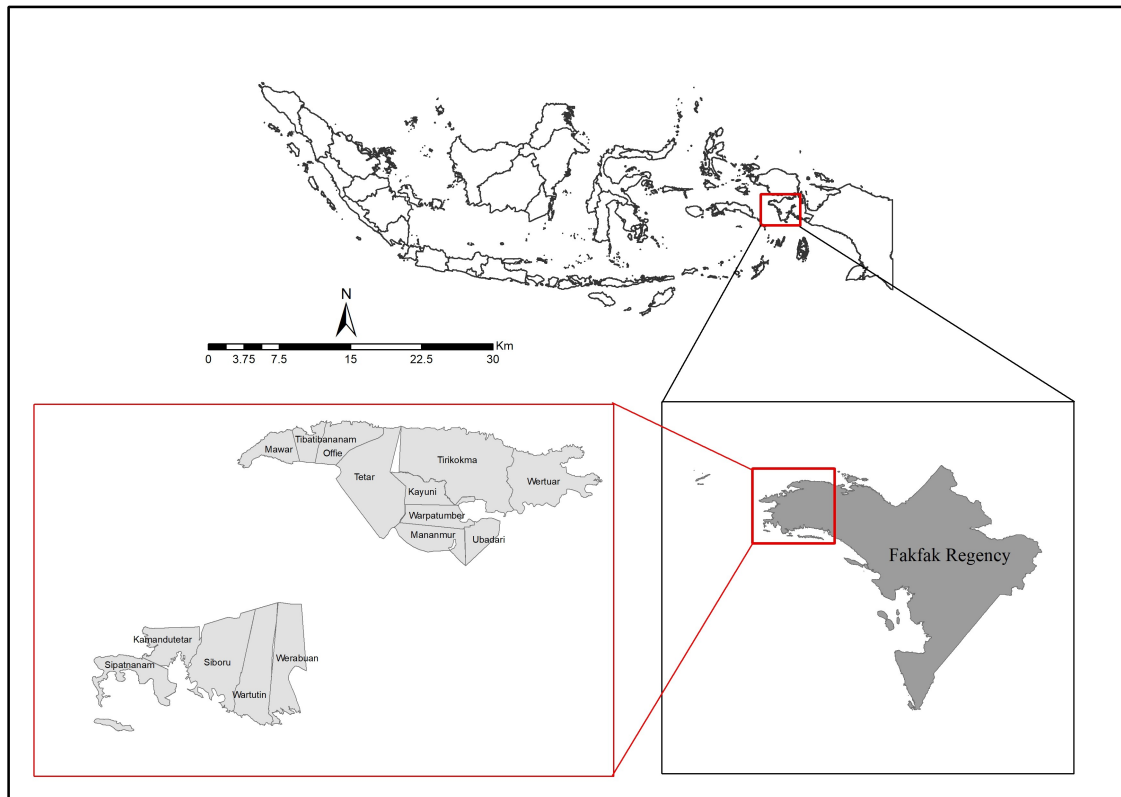


Figure 1. Study Area at Village Forest Fakfak

Attributes in the ecological dimension: HD Management Zone, Forest Cover, Forest Cover Change, Rehabilitation Activities, HD Protection, and Ecologically Functional Forest Zone. Attributes in the economic dimension: Availability of financial services and access to them, Assistance with economic production tools, KUPS Member Income, KUPS Market Reach, Types of KUPS Products, KUPS Business Capital, and Utilized Forest Products. Social attributes: customary rules in HD management, Social Forestry Management Plans (RKPS) and Annual Work Plans (RKT), availability of Management Decrees, coordination between stakeholders, completeness of Articles of Association or *Anggaran Dasar* (AD) and Bylaws or *Anggaran Rumah Tangga* (ART), group meetings or gatherings, community understanding of Village Forest management, conflicts in Village Forest management, and LPHD member activity.

Attributes will be assessed based on Multidimensional Scaling (MDS) assessment using a scale of 0-4. The scoring criteria follow a 5-point progression: 0 (very poor), 1 (poor), 2 (fair), 3 (good), and 4 (excellent). The assessment uses a scale of 0-4 to accommodate indicators that are more qualitative in nature and have a more limited assessment range. According to Fauzi (2019), the selected indicators must be easy to obtain data on and can be measured objectively. The results of the scale assessment describe the sustainability of each aspect of the research in the form of

a sustainability index, ranging from 0 to 100%. The distribution of sustainability index ranges is presented in Table 1.

Table 1. Categories of Sustainability Status of Village Forest Management

Index Value	Category
0.00 – 25.00	Not sustainable
25.01 – 50.00	Less sustainable
50.01 – 75.00	Moderately sustainable
75.01 – 100.00	Highly sustainable

Source: Kavanagh and Pitcher (2004)

Data collection on dimensions and attributes used methods including interviews with questionnaire distribution, documents, Landsat image analysis, focus group discussions (FGD), and field observations. Respondents in sustainability data collection were selected using the Slovin formula with a total of 90 respondents, consisting of 6 respondents taken from each representative in 15 HDs. The respondent sampling technique used purposive sampling, considering specific subjects and criteria. The respondents consisted of village forest management institutions (LPHD) and village officials (village heads or traditional leaders).

2.3.2 Data Analysis

The sustainability analysis of Village Forests was conducted using the RapPForest (Rapid Protection Forest) method with a multidimensional scaling (MDS) approach, which is a modification of the RAPFISH (Rapid Appraisal of Fisheries) method. According to Wulandari et al. (2026), The MDS approach enables a flexible “rapid, multidimensional assessment” even with limited data, making it relevant to the context of natural resource management in developing countries. Abdillah et al. (2023) highlight the advantages of RAPFISH, which uses MDS to “qualify” ecological, economic, social, and governance attributes, so that the results are not merely index scores but also a spatial representation of the relationships between these dimensions.

Evaluation of assessments using the Multidimensional Scaling (MDS) approach through ordination and leverage analysis. Ordination analysis can provide information about the sustainability of each Village Forest unit, while leverage analysis can provide information about the attributes that are most sensitive to the sustainability of an area in each dimension. Leverage analysis can produce stress values and coefficients of determination (R^2) that provide information about the aspects most sensitive to the sustainability of an area. With this data, we can determine the appropriate intervention measures to improve sustainability status (Santoso et al., 2019). Intervention for sustainable village forest management strategies is formulated based on the results of leverage analysis or sensitivity analysis, which are the most decisive factors for sustainability. The strategies are formulated through focus group discussions (FGDs) to ensure that the recommendations are contextually relevant and have strong support from stakeholders, as they are based on validation, needs, and views expressed directly by stakeholders.

3. RESULTS AND DISCUSSION

3.1 Sustainability Status of Village Forest

The sustainability status of village forests in each dimension consists of highly sustainable, moderately sustainable, and less sustainable. In the ecological dimension, there are two categories: highly sustainable (5 HD) and moderately sustainable (10 HD). In the economic and social dimensions, there are two categories: moderately sustainable and less sustainable. Village forests with a moderately sustainable status in the economic dimension consist of 6 HD, and in the social dimension consist of 3 HD. Meanwhile, village forests with a less sustainable status in the economic dimension consist of 9 HD, and in the social dimension consist of 12 HD.

The sustainability of village forests in Fakfak Regency (Figure 2) varies across each dimension: the ecological dimension is classified as highly sustainable (73.14), the economic dimension as moderately sustainable (50.01), while the social dimension is classified as less sustainable (45.79).

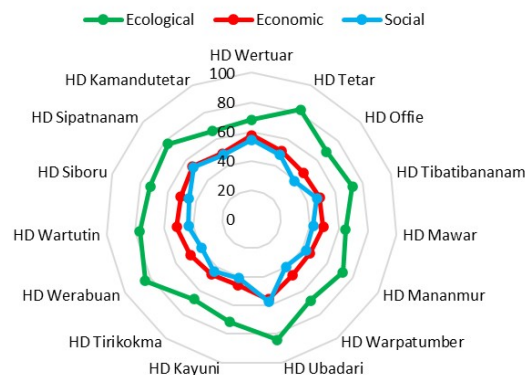


Figure 2. Radar Chart of Sustainability by Dimension

The analysis in Table 2 indicates that the indices are stable and reliable, as the difference between the Ordination and Monte Carlo values is very small (less than 2%). The model's accuracy is also very high, with stress values below 5% across all dimensions (Ecology 2.5%, Economy 2.8%, Social 1.6%). This demonstrates that the model exhibits an excellent level of goodness of fit in representing field conditions.

The high coefficients of determination for the ecological (97%) and social (98.8%) dimensions demonstrate that the attributes used are capable of fully explaining the variation in the data. The economic dimension (85.9%) also shows a strong influence. Based on these valid statistics, intervention policies should prioritize the economic and social dimensions because they have lower index scores compared to the ecological dimension.

3.1.1 Ecological Sustainability

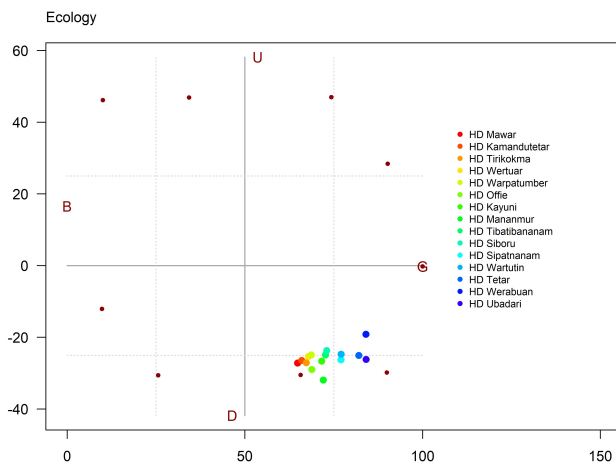
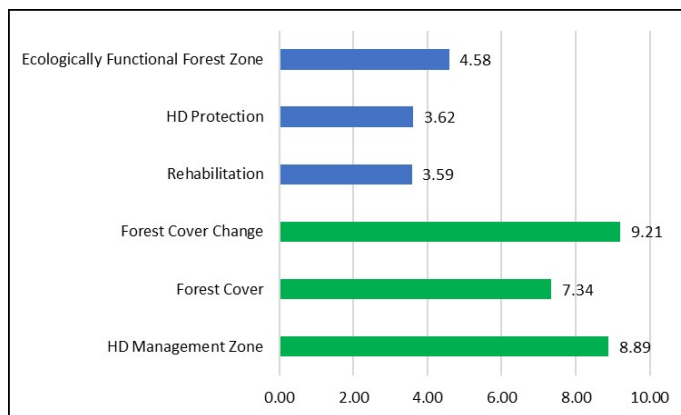
In the ecological dimension (Figure 3), the village forests (HD) with the highest sustainability status are, in order: HD Ubadari (84.11), HD Werabuan (84.04), HD Tetar (82.03), HD Wartutuini (77.09), and HD Sipatnanam (77.01). Meanwhile, the village forests with moderately sustainable status are, in order: HD Siboru (73.02), HD Tibatibananam (72.67), HD Mananmur (72.05), HD Kayuni (71.58), HD Offie (68.83), HD Warpatumber (68.67), HD Wertuar (67.90), HD Tirikokma (67.24), HD Kamandutetar (65.97), and HD Mawar (64.82).

The most sensitive attributes, or those that require special attention, are attributes with the highest Root Mean Square (RMS) values or those that exceed the average RMS value. The RMS value for the ecological dimension is 6.64. Therefore, the sensitive attributes in the ecological dimension are land cover change with a value of 9.21, forest cover (7.34), and Village Forest Management Zones (8.89). The results of the ecological dimension leverage analysis are presented in Figure 4.

Some Village Forests (HD) have experienced a reduction in forest area each year, while others have seen an increase

Table 2. Results of the Statistical Parameter Analysis for Each Dimension

Dimension	Ordination	Monte Carlo	Parameter (%)	
			Stress Value	Coefficient Determinant (R^2)
Ecology	73.14	72.21	2.5	97.0
Economic	50.01	49.75	2.8	85.9
Social	45.79	45.83	1.6	98.8

**Figure 3.** Results of Ecological Dimension Ordination**Figure 4.** Ecological Dimension Leverage

in forest cover. The loss of forest canopy in these Village Forests is largely tied to land clearing for plantations and the opening of new roads. Such land-use changes are consistent with recent data from Manokwari, West Papua, where forest conversion for residential and agricultural purposes has led to a measurable decline in total forest area (Kesaulija et al., 2023). Forest degradation is frequently characterized by the transition of primary forests into secondary forests. In contrast, deforestation occurs when these forested areas are fully converted into non-forest land, such as transmigration

settlements, industrial plantations, and other agricultural sectors (Hendri et al., 2022).

Of the 15 Village Forests, only HD Werabuan has a management zoning map. The zoning plan map for HD Werabuan was created with the assistance of the NGO Gemapala Fakfak. According to Toumbourou et al. (2025), zoning-based forest management, such as dividing areas into utilization zones and protection zones, supports sustainable resource management. Yuan et al. (2023) revealed that scientifically and participatively created village forest management zoning maps are very effective in preventing land conflicts. Zoning maps provide a clear division of space so that forest management plans are in harmony with social and ecological systems. In addition, according to Widharto et al. (2025), zoning maps created by considering spatial data such as land cover, topography, and land use, as well as input from local communities, can increase the social legitimacy of these maps. This approach combines traditional and scientific knowledge, fostering a sense of community and ownership among the community regarding village forest management. Thus, the potential for land conflicts arising from overlapping land dependencies and claims can be significantly minimized.

The attributes in the ecological dimension have a highly sustainable status, but there are three attributes that require intervention so that every village forest is highly sustainable. The intervention, in the form of a strategy to increase forest cover and reduce deforestation, is to carry out reforestation activities on open land in village forest areas. This strategy needs to be carried out by various agencies, namely community groups, Production Forest Management Unit in Fakfak (KPHP FF), and with the support of the West Papua provincial forestry service. For reforestation activities to be carried out optimally, intervention is also needed in implementing training activities on HD management zoning. The aim is for the community to understand which zones can be utilized and which locations must be protected.

3.1.2 Economic Sustainability

The results of the ordination of the sustainability status of Village Forests in the economic dimension are presented in Figure 5. In the economic dimension, village forests with a moderately sustainable status consist of HD Wertuar (57.56), HD Ubadari (55.67), HD Sipatnanam (54.24), HD Wartutin (51.60), HD Siboru (50.88), and HD Tetar (50.74). Meanwhile, village forests with a less sustainable status

consist of HD Mawar (49.44), HD Kamandutetar (49.37), HD Tibatibananam (48.99), HD Werabuan (48.35), HD Office (47.63), HD Warpatumber (47.25), HD Tirikokma (46.54), HD Mananmur (46.16), and HD Kayuni (45.74).

HDs with a moderately sustainable status have functioning economic systems, but remain vulnerable to external changes. These HDs have market access and verified HHBK products that have already generated added value. One example is the Ubadari HD, which leverages tourism potential to boost economic value-added. However, the implementation of these tourism activities has not yet been maximized. Meanwhile, HDs in the less sustainable category have stagnant economic systems that require intervention. These groups have not maximized the use of production tools, and their market reach remains limited.

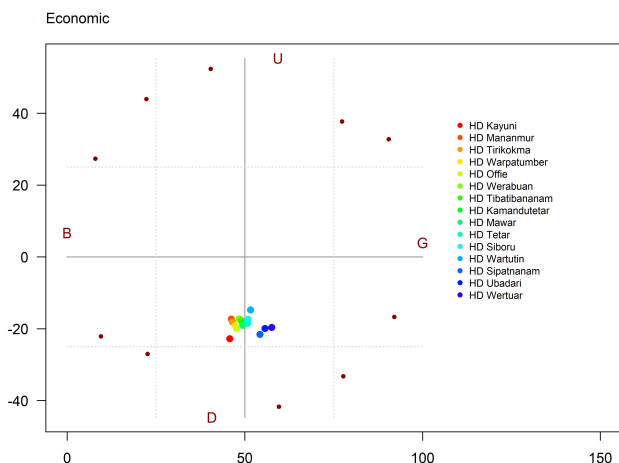


Figure 5. Results of Economic Dimension Ordination

The most sensitive attributes in determining the sustainability of Village Forest management from an economic perspective are the type of products from KUPS (12.35) and the utilization of non-timber forest products (7.34). The RMS value for the economic dimension is 6.11. The results of the economic dimension leverage are presented in Figure 6. The KUPS product type attribute is supported by the utilization of non-timber forest products by the community. Each Village Forest has a Social Forestry Business Group (KUPS), which manages various types of non-timber forest product derivatives. On average, each LPHD has more than two products from KUPS, consisting of processed Tomandin nutmeg products, woven mats or pandan leaves, and processed bamboo products.

HD Wertuar has various types of processed KUPS products such as nutmeg juice, nutmeg syrup, nutmeg candy, and the group has also carried out nutmeg seed distillation activities. In addition to nutmeg fruit processing, KUPS Wertuar also utilizes non-timber forest products other than nutmeg

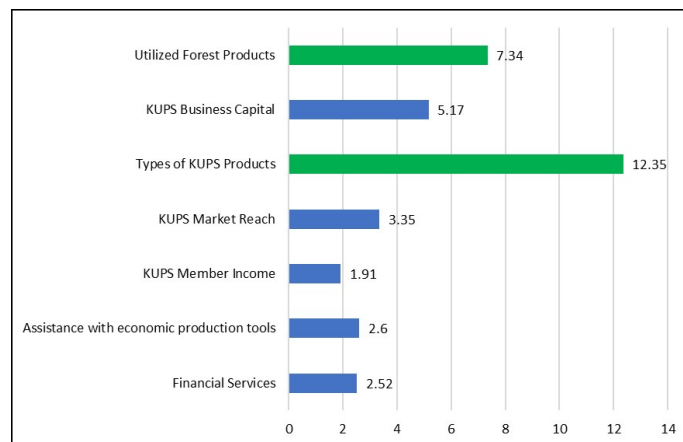


Figure 6. Economic Dimension Leverage

fruit, namely crab farming and seaweed cultivation. Nutmeg fruit processing and cultivation activities are assisted by the Kaleka NGO. While, HD Ubadari has processed nutmeg and woven products. In addition to these products, HD Ubadari is assisted by the Indonesian Conservation Foundation to empower the community in the management and development of the Ubadari waterfall tourist site. HD Wartutin also has a variety of business products such as processed nutmeg and woven bags to woven plates, as well as ornamental orchids. HD Sipatnanam, HD Siboru, and HD Tatar have various nutmeg-derived products such as nutmeg syrup, nutmeg juice, nutmeg chips, and various types of woven tomang bags and mats.

Non-timber forest products (NTFPs) used by communities for daily needs and sold include: forest pandanus leaves, bamboo, seasonal fruits (nutmeg, durian, rambutan, langsung, avocado, matoa), community garden produce using agro-forestry systems (water spinach, spinach, mustard greens, pumpkin, papaya, gnetum, rice, pineapple, betel, areca nut, banana, corn, sweet potato, cassava, and taro), and spices (ginger, galangal, turmeric, lemongrass). Tomandin nutmeg is the main source of income for the forest community because almost all the community has nutmeg gardens and the parts that are used consist of the fruit flesh, flowers and seeds. Tomandin nutmeg is harvested three times a year, consisting of the West Season (harvest period from October to December), the East Season (harvest period from June to August), and the Sun Season (harvest period from February to March).

According to Hazari et al. (2023) Village communities' use of NTFPs covers diverse livelihood and material requirements that are deeply embedded in their local cultural heritage. Derebe et al. (2023) revealed that the extraction of Non-Timber Forest Products (NTFPs) serves as a crucial economic instrument for residents in remote areas and communities living in forest buffer zones. Integrating scientific methods into non-timber forest product management is es-

essential for balancing community livelihoods and biodiversity conservation in this region.

Interventions in the form of policy strategies that can be implemented to improve the sustainability of the economic dimension include providing cross-stakeholder entrepreneurship training to groups, as well as training on obtaining business permits such as BPOM (Indonesian Food and Drug Administration), halal labels, product packaging labeling, and market reach. The aim is to make KUPS products more attractive and ensure they have permits to be distributed safely. In addition, it is necessary to provide training on the utilization and cultivation of HHBK to the community at the village level, so that it can be directly followed by the community. The goal is to increase the utilization of HHBK so that it is more diverse and not focused on the sale of raw nutmeg and timber.

3.1.3 Social Sustainability

The results of the ordination of the sustainability status of Village Forests in the social dimension are presented in Figure 7. Village Forests in the Moderately Sustainable category are HD Ubadari (57.5), HD Wertuar (54.43), and HD Sipatnanam (53.34). Meanwhile, the other 12 Village Forests fall into the Less Sustainable category. This indicates that Village Forest institutions currently only meet the administrative requirements for obtaining permits but have not yet operated at full capacity. Each Village Forest has an RKPS but has not yet implemented its program activities. The absence of an Annual Work Plan (RKT) and insufficient member engagement can lead to governance risks. Even HDs classified as “sufficiently sustainable” cannot yet be considered strong, as they remain vulnerable. If no improvements are made, they may deteriorate into the “less sustainable” category.

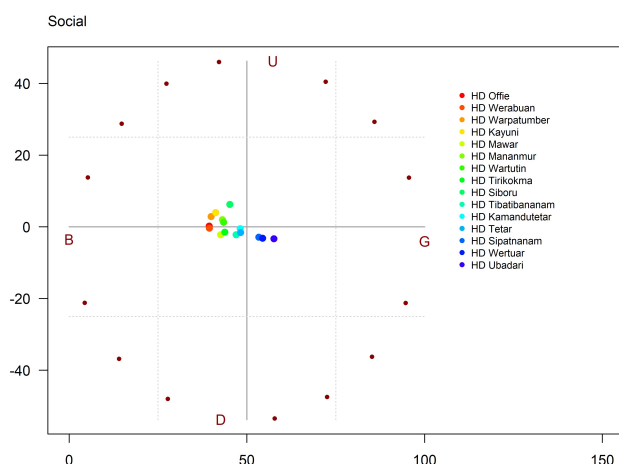


Figure 7. Results of Social Dimension Ordination

The most sensitive attributes in determining the sustainability of Village Forest management from a social perspective (Figure 8) are customary rules in HDM management (7.28), completeness of LPHD management decrees (4.93), and group meetings (4.04). The RMS value for the social dimension is 3.60. Based on the leverage results, each village forest has customary rules for forest protection and utilization. These customary rules have been passed down from generation to generation and are obeyed by the community. These customary rules include prohibition of cutting trees at river springs, prohibition of entering a forest area without prior permission, and prohibition of entering sacred areas such as caves or certain forests. The community believes that violating these customary rules can cause illness or other fatal consequences. Essentially, customary law plays the same role across various regions.

According to [Burhanuddin et al. \(2024\)](#), *Suku Anak Dalam* in the village of Makekal Hulu, Jambi Province, has customary rules that serve as the primary instrument for regulating access to and utilization of forest resources, and form the basis for governing logging, hunting, and land clearing. In [Harly \(2023\)](#) study, the village of Bayan in North Lombok has customary rules such as awiq-awiq that contribute significantly to the economic well-being, social integration, and cultural preservation of the indigenous community. By integrating prohibitive norms and sanctions, these rules ensure the sustainable and consistent utilization of forest resources. [Bhattacharya et al. \(2019\)](#), found that active participation by local communities in the management of conservation areas is a crucial factor in ensuring the long-term sustainability of biodiversity.

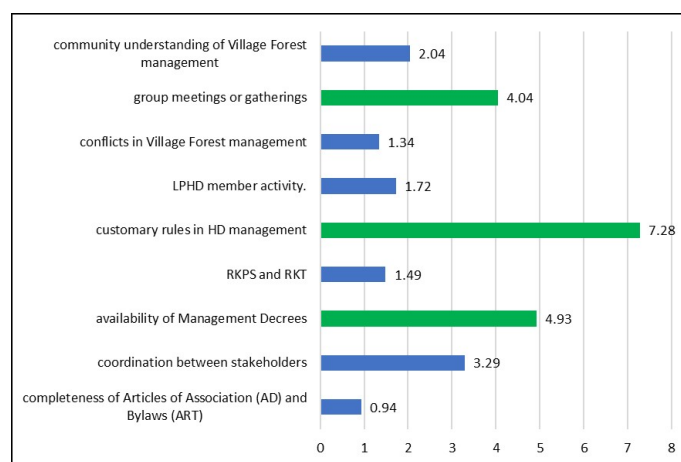


Figure 8. Social Dimension Leverage

Customary rules serve as guidelines for communities in protecting forests, but to date there has been no documentation of the customary rules that have been implemented. This can lead to a shift in customary beliefs or ignorance of these rules among future generations. Interventions that can be carried out to support the sustainability of customary

rules in village forest management include documenting and preserving the community's customary rules. The goal is to ensure that customary rules remain sustainable and are preserved for future generations. The actors who can play a role in implementing this strategy are traditional leaders facilitated by KPHP FF and HD Facilitators.

The Management Decree is important for members of the management team to play an active role in LPHD activities. However, until now, only core management members such as the chair, vice chair, secretary, and KUPS chair have been aware of the Management Decree, while other members are still unaware of their positions and responsibilities. This has resulted in a lack of activity among LPHD members. Intervention is needed to support the equitable distribution of information on the Management Decree, namely by facilitating assistants to provide public outreach to LPHD administrators regarding the functions and divisions of each LPHD management member. The aim is to provide the group with an understanding of the main tasks of each division of the Village Forest management, so that they can work more actively and effectively. This intervention can be carried out by the Fakfak KPHP agency and the role of HD assistants.

Group meetings or gatherings are also considered important for the sustainability of Village Forests. Group meetings need to be held to discuss work programs to be implemented or activities to be developed. Until now, group meetings have only been held when there is a Village Forest assistance schedule or visits from government agencies. The groups are not yet independent enough to hold regular meetings or gatherings. A similar situation was observed in the HD studied by Wahyu et al. (2022), where group meetings were held at the initiative and encouragement of the facilitator. According to Pujiyanto et al. (2023), Member engagement within farmer groups is demonstrated through active involvement in the planning phase, specifically characterized by regular attendance at group meetings, the provision of constructive feedback, and direct contributions to the formulation of group work plans. The intervention carried out is the need for assistance activities that implement annual work plans so that activities can be carried out in a structured manner. These plans can be used as guidelines by the Institution in conducting group meetings to achieve the activity targets that must be carried out.

4. CONCLUSIONS

Village forests that have a highly sustainable status include HD Ubadari, HD Wertuar, and HD Sipatnaman. Meanwhile, based on dimensions, the ecological dimension has a highly sustainable status, the economic dimension has a fairly sustainable status, and the social dimension has a less sustainable status. The intervention provided in the form of a sustainable village forest management strategy focuses on the ecological, economic, and social dimensions. The strategy for the ecological dimension is to carry out training

and reforestation activities. The strategy for the economic dimension is entrepreneurship training, financial services training, and training on the utilization of non-timber forest products. The strategy for the social dimension is the development of synergistic work plans.

5. ACKNOWLEDGEMENT

We would like to express our gratitude to the *Lembaga Pengelola Dana Pendidikan* (LPDP) for the financial support provided for this research. We also extend our sincere thanks to the Production Forest Management Unit Fakfak and the Village Forest Management Institutions in Fakfak for their invaluable assistance and guidance during the data collection process.

REFERENCES

- Abdillah, N., T. Thamrin, N. Nofrizal, and G. Wijayanto (2023). Quantifying Ecological, Economic, Social, and Governance Attributes for Urban Forest Eco-Tourism Using MDS-RAPFISH Approach. *International Journal of Sustainable Development and Planning*, **18**(8); 2369–2378
- Amal, M. I., H. Kaskoyo, R. Nurindarwati, and R. Safe'i (2025). Index and Status of Sustainable Forest Management in Social and Economic Dimensions by Sumber Sari Forest Farmer Group in Wan Abdul Rachman Grand Forest Park, Lampung Province. *Jurnal Belantara*, **8**(2); 226–234
- Bhattacharya, S., S. De, A. Shome, and A. Dutta (2019). Socio-Environmental Survey of a Forest Hamlet Proximate to Neora Valley National Park in the Eastern Himalayas, India. *Indonesian Journal of Environmental Management and Sustainability*, **3**(1); 24–31
- Burhanuddin, N. Elsyra, J. Sunaryo, Syahwami, H. Rahmi, and Hamirul (2024). The Role of Customary Law in Forest Governance and Conservation in Jambi, Indonesia: A Case Study of Makekal Hulu Village Within the Customary Territory of the Suku Anak Dalam. *Enigma in Cultural*, **2**(2); 103–116
- Derebe, B., A. Alemu, and Z. Asfaw (2023). Contribution of Nontimber Forest Products Earn to Livelihood in Rural Households and the Type of Use: A Systematic Review. *International Journal of Forestry Research*, **2023**(1); 9643290
- Fauzi, A. (2019). *Teknik Analisis Keberlanjutan*. PT Gramedia Pustaka Utama, Jakarta, Indonesia (in Indonesia)
- Hariyanti, F. and B. Indasari (2022). Utilization of Village Potential Data to Determine the Sustainability Status of Village Development in Riau Province, Indonesia. *IOP Conference Series: Earth and Environmental Science*, **1083**(1); 012074
- Harly, L. N. B. (2023). Sustainable Forest Management from the Perspective of Customary Law in Indonesia: A Case

- Study in the Bayan Community. *International Journal of Social Sciences and Humanities*, **1**(1); 32–42
- Hazari, S., M. Kalita, and B. Lahiri (2023). The Value of Non-Timber Forest Products (NTFPs) in Promoting India's Rural Livelihoods. *Indonesian Journal of Forestry Research*, **10**(2); 221–237
- Hendri, S. Raharjo, E. Suarga, M. F. Rosyaridho, and J. Kalmirah (2022). Towards Low Carbon Development Strategies from Forestry Sector in West Papua. *IOP Conference Series: Earth and Environmental Science*, **989**(1); 012007
- Kahirun, L. O. A. N. Ramadhan, L. O. M. Erif, and U. Mubarakah (2025). Evaluating the Quality Status and Sustainability of Anggoeya Spring in the Ecological Dimension Using the Rapid Appraisal for Springs Method. *Indonesian Journal of Environmental Management and Sustainability*, **9**(1); 1–10
- Kavanagh, P. and T. J. Pitcher (2004). Implementing Microsoft Excel Software for RAPFISH: A Technique for the Rapid Appraisal of Fisheries Status. Technical Report 2
- Kesaulija, F. F., M. I. Aipasa, Sumaryono, and A. Suhardiman (2023). Land Use and Land Cover Change in Manokwari, West Papua Province. *IOP Conference Series: Earth and Environmental Science*, **1192**(1); 012045
- Liling, Y. and D. Malamassam (2017). Sustainability Index and Status of Private Forest Management: A Study of Ecology, Economics, and Technical Aspects of Forestry, in Toraja Regencies, Indonesia. *International Journal of Sciences: Basic and Applied Research*, **34**(1); 163–174
- Martin, E., D. Suharjito, D. Darusman, S. Sunito, and B. Winarno (2016). Tunggu Tubang and Ulu Ayek: Social Mechanism of Sustainable Protected Forest Management. *Jurnal Manajemen Hutan Tropika*, **22**(2); 85–85
- Metananda, A. A., D. D. Al-Reza, C. M. Hanum, and W. F. Afrianto (2025). Sustainability Status of Mangrove Rehabilitation in Natuna Regency, Indonesia: A Rapid Appraisal Using RAPFISH. *Narra X*, **3**(3); e248–e248
- MoEF (2021). Peraturan Menteri Lingkungan Hidup dan Kehutanan tentang Pengelolaan Perhutanan Sosial (Ministerial Decree on the Social Forestry Management) P.09/MENLHK/SETJEN/KUM.1/10/2021. Ministry Regulation (in Indonesia)
- MoEF (2026). Dirjen Perhutanan Sosial dan Lingkungan. Capaian Perhutanan Sosial, Realisasi Per Provinsi (Director General of Social Forestry and the Environment. Social Forestry Achievements, Realization by Province). Accessed 2026-02-25 (in Indonesia)
- Morgan, E. A., T. Cadman, and B. Mackey (2020). Integrating Forest Management Across the Landscape: A Three Pillar Framework. *Journal of Environmental Planning and Management*, **64**(10); 1735–1769
- Ostrom, E. (1999). *Self-Governance and Forest Resources*. Center for International Forestry Research
- Phan, T. T. and D. H. Nong (2024). A Pilot Model of Community-Based Forest Management in Xuan Nha Nature Reserve, Son La Province, Vietnam. *Forest and Society*, **8**(1); Article 10
- Priya and S. Das (2006). Exploring the Key Drivers of Social Forestry Sustainability: A Case Study of Western Himalayan Region, India. *Small-scale Forestry*, **25**; 209–228
- Pujiyanto, M. A., N. L. Wisuda, and G. S. Tanjung (2023). Analysis of Farming Group Member Participation on the Development Farming in Wonosoco Village Undaan District (Case Study of Waduk Rejo Farmers Group). *JIA (Jurnal Ilmiah Agribisnis): Jurnal Agribisnis dan Ilmu Sosial Ekonomi Pertanian*, **8**(2); 95–103
- Putra, S. A., D. R. Nurrochmat, H. Purwawangsa, N. A. Nurrochmat, M. Qanitha, and F. Mutaqin (2025). Analysis of the Sustainability of Productive Carbon Forests in Garut, West Java, Indonesia. *Biodiversitas*, **26**(7); 3218–3226
- Rachmina, D., Herawati, Feryanto, Mahdi, R. P. Wibowo, and Z. Azriani (2024). Business Sustainability Analysis of the Social Forestry Program in West Sumatra Province. *AGRARIS: Journal of Agribusiness and Rural Development Research*, **10**(2); 215–235
- Rusdiana, O., R. S. Nainawa, N. Mindawati, and Y. Hidayat (2026). Ecological, Economic, and Social Sustainability of the Puspa and Cardamom Agroforestry System in Gunung Walat Educational Forest (HPGW), Indonesia. *Forests*, **17**(2); 220
- Sabrina, A. D., A. R. Ramadandhi, A. A. I. Nur, N. Liza, Sutarno, C. K. Yap, M. Indrawan, and A. D. Setyawan (2023). Sustainability Level of Mangrove Forest Management Based on RAP-MForest Approach in Pancer Cengkong, Trenggalek District, Indonesia. *International Journal of Bonorowo Wetlands*, **12**(2); 7
- Santoso, N., Sutopo, and R. P. Nugraha (2019). Analysis of Sustainability Ecosystem Mangrove Management in Pangkah Wetan and Pangkah Kulon Villages Area, Ujungpangkah District, Gresik Regency, East Java Province. In *IOP Conference Series: Earth and Environmental Science*, volume 399. IOP Publishing, page 012007
- Sittadewi, E. H., I. G. Tejakusuma, T. Handayani, A. D. Santoso, A. Tohari, A. Mulyono, Z. Zakaria, E. B. Budiman, H. E. H. Fatahillah, and R. Fitriani (2025). Novel Rap-Landslide Method for Assessing Agroforestry Sustainability in Landslide-Prone Areas. *Resources*, **14**(6); 93
- Sukwika, T., D. Darusman, C. Kusmana, and D. R. Nurrochmat (2016). Evaluating the Level of Sustainability of Privately Managed Forest in Bogor, Indonesia. *Biodiversitas*, **17**(1); 241–248
- Sulaiman, I. A., Z. Nasution, A. Rauf, and M. S. B. Kusuma (2021). Multidimensional Scaling Approach to Evaluate Sustainability Status of Belawan Watershed Management. *IOP Conference Series: Earth and Environmental Science*, **912**(1); 012064
- Syahputra, F., A. Mardiyah, and B. Undadreja (2025).

- Assessing the Sustainability of Agroforestry Systems in South Lampung Regency, Indonesia: A Case Study from Register 6 Way Buatan. *Agriecobis: Journal of Agricultural Socioeconomics and Business*, **8**(02); 167–179
- Toumbourou, T. D., M. B. Dunphy, L. Mulyani, I. Auwalin, Rumayya, A. S. Hartoto, and A. Rawluk (2025). Social Forestry for a Good Life. The Uneven Well-Being Benefits of Indonesia's Social Forestry Scheme. *People and Nature*, **7**(6); 1443–1463
- Wahyu, A., D. Suharjito, D. Darusman, and L. Syaufina (2022). Assessment of Village and Community Forest Sustainability: Evidence from the Local Level. *International Journal of Sustainable Development and Planning*, **17**(6); 1753–1763
- Widhanarto, G. O., T. Santoso, W. A. Pradana, and D. As-tiani (2025). Spatial Based Zoning Plan for Sustainable Forest Management of Riam Sicangguran Village Forest. *Instrumentation, Measure, Metrologie*, **24**(2); 151
- Wulandari, U., P. Purwanti, D. Setyohadi, and Z. Abidin (2026). Multidimensional RAPFISH Analysis of Danish Seine Fisheries in Brondong, Indonesia: Ecological, Economic, Social, Technological, and Ethical Perspectives. *Fisheries and Aquatic Sciences*, **29**(3); 152–165
- Yuan, J., D. Yang, N. Liu, and C. Gao (2023). A Local-Scale Participatory Zoning Approach to Conflict Resolution in Protected Areas. *Landscape and Urban Planning*, **232**; 104677