Journal of the Community Development in Asia (JCDA)
Vol. 8 No. 3, pp.506-522, September, 2025
E-ISSN: 2654-7279 P-ISSN: 2685-8819
https://ejournal.aibpmjournals.com/index.php/JCDA/index

Designing Agroecology-Based Environmental Accounting Disclosures Through Agricultural Asset Valuation in Indigenous Community-Owned Business Entities

Kurniawan Patma[1*], Ignasisus Dwi Atmana Sutapa[1], Maria Yosephine Dwi Hayu Agustini[1]
[1]Soegijapranata Catholic University, Jl. Pawiyatan Luhur Sel. IV No.1, Bendan Duwur, Kec. Gajahmungkur, Kota Semarang, Jawa Tengah, 50234, Indonesia
*Corresponding Email: 24o20001@student.unika.ac.id

ARTICLE INFORMATION

Publication information

Research article

HOW TO CITE
Patma, K., Sutapa, I. D. A., & Agustini, M. Y. D. H. (2025). Designing agroecology-based environmental accounting disclosures through agricultural asset valuation in indigenous community-owned business entities**.** *Journal of the Community Development in Asia, 8*(3), 506-522.

DOI:
https://doi.org/10.32535/jcda.v8i3.4155

Received: 14 July 2025
Accepted: 16 August 2025
Published: 20 September 2025

ABSTRACT

This study examines the implementation of agroecology-based environmental accounting disclosures through agricultural asset valuation in indigenous community-owned business entities, focusing on BUMMA Mare in Papua. The objective is to evaluate the recognition, measurement, and disclosure of biological assets and agricultural products under PSAK 241 while integrating environmental accounting principles. A qualitative descriptive method was applied using semi-structured interviews with BUMMA Mare management and analysis of financial documents. Results show that BUMMA Mare manages 1,370 areca nut trees, consisting of 623 productive trees valued at IDR 146,405,000 and 747 immature trees valued at IDR 83,664,000. However, its financial statements have not fully implemented PSAK 241, as biological assets and agricultural products remain unrecognized and undisclosed. Furthermore, December's harvest produced 15,575 kg with an estimated fair value of IDR 2,323,790,000, yet this was not reported in the statements. The study concludes that incorporating agroecology-based environmental accounting improves transparency, strengthens accountability to indigenous stakeholders, and supports both ecological and financial sustainability. This framework offers practical guidance for similar entities in aligning traditional agricultural practices with modern accounting standards.

Keywords: Agroecology; Biological Assets; Environmental Accounting; Indigenous Enterprises; PSAK 241

INTRODUCTION

The Financial Accounting Standards (PSAK) No. 241 regulates the accounting treatment of agricultural activities, particularly the recognition, measurement, and disclosure of biological assets and agricultural products. Biological assets are defined as living animals or plants that undergo biological transformation, while agricultural products are the harvests obtained from these assets. The standard emphasizes fair value measurement and transparent disclosure to provide reliable and relevant information to stakeholders. However, in practice, the implementation of PSAK 241 remains challenging for many agricultural entities, particularly in rural and community-based enterprises where accounting systems are often underdeveloped or inconsistently applied.

Beyond the technical aspects of PSAK 241, agricultural activities are closely tied to environmental impacts. Farming and plantation operations typically involve the direct use of natural resources such as soil, water, and biodiversity, as well as inputs like fertilizers, pesticides, and herbicides. These practices influence both ecological conditions and long-term sustainability. As a result, environmental accounting has gained prominence as a complementary framework to financial reporting, offering a way to capture the ecological costs and responsibilities associated with business operations (Akpan & Oluwagbade, 2023). Integrating environmental accounting into agricultural financial reporting enhances transparency, aligns with global sustainability agendas, and highlights an organization's commitment to ecological stewardship. Previous studies have shown that environmental disclosure not only improves stakeholder trust but also contributes to long-term competitiveness and resilience in agricultural enterprises (Sun et al., 2025; Wu & Tham, 2023).

In the Indonesian context, agricultural enterprises are diverse, ranging from large-scale agribusiness companies to smallholder groups and indigenous community-owned enterprises (Pakpahan et al., 2022; Sasongko et al., 2022). In Papua, one of the most significant models is the Customary-Owned Enterprise (BUMMA), which mobilizes community-sourced capital to manage natural resources collectively. These enterprises aim to improve local welfare, strengthen cultural identity, and support sustainable economic activities. One such entity, BUMMA Mare, manages an 8-hectare areca nut plantation with approximately 1,370 trees. Despite the plantation's economic potential, BUMMA Mare has not yet fully applied PSAK 241 in recognizing, measuring, and disclosing its biological assets and agricultural products. The absence of systematic financial reporting has resulted in limited transparency and reduced decision-making value in its financial statements. This reflects a broader problem faced by community-owned enterprises in rural Indonesia, where financial and environmental reporting practices are underdeveloped (Gunawan, 2021; Wahyuningrum, 2020).

The importance of integrating environmental accounting in such contexts is underscored by the ecological impact of plantation activities. Fertilizer and pesticide application, soil management, land clearing, and continuous harvesting not only influence productivity but also affect environmental quality, biodiversity, and long-term sustainability (Shah & Wu, 2019). By systematically incorporating environmental costs into financial reporting, BUMMA Mare could present more comprehensive disclosures that reflect both its financial performance and environmental responsibility. This would not only improve accountability but also strengthen trust among community members, government regulators, and external stakeholders. In turn, transparent reporting could facilitate greater access to funding, partnerships, and policy support, ultimately enhancing the sustainability of indigenous-owned enterprises (Chikweche et al., 2023).

This study aims to design a framework for agroecology-based environmental accounting disclosures through asset valuation in community-owned business entities, focusing specifically on BUMMA Mare. The framework integrates PSAK 241 with environmental accounting principles to create a holistic model for recognizing, measuring, and disclosing biological assets and agricultural products. By embedding agroecology principles, the proposed framework emphasizes harmony between economic productivity, ecological balance, and community well-being. Such integration ensures that financial reports capture not only monetary outcomes but also environmental stewardship, aligning accounting practices with the goals of sustainable development.

The significance of this research lies in its ability to address a persistent gap in agricultural accounting practices. Traditional financial reporting in agriculture has often overlooked environmental aspects, focusing narrowly on production and profitability. By incorporating environmental accounting, this study responds to the increasing demand for sustainability-oriented financial reporting that accounts for ecological costs and benefits. The novelty of this research rests in applying agroecology principles—a framework typically associated with sustainable farming—to the recognition, measurement, and disclosure of biological assets and agricultural products. To date, few studies have systematically integrated agroecology into accounting practices, making this research a valuable contribution to the field.

The contributions of this study are twofold. First, at the theoretical level, it extends the literature on environmental and agricultural accounting by offering an integrated disclosure framework that combines PSAK 241 compliance with sustainability-oriented reporting. Second, at the practical level, it provides a model for BUMMA Mare and similar indigenous enterprises to improve the transparency and accountability of their financial statements. This guidance will help such enterprises strengthen stakeholder trust, demonstrate ecological responsibility, and enhance access to funding and support. More broadly, the findings contribute to efforts in promoting sustainable agricultural practices and inclusive economic development in indigenous communities

LITERATURE REVIEW

PSAK 241: Agricultural Accounting

PSAK No. 241 regulates the accounting treatment for agricultural activities, particularly the recognition, measurement, and disclosure of biological assets and agricultural products. Biological assets, defined as living plants or animals undergoing biological transformation, are recognized when an entity gains control over them and measured at fair value less costs to sell, unless fair value cannot be reliably measured (Ningsih & Wibowo, 2025; Pinandita et al., 2024). The emphasis on recognition and measurement seeks to ensure that stakeholders obtain relevant and reliable information for informed decision-making.

However, empirical studies reveal inconsistencies in its application within Indonesia. Dewi & Ayu (2017) and Soedarman et al. (2022) report that agricultural companies, particularly those operating in remote areas, often fail to comply fully with PSAK 241, leading to incomplete disclosure of biological assets. While such findings highlight adoption gaps, they do not sufficiently explain the institutional or cultural barriers that hinder implementation. More recent research emphasizes that indigenous enterprises like BUMMA Mare encounter distinct challenges, including limited accounting expertise and reliance on customary governance structures, which exacerbate compliance difficulties. In contrast, state-owned enterprises such as PT Perkebunan Nusantara (PTPN) have begun selectively aligning with International Financial Reporting Standards (IFRS), suggesting that institutional capacity significantly influences the level of adoption.

This contrast underscores a critical gap in the literature: while mainstream research identifies non-compliance, there has been limited exploration of how socio-cultural contexts and organizational capacity shape the practical feasibility of PSAK 241.

At the international level, studies suggest that integrating agricultural accounting with sustainability frameworks such as the Global Reporting Initiative (GRI) or Environmental Management Accounting (EMA) can strengthen transparency and relevance (Schaltegger & Burritt, 2017; Zatini et al., 2025). Yet, these approaches are rarely examined in indigenous or small-scale enterprises in Indonesia. Thus, the literature has not reconciled how global sustainability-oriented practices could be meaningfully adapted to entities like BUMMA Mare. Addressing this gap, the present study seeks to link PSAK 241 with environmental accounting principles, offering a framework that not only meets financial reporting standards but also reflects ecological stewardship and community-based accountability.

Environmental Accounting and Sustainability

Environmental accounting, defined by Schaltegger and Burritt (2017), functions as an information system that identifies, measures, and discloses costs and benefits associated with environmental impacts. Its relevance in agriculture is evident, as farming inherently involves land-use changes, resource extraction, and chemical applications. Danso et al. (2020) demonstrate that organizations integrating environmental factors into financial reporting often achieve stronger environmental performance, improved stakeholder relations, and enhanced access to financial resources.

Despite its advantages, the adoption of environmental accounting in agriculture remains limited. In Indonesia, Abdullah et al. (2020) and Rachmawati & Oktariyani (2019) find that plantation companies have begun acknowledging environmental factors, yet disclosures remain superficial and fragmented. This is largely attributed to the lack of technical expertise and standardized measurement tools. Conversely, international studies document more advanced practices, in which companies embed environmental costs into structured sustainability reports aligned with frameworks such as the GRI and ISO standards. The contrast highlights a widening gap: while global corporations embed environmental accountability as part of strategic reporting, Indonesian enterprises, particularly community-based entities, remain underdeveloped.

Importantly, existing literature often frames environmental accounting challenges as technical deficiencies, overlooking socio-cultural, institutional, and economic influences that shape disclosure practices. This omission creates a research gap, particularly in indigenous or small-scale enterprises where legitimacy is grounded in both ecological stewardship and community trust. The present study responds by extending the discourse beyond corporate models to propose context-sensitive frameworks that adapt environmental accounting to the realities of enterprises such as BUMMA Mare.

Comparative Insights from Agricultural Enterprises

Comparative perspectives from both local and global enterprises deepen understanding of how environmental accounting can be advanced. In Indonesia, PTPN has attempted to align financial reporting with international standards such as IFRS in managing and disclosing biological assets (Jusup, 2014). Yet adoption remains partial, limited to certain units and constrained by institutional capacity. This incremental progress contrasts sharply with multinational corporations such as Nestlé and Unilever, which have systematically embedded sustainability into their accounting and reporting systems.

Globally, sustainability reporting has been reinforced by frameworks including the GRI and IFRS. The release of GRI 13: Agriculture, Aquaculture, and Fishing Sectors

introduced sector-specific guidelines on land-use change, biodiversity, and environmental stewardship, encouraging disclosure beyond generic indicators. Similarly, the International Sustainability Standards Board (ISSB), through IFRS S1 and S2, has established a baseline for climate-related disclosures, further institutionalizing sustainability in corporate reporting (GRI, 2022). Companies such as Unilever have operationalized these frameworks by adopting GRI indicators, reporting on measurable carbon reductions and resource efficiency improvements.

These global developments illustrate how institutional frameworks and market pressures enable corporations to transform environmental accounting from a compliance requirement into a strategic asset that strengthens competitiveness, legitimacy, and consumer trust. However, the gap between multinational practices and indigenous or community-based enterprises remains wide. Entities such as BUMMA Mare struggle with limited expertise, cultural governance traditions, and weak regulatory enforcement. Recent scholarship on natural capital accounting in Indonesia (Kurrahman et al., 2024) underscores opportunities to integrate ecosystem and land-use considerations into reporting, but adoption beyond large corporations remains weak.

This discrepancy highlights a pressing gap: the absence of frameworks tailored to indigenous and small-scale enterprises. Existing research celebrates corporate sustainability adoption but rarely explores adaptations needed for enterprises whose accountability is rooted in community and cultural legitimacy. The present study seeks to bridge this gap by adapting lessons from global practice into an agroecology-based accounting framework that aligns PSAK 241 with environmental and community accountability principles.

Environmental Management Accounting (EMA)

EMA provides a more detailed approach to identifying, measuring, and managing environmental costs and benefits. According to Schaltegger and Burritt (2017), EMA focuses on recognizing hidden costs such as energy use, waste generation, and harmful chemical applications that are often overlooked in traditional reporting. Evidence from Manurung (2011) shows that EMA adoption enables companies to optimize resource allocation, reduce operational costs, and improve competitiveness through minimized environmental impacts.

Recent research strengthens this perspective. Rachmawati and Oktariyani (2019) note that while Indonesian plantations are beginning to account for environmental aspects, systematic EMA integration remains limited. Nur et al. (2023) confirm that interest in green accounting is growing but remains fragmented, descriptive, and seldom strategic. Similarly, Indarto and Ani (2023) emphasize EMA's potential role in supporting policy tools such as carbon taxation, noting that effective climate change mitigation requires robust environmental cost measurement.

For indigenous enterprises like BUMMA Mare, EMA presents unique opportunities. Capturing the costs of fertilizers, pesticides, and land rehabilitation offers a clearer representation of environmental contributions and strengthens community trust. Yet, unlike multinational corporations compelled by global market pressures to adopt frameworks such as GRI (2022) and ISSB's IFRS S1 and S2 (IFRS Foundation, 2022), indigenous-owned enterprises face structural and cultural constraints, including limited expertise and reliance on customary governance.

This contrast underscores the importance of adapting EMA to local contexts. Rather than replicating global frameworks, enterprises require EMA-based models that integrate ecological sustainability with community-based accountability. Integrating EMA with

PSAK 241's biological asset recognition and measurement could transform financial reporting into a system that is transparent, reliable, socially responsive, and ecologically grounded. Such integration provides a pathway for indigenous enterprises like BUMMA Mare to demonstrate resource stewardship while maintaining competitiveness and ensuring long-term sustainability.

RESEARCH METHOD

This study employs an applied research approach designed to develop a framework for agroecology-based environmental accounting disclosures through the valuation of assets in community-owned business entities, with a specific focus on BUMMA Mare. The primary objective of this research is to examine the recognition, measurement, and disclosure of biological assets and agricultural products, ensuring that these processes are consistent with the requirements of PSAK 241. At the same time, the study seeks to integrate environmental accounting principles, thereby advancing a more holistic reporting model that reflects both financial accountability and ecological sustainability.

The data used in this study are derived from both primary and secondary sources. Primary data were obtained through in-depth, semi-structured interviews with key stakeholders, including the treasurer and management team of BUMMA Mare. These interviews were conducted to capture firsthand insights into current practices related to the management, valuation, and disclosure of biological assets and agricultural outputs. This approach provided a clearer understanding of how community-owned enterprises interpret and apply PSAK 241 in their daily operations. Secondary data were collected from various supporting materials such as financial statements, internal reports, operational records, and relevant documentation provided by BUMMA Mare. These secondary sources were essential in validating the findings from interviews and in tracing the historical and institutional context of financial reporting practices within the enterprise.

The data collection techniques applied in this study included semi-structured interviews and systematic document analysis. Semi-structured interviews allowed flexibility in probing specific issues, while still maintaining comparability across respondents. The interviews explored the processes of recognition, measurement, and disclosure of biological assets, and further examined the extent to which environmental accounting considerations were incorporated into existing financial reporting mechanisms. Documentation analysis, on the other hand, provided an opportunity to critically examine BUMMA Mare's financial statements, reports, and supporting schedules. The analysis specifically targeted the disclosure of biological assets and agricultural products, highlighting areas of compliance and non-compliance with PSAK 241.

For data analysis, a qualitative descriptive method was employed. This approach was selected because it enables a detailed exploration of practices, perceptions, and institutional realities without reducing them to purely numerical indicators. The analysis involved systematically organizing and interpreting the collected data, identifying key themes, and comparing them with the theoretical and regulatory framework established by PSAK 241 and environmental accounting principles. This process allowed the identification of gaps, inconsistencies, and opportunities for improvement in the current application of accounting standards. The findings are presented not only to describe existing practices but also to propose a more comprehensive framework for integrating agroecology-based principles into financial reporting.

Ultimately, the study seeks to contribute to both academic and practical domains by offering a framework that enhances transparency, accountability, and sustainability in community-owned agricultural enterprises. In doing so, it provides a context-sensitive

model for indigenous businesses like BUMMA Mare to strengthen compliance with PSAK 241, integrate environmental management considerations, and reinforce their legitimacy within both market and community contexts.

RESULTS

Table 1. Measurement of Productive Biological Assets: Areca Nut Trees at BUMMA Mare

Type of Biological Asset	Number of Trees	Price Per Tree (IDR)	Total Purchase Cost (IDR)	Maintenance Cost (IDR)	Total Biological Asset Cost (IDR)
Productive Asset (Areca Nut)	623	200,000	124,600,000	21,805,000	146,405,000

Table 1 presents the measurement of productive biological assets, specifically areca nut trees, at BUMMA Mare. There are 623 areca nut trees, valued at IDR 200,000 per tree, resulting in a total purchase cost of IDR 124,600,000. The maintenance cost for these trees is IDR 21,805,000, bringing the total biological asset cost to IDR 146,405,000. This data represents the total value of the productive assets that are expected to generate economic benefits for BUMMA Mare in the future.

Table 2. Measurement of Immature Biological Assets: Areca Nut Trees in the Growth Stage

Type of Biological Asset	Number of Trees	Price Per Tree (IDR)	Total Purchase Cost (IDR)	Maintenance Cost (IDR)	Total Biological Asset Cost (IDR)
Immature Asset (Areca Nut)	747	100,000	74,700,000	8,964,000	83,664,000

Table 2 presents the measurement of immature biological assets, specifically the areca nut trees that are still in the growth stage. There are 747 trees valued at IDR 100,000 per tree, resulting in a total purchase cost of IDR 74,700,000. The maintenance cost for these trees is IDR 8,964,000, bringing the total biological asset cost for the immature trees to IDR 83,664,000. These assets have not yet yielded any products but are expected to generate economic benefits once they mature.

Figure 1. Structure of Biological Asset Disclosure in BUMMA Mare's Financial Statements

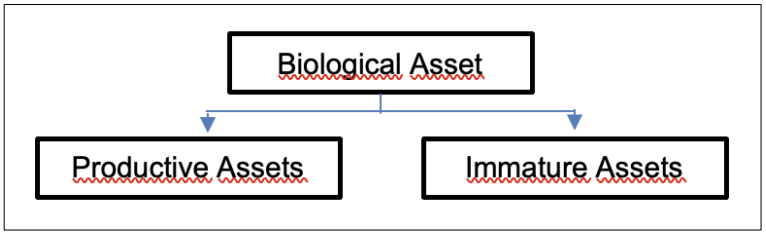

Figure 1 illustrates the structure of biological asset disclosure in BUMMA Mare's financial statements. Biological assets are divided into two main categories: productive assets and immature assets. This disclosure reflects how biological assets are classified and calculated in the financial statements, though it still does not fully align with PSAK 241's recognition and measurement requirements. While there is a clear distinction between the two categories, BUMMA Mare's financial statements do not yet include fair value measurements or more in-depth assessments as required by the standards.

Implementation of Recognition, Measurement, and Disclosure of Biological Assets Based on PSAK 241 at BUMMA Mare

Recognition of Biological Assets

Biological assets are living animals or plants that undergo biological transformations, starting from growth, degeneration, production, and procreation, resulting in qualitative or quantitative changes in the asset. BUMMA Mare's biological assets include areca nut trees, which grow over time. Therefore, recognition of biological assets is required, starting from the coconut seedlings until the plants produce bunches ready for harvest.

Interviews with the Director and Treasurer of BUMMA Mare regarding the recognition of biological assets revealed that recognition of biological assets requires permission from the customary law, so BUMMA Mare cannot fully recognize them. According to PSAK 241, every entity that owns biological assets is required to recognize its biological assets (Ningsih & Wibowo, 2025). BUMMA Mare can now recognize biological assets because the customary law has handed over the areca nut plantation to be managed by BUMMA Mare, and the BUMMA Mare treasurer has provided financial reports to the customary law. Furthermore, according to researchers, the treasurer is not yet familiar with the standards for recognizing biological assets.

Therefore, the researcher will apply the recognition of biological assets to BUMMA Mare in accordance with PSAK 241. This application of biological asset recognition can be used as a guideline for recognizing biological assets owned by BUMMA Mare. Based on PSAK 241, an entity can recognize biological assets when BUMMA Mare controls the biological assets as a past event, namely by purchasing a plantation by the Customary and handing over its management to BUMMA. Furthermore, the biological assets owned by BUMMA Mare are BUMMA Mare has been able to provide economic benefits in the future. This is evidenced by the number of areca nut trees owned by BUMMA Mare, which is 1,370. The more biological assets owned by BUMMA Mare, the greater the profit from the harvest. Therefore, the acquisition cost of biological assets at BUMMA Mare can be measured reliably. The application of biological asset recognition at BUMMA Mare is carried out in accordance with PSAK 241. Productive biological assets are recognized at cost less accumulated depreciation, reflecting their usage over time. Meanwhile, immature biological assets are recognized at cost, where the acquisition cost encompasses all expenses related to their development. These include the cost of purchasing seeds, clearing the plantation, acquiring fertilizers and pesticides, as well as labor costs for palm oil boning, sanitation, and fertilizer application.

Biological assets in the financial statements can be recognized as current assets and non-current assets according to the biological transformation period of the asset.

Biological assets are recognized as current assets when their useful life or biological transformation is less than or up to 1 year, and are recognized as non-current assets if their useful life or biological transformation is more than 1 year. Biological assets at BUMMA Mare, namely areca nut trees, are recognized as non-current assets in the statement of financial position because their useful life or biological transformation is more than one year.

Biological Asset Measurement

BUMMA Mare has not measured its biological assets in accordance with PSAK 241. This is evidenced by the absence of a biological asset account in the Statement of Financial Position. Therefore, the researcher measured BUMMA Mare's biological assets in accordance with PSAK 241, which is measured at acquisition cost less accumulated depreciation and accumulated impairment losses. Regarding the number of biological assets, seedling prices, and costs incurred, the head of the BUMMA Mare plantation unit explained that there are 623 mature areca nut trees and 747 immature areca nut trees. Meanwhile, the market price for mature areca nut seedlings is IDR 200,000 per tree, and for immature areca nuts, IDR 100,000. Furthermore, the costs incurred include oil palm brooding wages, sanitation wages, and the number of productive plants owned by BUMMA Mare is 623. The number of seedlings is then multiplied by the market price of productive plant seedlings, which is IDR 200,000 per seedling. The total cost of purchasing the productive plants is IDR 124,600,000. This is then added to the total cost of IDR 21,805,000. Therefore, the total acquisition cost of the productive biological assets in the BUMMA Mare plantation unit is IDR 146,405,000.

Producing biological assets is considered to be able to provide benefits in the form of agricultural products. The productive areca nut trees owned by BUMMA Mare have been able to produce a harvest of areca nuts. Therefore, depreciation is necessary. Annual depreciation is calculated using the Straight-Line Method with the following calculation: fertilizer costs, net plantation costs, fertilizer purchase costs, and pesticide purchase costs. Details of the measurement of productive biological assets can be seen in Table 3.

Table 3. Measurement of Biological Assets Yields

The acquisition cost of biological assets results in	
Plant Seeds Produce	
Pre Production	
623 trees × IDR 200,000	IDR 124,600,000
Production	
Seedling Planting Costs	IDR 3,115,000
Maintenance Costs	IDR 6,230,000
Post Production	
Harvest Costs	IDR 12,460,000
The total acquisition cost of biological assets results in	IDR 146,405,000

Source: Processed Data (2025)

Based on Table 3, the measurement of productive biological assets begins with the calculation of the total number of biological assets.

The measurement of the value of productive biological assets at BUMMA Mare is calculated based on the acquisition cost minus annual depreciation costs. The measurement of productive biological assets is as follows:
= IDR 146,405,000 – IDR 5,856,200
= IDR 140,548,800

Based on the calculations above, it can be concluded that the measurement value of productive biological assets is IDR 140,548,800. Meanwhile, the measurement for non-productive biological assets can be seen in Table 4.

Table 4. Measurement of Immature Biological Assets

The acquisition cost of biological assets has not yet generated	
The plant seeds have not yet produced	
Pre Production	
747 trees × Rp. 100.000	IDR 74,700,000
Production	
Seedling planting costs	IDR 3,735,000
Maintenance costs	IDR 5,229,000
Total acquisition cost of biological assets has not yet produced	IDR 83,664,000

Based on Table 4, the measurement of immature biological assets starts from calculating the number of immature biological assets owned by BUMMA Mare, which is 747 stems, then the number of seeds is multiplied by the price of productive plant seeds in the market, which is IDR 100,000 per stem. The total cost incurred for purchasing productive plants is IDR 74,700,000. After that, it is added to the total cost incurred, which is IDR 8,964,000. So, the total acquisition price of immature biological assets in the BUMMA Mare plantation unit is IDR 83,664,000.

Disclosure of Biological Assets

BUMMA Mare has not disclosed biological assets in accordance with PSAK 241. This is evidenced by the absence of biological assets in the balance sheet prepared by the BUMMA Mare Treasurer. Regarding the disclosure of biological assets in the financial statements, the BUMMA Mare Treasurer explained that the report only includes the required data according to the provided format. Because BUMMA Mare has not disclosed biological assets, the researcher conducted a biological asset disclosure in accordance with PSAK 241. BUMMA Mare's biological assets are grouped into immature biological assets, totaling 623 stems, and productive biological assets, totaling 747 stems. The carrying value of productive biological assets is IDR 146,405,000, and immature biological assets, IDR 83,664,000. Biological assets are presented in the Statement of Financial Position under non-current assets.

Application of Recognition, Measurement, and Disclosure of Agricultural Products Based on PSAK 241 at BUMMA Mare

Recognition of Agricultural Products

BUMMA Mare has not yet recognized agricultural products in accordance with PSAK 241. This is evidenced by the absence of an inventory account on BUMMA Mare's balance sheet. Therefore, the researcher recognized agricultural products in accordance with PSAK 241. According to PSAK 241, agricultural products are recognized as inventory and are recognized at fair value less costs to sell.

Measurement of Agricultural Products

BUMMA Mare has not yet measured agricultural products in accordance with PSAK 241. This is evidenced by the absence of an inventory account on BUMMA Mare's balance sheet. Therefore, the researcher measured agricultural products in accordance with PSAK 241. According to PSAK 241, agricultural products are measured at fair value less costs to sell at the point of harvest. Regarding harvest yields and costs incurred during the harvest, the Director of BUMMA explained that the December harvest yield was 3 tons. A clear measurement of agricultural production can be seen in Table 5.

Table 5. Measurement of Agricultural Products in Rupiah

Harvest income in December (optimal scenario)	15,575 kg	15,575 kg × 150,000	IDR 2,336,250,000
Fair value of agricultural products	IDR 150,000/kg		

Table 5 shows that the agricultural product harvest in December was 15,575 kg. The fair market value of the agricultural product, namely fresh fruit, is IDR 150,000/kg. Total harvest income was IDR 2,336,250,000. Meanwhile, costs incurred during the harvest, including the cost of dodos (planting costs) and harvesting, amounted to IDR 12,460,000. Therefore, the total value of the agricultural product measurement in December was IDR 2,323,790,000.00.

Disclosure of Agricultural Products

BUMMA Mare has not disclosed its agricultural products in accordance with PSAK 241. This is evidenced by the absence of inventory presentation in BUMMA Mare's Statement of Financial Position. Therefore, the researcher disclosed an inventory of IDR 2,323,790,000 in the statement of financial position under current assets.

To better illustrate the integration of agroecology-based environmental accounting into the management of biological assets and agricultural products at BUMMA Mare, the following table presents the proposed design for environmental accounting disclosures. This design outlines how environmental costs, including land management, the use of environmentally friendly fertilizers, and pesticides, should be recognized and disclosed in the financial statements. The table also details the appropriate accounts and the types of financial statements where these disclosures should appear, offering a comprehensive framework for improving the transparency and sustainability of BUMMA Mare's financial reporting.

Table 6. Agroecology-Based Environmental Accounting Design at BUMMA Mare

Accounting Design Element	Disclosure Category	Description of Disclosure	Measurement and Recognition Method	Account	Financial Statement Type
Land Management	Maintenance & Environmental Costs	Land management practices that are environmentally friendly (rehabilitation, sanitation)	Measurement of land maintenance costs based on direct expenses for sanitation and land rehabilitation activities.	Environmental Expense	Income Statement
Environmentally Friendly Fertilizers	Maintenance & Environmental Costs	Use of fertilizers that do not harm the environment and improve soil fertility	Measurement of fertilizer costs based on the purchase and distribution of environmentally friendly fertilizers.	Environmental Expense	Income Statement
Environmentally Friendly Pesticides	Maintenance & Environmental Costs	Use of pesticides safe for the ecosystem	Measurement of pesticide costs based on the	Environmental Expense	Income Statement

		(natural-based)	purchase and use of environmentally friendly pesticides.		
Environmental Cost Disclosure	Total Biological Asset Disclosure	Total costs related to environmental management and biological asset maintenance	Calculating the total costs incurred for maintenance and environmental management, including land, fertilizers, and pesticides.	Environmental Expense	Notes to Financial Statements
Biological Asset Valuation	Biological Asset Recognition	Recognition of biological assets based on fair value and costs related to environmental management	Measurement of biological asset fair value considering environmental management and operational costs.	Biological Assets	Balance Sheet

Table 6 outlines the proposed agroecology-based environmental accounting design for BUMMA Mare, integrating environmental costs into the management of biological assets and agricultural products. Each accounting design element is associated with an environmental expense account, which is recorded under expenses in the Income Statement. For example, costs related to land management, environmentally friendly fertilizers, and pesticides are considered expenses supporting sustainability in agriculture and are reported in the income statement. The total environmental costs related to these activities will be disclosed in the Notes to the Financial Statements, providing further transparency to stakeholders about the environmental impact incurred by BUMMA Mare. Additionally, biological assets will be recognized in the Balance Sheet, considering the costs related to environmental management and operational expenses

The findings of this study show that BUMMA Mare has not fully implemented this standard in their financial statements, as evidenced by the absence of biological assets or agricultural product accounts in their balance sheet.

DISCUSSION

The findings of this study confirm that BUMMA Mare has not fully implemented the recognition, measurement, and disclosure of biological assets as required by PSAK 241. Although the entity manages a substantial number of productive and immature areca nut trees, these assets are not yet systematically recognized in its financial statements. This supports earlier findings by Dewi & Ayu (2017) and Soedarman et al. (2022), who reported that many agricultural enterprises in Indonesia, particularly those operating in remote or community-based contexts, struggle to apply PSAK 241 consistently.

When compared with larger plantation enterprises such as PTPN, which has selectively adopted IFRS in certain units (Jusup, 2014), the case of BUMMA Mare highlights the influence of institutional capacity and governance structures on accounting practices. While PTPN benefits from corporate governance frameworks and professional expertise, BUMMA Mare operates within customary law arrangements and limited accounting

resources. This discrepancy reinforces the argument that compliance with PSAK 241 cannot be understood purely as a technical matter but must also consider cultural and institutional dimensions.

In terms of measurement, the results indicate that BUMMA Mare's accounting practices remain focused on acquisition costs, with little reference to fair value assessment. This contrasts with international standards, where companies such as Nestlé and Unilever integrate sustainability considerations into both financial and non-financial disclosures. The introduction of GRI (2022) 13 and the ISSB's IFRS (2022) S1 and S2 provides evidence of a global shift toward sector-specific and climate-related reporting. However, indigenous enterprises like BUMMA Mare face barriers in adopting these frameworks, not only due to technical limitations but also because such standards may not fully align with their socio-cultural context.

Another important aspect is the integration of environmental accounting principles. While prior research suggests that EMA enables companies to better capture hidden costs and improve resource efficiency (Manurung, 2011; Schaltegger & Burritt, 2017), this study reveals that BUMMA Mare has not yet incorporated such practices. This gap is critical because agricultural activities inherently involve environmental externalities, such as the use of fertilizers and pesticides or the long-term maintenance of land. The absence of disclosure around these costs reduces both transparency and accountability to stakeholders. Recent studies (Indarto & Ani, 2023; Nur et al., 2023) also highlight that Indonesian enterprises are still at an early stage in embracing green accounting practices, which suggests a systemic issue rather than an isolated case.

The implementation of PSAK 241, particularly regarding the recognition and measurement of biological assets, has been a challenge for many agricultural entities in Indonesia. Research by Soedarman et al. (2022) indicated that many plantation companies have yet to comply with PSAK 241, especially in terms of fair value measurement and adequate disclosure. BUMMA Mare, as an indigenous community-owned entity, faces similar difficulties in complying with PSAK 241, despite the significant economic potential their areca nut plantation holds.

In contrast, when comparing with international practices, large companies such as Nestlé and Unilever have successfully integrated sustainability principles and environmental accounting into their financial reporting (Weng, 2025). Research by Jusup (2014) revealed that large entities have adopted international reporting standards that not only comply with financial accounting principles but also consider the environmental impact of their activities. This contrasts with the findings of this study, which suggest that BUMMA Mare needs to consider environmental aspects more explicitly in their financial reporting.

Taken together, these findings point to two key implications. First, indigenous-owned entities require tailored frameworks that integrate PSAK 241 with simplified environmental accounting principles, enabling them to meet minimum disclosure standards while remaining feasible within their resource constraints. Second, future policy should recognize the unique challenges faced by such enterprises and provide capacity-building initiatives to support adoption. By bridging the gap between global frameworks and local realities, indigenous enterprises like BUMMA Mare could enhance both financial transparency and ecological accountability

CONCLUSION

This study set out to evaluate the implementation of PSAK 241 in BUMMA Mare, an indigenous community-owned agricultural enterprise in Papua, and to propose an agroecology-based environmental accounting framework. The findings confirm that BUMMA Mare has not fully applied the recognition, measurement, and disclosure of biological assets and agricultural products in accordance with PSAK 241. Asset recognition remains confined to acquisition costs, with little evidence of fair value assessments or systematic disclosures. Moreover, environmental costs arising from agricultural activities such as fertilizer use, pesticide application, and long-term land maintenance are not reflected in the financial statements. These limitations reduce transparency and accountability, weakening the entity's ability to communicate effectively with stakeholders.

Theoretically, this research extends the agricultural accounting literature by integrating agroecology-based environmental accounting principles into the context of PSAK 241. Prior studies (Dewi & Ayu, 2017; Rachmawati & Oktariyani, 2019; Soedarman et al., 2022) have predominantly documented compliance gaps in large plantation enterprises but have rarely explored the unique constraints faced by indigenous-owned entities. By focusing on BUMMA Mare, this study demonstrates that accounting practice is not solely a technical exercise but is deeply shaped by institutional capacity, customary governance, and socio-cultural realities. This enriches the theoretical understanding of how accounting frameworks can be adapted to diverse institutional and cultural contexts, filling a gap in both national and international scholarship.

Practically, the study offers actionable guidance for agricultural enterprises, particularly those managed by indigenous communities, to enhance financial reporting quality. Integrating biological asset recognition under PSAK 241 with EMA enables entities to capture both financial and ecological dimensions of performance. For BUMMA Mare, adopting such a framework would improve the transparency of asset valuation, reflect environmental costs more accurately, and foster stronger trust with community stakeholders. For practitioners, the findings underline the importance of developing competencies not only in conventional accounting techniques but also in measuring and disclosing environmental costs, such as rehabilitation expenditures and carbon-related impacts.

From a policy perspective, this study emphasizes the need for regulatory and institutional support to encourage the adoption of PSAK 241 in indigenous-owned entities. National accounting bodies and regulators could provide simplified technical guidelines tailored for small-scale agricultural enterprises. Recent international developments, such as the GRI (2022) and the ISSB's IFRS S1 and S2 standards (IFRS Foundation, 2022), set a strong global precedent for sector-specific and climate-related disclosures. Harmonizing these global frameworks with local standards would help Indonesian entities keep pace with international expectations while remaining culturally relevant. Policy instruments such as training programs, deployment of environmental accounting specialists, and fiscal incentives for sustainable agricultural practices could accelerate this transition.

LIMITATION

This study has several limitations that open avenues for further research. First, it focuses on a single entity, which restricts generalizability. Future studies should involve multiple indigenous-owned enterprises across different regions in Indonesia to capture variations in PSAK 241 implementation. Second, research could extend the proposed framework to other types of biological assets, such as oil palm, cocoa, or coffee, thereby testing its scalability and adaptability. Longitudinal research would also be valuable to assess the long-term effects of agroecology-based accounting on financial performance, ecological sustainability, and community welfare. Finally, comparative studies between indigenous-

owned and corporate enterprises could further illuminate how institutional capacity and governance structures mediate the adoption of environmental accounting practices.

ACKNOWLEDGMENT
The authors extend heartfelt gratitude to everyone who contributed, whether directly or indirectly, to the completion of this research. This work was made possible through the valuable insights, encouragement, and support provided during the research journey. The authors also recognize the wider academic community, whose scholarly works and discussions have significantly enriched the foundation of this study.

DECLARATION OF CONFLICTING INTERESTS
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

Abdullah, M., Hamzah, N., Ali, M. H., Tseng, M. L., & Brander, M. (2020). The Southeast Asian haze: The quality of environmental disclosures and firm performance. *Journal of Cleaner Production*, *246*, 118958. https://doi.org/10.1016/j.jclepro.2019.118958

Akpan, J. U., & Oluwagbade, O. (2023). Social and environmental responsibility in accounting: Beyond financial metrics. *International Journal of Social Sciences and Management Research*, *9*(9), 163-188. https://doi.org/10.56201/ijssmr.v9.no9.2023.pg163.188

Chikweche, T., Garlin, F., Khan, A., & Lwin, M. (2023). A Conceptual Framework for an Integrated One-Stop Portal to Support Indigenous Small Business Enterprises: Setting Foundations for/Enhanced Policy Use, Financial Inclusion and Networking. In *Small and Medium-sized Enterprises, and Business Uncertainty: Just Surviving or Thriving?* (pp. 37-54). Singapore: Springer Nature Singapore.,

Danso, A., Adomako, S., Lartey, T., Amankwah-Amoah, J., & Owusu-Yirenkyi, D. (2020). Stakeholder integration, environmental sustainability orientation and financial performance. *Journal of Business Research*, *119*, 652-662. https://doi.org/10.1016/j.jbusres.2019.02.038

Dewi, N. W., & Ayu, G. (2017). Analisis sistem akuntansi aset biologis perusahaan akuakultur (studi kasus pada CV Dewata Laut). In *Seminar Nasional Riset Inovatif* (Vol. 5, pp. 758-766).

Global Reporting Initiative (GRI). (2022). *Sector Standard for Agriculture, Aquaculture, and Fishing: Standard for sustainable production on land and sea*. Global Reporting Initiative (GRI). https://www.globalreporting.org/standards/standards-development/sector-standard-for-agriculture-aquaculture-and-fishing/

Gunawan, J. (2021). Corporate social responsibility in Indonesia: Why is environmental disclosure the least disclosed information in annual and sustainability reports for natural products industries in Indonesia?. In *Current Global Practices of Corporate Social Responsibility: In the Era of Sustainable Development Goals* (pp. 711-743). Springer International Publishing.

IFRS Foundation. (2022). *IFRS Accounting Standards Navigator*. IFRS Foundation. https://www.ifrs.org/issued-standards/list-of-standards/

Indarto, B. A., & Ani, D. A. (2023). The role of green accounting through the implementation of carbon taxes as an instrument for climate change mitigation in Indonesia. *The Accounting Journal of Binaniaga*, *8*(01), 73-84.

Jusup, H. (2014). *Dasar-Dasar Akuntansi* (7th ed.). YKPN Publishing.

Kurrahman, T., Tsai, F. M., Sethanan, K., Lim, M. K., & Tseng, M. L. (2024). Data-driven natural capital accounting model in Indonesia: Impacts of environmentally related economic activities on ecological processes and services. *Journal of Cleaner Production*, *469*, 143213. https://doi.org/10.1016/j.jclepro.2024.143213

Manurung, E. M. (2011). *Akuntansi Dasar*. Erlangga.

Ningsih, T. M. H., & Wibowo, D. (2025). Implementasi penerapan PSAK 241 atas aset biologis di Safwana Koi Farm. *Jurnal Ilmu dan Riset Akuntansi (JIRA)*, *14*(6).

Nur, M., Indriyanto, E., Digdowiseiso, K., & Hashim, H. A. (2023). The implementation of green accounting in Indonesia: A bibliometric analysis. *International Journal of Economics, Management, Business, And Social Science*, *3*(2), 470-480. https://doi.org/10.59889/ijembis.v3i2.242

Pakpahan, H. T., Karsidi, R., Sugihardjo, S., & Anantayu, S. (2022). Professionalism level of agricultural extension in Karo and Samosir Regency. *Journal of International Conference Proceedings,* 5(3), 26-33. https://doi.org/10.32535/jicp.v5i1.1440

Pinandita, C. P., Ahmad, A., & Sasaputri, D. (2024). Analisis perlakuan akuntansi agrikultur berdasarkan PSAK No. 241 pada Perusahaan Putra Jaya Nanas Kabupaten Blitar. *Simposium Nasional Akuntansi Vokasi (SNAV) XII*, *12*, 142-150.

Rachmawati, Y., & Oktariyani, A. (2019). Implementasi perlakuan akuntansi aset biologis berbasis PSAK 69 yang berlaku efektif 1 Januari 2018 pada Perusahaan Perkebunan (Studi Kasus PT. PP London Sumatera Indonesia, Tbk). *Akuntansi dan Manajemen*, *14*(2), 130-145. https://doi.org/10.30630/jam.v14i2.50

Sasongko, B., Puspaningtyas, M., & Bawono, S. (2022). The relationship between agricultural value added, investment and consumption: Vector Error Correction Model Approach. *Asia Pacific Journal of Management and Education*, *5*(2), 12-25. https://doi.org/10.32535/apjme.v5i2.1547

Schaltegger, S., & Burritt, R. (2017). *Contemporary Environmental Accounting: Issues, Concepts and Practice*. Routledge.

Shah, F., & Wu, W. (2019). Soil and crop management strategies to ensure higher crop productivity within sustainable environments. *Sustainability*, *11*(5), 1485. https://doi.org/10.3390/su11051485

Soedarman, M., Sumengkar, D., & Sa'adah, L. (2022). Perlakuan akuntansi aset biologis menurut Ias 41 Agriculture Dan PSAK 69 (Studi Pada Ptpn Xii Kebun Teh Wonosari). *Measurement Jurnal Akuntansi*, *16*(2), 130-135. https://doi.org/10.33373/mja.v16i2.4620

Sun, Y., Zhang, X., & Yang, G. (2025). The Power of Green Communication: A Dual Path to Enhanced Corporate Resilience Through Environmental Information Disclosure. *Sustainability*, *17*(3), 896. https://doi.org/10.3390/su17030896

Wahyuningrum, I. F. S., Budihardjo, M. A., Muhammad, F. I., Djajadikerta, H. G., & Trireksani, T. (2020). Do environmental and financial performances affect environmental disclosures? Evidence from listed companies in Indonesia. *Entrepreneurship and Sustainability Issues*, *8*(2), 1047-1061. https://doi.org/10.9770/jesi.2020.8.2(63)

Weng, L. S. (2025). Stakeholder Engagement in Sustainable Supply Chain Management: Integrating Sustainability Reporting, Governance, and Corporate Responsibility. Available at SSRN: https://dx.doi.org/10.2139/ssrn.5137976

Wu, Y., & Tham, J. (2023). The impact of environmental regulation, Environment, Social and Government Performance, and technological innovation on enterprise resilience under a green recovery. *Heliyon*, *9*(10). https://doi.org/10.1016/j.heliyon.2023.e20278

Zatini, G., Della Porta, A., & Za, S. (2025). Deciphering barriers and strategies in Environmental Management Accounting (EMA) adoption: A comprehensive two-decade analysis. *Corporate Social Responsibility and Environmental Management*, *32*(3), 3355-3370. https://doi.org/10.1002/csr.3130

ABOUT THE AUTHOR(S)

1st Author
Kurniawan Patma is a doctoral student in the Environmental Science program at Soegijapranata Catholic University. He is currently focused on environmental accounting, specifically the integration of ecological factors into financial reporting within the agricultural sector. He is actively involved in research on the application of agroecology-based accounting in indigenous community-owned enterprises. He holds a Master's degree in Accounting and has contributed to various studies on the implementation of environmental accounting standards.
Email: 24o20001@student.unika.ac.id
ORCID ID: https://orcid.org/0000-0002-1327-9106

2nd Author
Ignasius Dwi Atmana Sutapa is a professor in environmental science at Soegijapranata Catholic University in Semarang, Indonesia. He serves as the Head of the Doctoral Program in Environmental Science at SCU and is the Executive Director of the Asia Pacific Centre for Ecohydrology (APCE), a UNESCO Category II Centre. His research interests encompass water treatment, ecohydrology, environmental management, and sustainable development. Prof. Sutapa has been actively involved in international collaborations and has contributed to various initiatives aimed at achieving the Sustainable Development Goals (SDGs).
Email: ignasdas@gmail.com
ORCID ID: https://orcid.org/0000-0002-4710-4910

3rd Author
Maria Yosephine Dwi Hayu Agustini is a professor of marketing management at Soegijapranata Catholic University, Semarang, Indonesia. She serves as the Head of the Master's Program in Management at SCU and specializes in international marketing, retail management, and green marketing. She holds a Ph.D. in Management and has been actively involved in academic research and curriculum development. Her recent research includes studies on integrated marketing communication and its impact on consumer behavior.
Email: hayu@unika.ac.id
ORCID ID: https://orcid.org/0000-0002-3330-249X