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Evaluation of the Implementation of Regency Conservation Policies on Forest Cover and the Livelihoods of Indigenous Communities in Tambrauw Regency, Southwest West Papua

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A B S T R A C T

This study is motivated by the importance of empirically evaluating the effectiveness of community-based conservation in Tambrauw Regency in maintaining forest cover while also improving the livelihoods of indigenous communities. The aim of the research is to analyze the implementation of community-based conservation policies and their impact on changes in forest cover and the socio-economic conditions of indigenous communities. The study uses a mixed methods approach with an integrative design, combining spatial quantitative analysis based on multitemporal satellite imagery to measure changes in forest cover, along with qualitative and descriptive analysis of socio-economic data through interviews and field observations. The results show that forest cover is relatively stable with only minor changes, but this condition cannot be directly linked to the success of the conservation policies, rather it is more influenced by customary factors and geographical conditions. On the other hand, the policy hasn't had a significant impact on improving the livelihoods of indigenous communities, indicated by minimal economic benefits, low levels of socialization, and weak implementation and community involvement mechanisms. In short, community-based conservation in Tambrauw hasn't created a synergy between ecological and socio-economic goals, so it's necessary to strengthen policy implementation, actively involve indigenous communities, and develop sustainable economic benefit schemes as policy implications

INTRODUCTION

Indonesia is a country with high biodiversity, but it is facing serious pressure on forest sustainability due to deforestation, land degradation, and changes in land use. Various conservation policies have been implemented over the past two decades, but the results vary across regions. This shows that the effectiveness of conservation is not only determined by the presence of policies but also by the quality of implementation and the involvement of local actors in managing natural resources. In this context, community-based conservation becomes an important approach because it positions local communities, especially indigenous peoples, as key players in the planning, management, and supervision of conservation areas. Indigenous communities have historical, cultural, and spiritual connections with the forests, which are reflected in traditional management practices that tend to be sustainable. Several studies show that areas managed by indigenous communities have lower deforestation rates, especially if their management rights are formally recognized. However, the success of this approach really depends on meaningful participation, clear rights, and tangible economic benefits.

Tambrauw Regency in Southwest Papua is an area that bases its development on conservation through the "conservation regency" policy, supported by various local regulations and recognition of indigenous peoples. This region has vast forest cover with high ecological value, but it also faces development pressures. On the other hand, the indigenous communities in Tambrauw still heavily rely on the forest for their livelihood, so the success of conservation needs to be measured not just from an ecological perspective, but also by its impact on community welfare. Even though there is a strong policy framework, empirical studies that integrate forest cover change analysis with the socio-economic impact on indigenous communities in Tambrauw are still limited. Besides that, the implementation of policies at the local level hasn't been fully understood or felt by the community. That's why this research is important to comprehensively evaluate the effectiveness of community-based conservation, to make sure there's a balance between ecological protection and improving people's livelihoods in a sustainable way.

The problem formulation in this study starts from the gap between the design and implementation of community-based conservation policies in Tambrauw Regency, which could affect ecological and socio-economic outcomes. Even though, in principle, indigenous communities have been positioned as the main actors, the effectiveness of their involvement in institutions, management, and monitoring of conservation areas is still not optimal. On the other hand, changes in forest cover as an ecological indicator haven't been analyzed systematically in the context before and after the policy, while the impact of the policy on indigenous peoples' livelihoods is also not clearly measured, especially regarding economic benefits and household welfare. Besides that, the success of community-based conservation is influenced by various factors such as clarity of management rights, the strength of local institutions, the level of participation, and stakeholder support. Therefore, this study focuses on comprehensively examining the connection between policy implementation, forest cover

dynamics, impacts on indigenous livelihoods, and the factors that strengthen or weaken the effectiveness of community-based conservation in Tambrauw Regency.

This study aims to comprehensively evaluate the impact of community-based conservation policies in Tambrauw Regency in achieving a balance between ecological protection and improving the welfare of indigenous communities. In general, the study analyzes to what extent conservation policies can maintain forest cover sustainability while supporting the livelihoods of local communities that depend on natural resources. To achieve this goal, the study specifically examines the implementation of community-based conservation policies, including the mechanisms for involving indigenous communities and local institutions; analyzes changes in forest cover before and after the policy implementation as an indicator of ecological impact; and assesses the policy's effects on the livelihoods of indigenous communities, particularly in terms of income, sources of livelihood, and sustainable use of forest resources. By integrating policy analysis, spatial data, and socio-economic conditions, this study is expected to provide an evidence-based picture of community-based conservation performance at the regional level.

This research is expected to make a significant contribution academically, for policy, and practically in the development of community-based conservation. Academically, it enriches conservation studies by integrating ecological and socio-economic analysis through the use of dual indicators, namely changes in forest cover and the living conditions of indigenous communities, while also strengthening understanding of the role of indigenous people in natural resource management, especially in Papua. From a policy perspective, the results of this study are expected to provide an evidence-based foundation for local governments to evaluate and improve the implementation of community-based conservation, including identifying weaknesses, assessing policy impacts, and formulating more adaptive, inclusive, and fair strategies. Practically, this research benefits indigenous communities and stakeholders by providing empirical evidence that can strengthen their position in decision-making processes, and also serves as a reference for designing conservation programs that not only protect forest preservation but also effectively and sustainably support community livelihoods.

LITERATURE REVIEW

Community-Based Conservation as Environmental Policy

Community-based conservation has grown as a response to the weaknesses of conventional, top-down conservation approaches that often ignore local communities' interests, leading to conflicts and low support for preservation efforts. This approach puts local communities, especially those with direct ties to natural resources, at the center of decision-making, management, and oversight, assuming that their involvement promotes ecosystem sustainability and reduces social conflicts. That said, the effectiveness of community-based conservation isn't automatic; it's heavily influenced by policy design, clarity of management rights, institutional capacity, and government

support. In practice, failures often happen when community participation is symbolic without real authority. Therefore, community-based conservation is understood as a policy framework that can have various impacts on forest cover and the livelihoods of indigenous communities, so it needs to be analyzed empirically to assess its effectiveness in specific contexts, like in Tambrauw Regency.

Indigenous Communities and Forest Management

Indigenous communities have a close and multidimensional relationship with forests, encompassing economic, social, cultural, and spiritual aspects. This relationship forms a management system based on local knowledge that is passed down through generations and often embodies sustainability principles aligned with modern conservation. Several empirical studies over the past decade have shown that areas managed by indigenous communities tend to have lower deforestation rates than areas managed by the state or the private sector. Recognition of indigenous peoples' management rights has been shown to contribute to protecting forest cover and reducing carbon emissions, while significantly maintaining forest carbon stocks. However, the effectiveness of indigenous peoples' roles in conservation depends heavily on policies governing their access and authority. Policies that restrict access without considering local livelihood systems can have negative socio-economic impacts and trigger resistance. In the context of Tambrauw Regency, indigenous peoples are the primary actors affected by and play a role in community-based conservation. This is reinforced by the legal framework, Regional Regulation No. 6 of 2018, which recognizes and protects indigenous communities, including tenure rights and customary institutions. Therefore, evaluation of conservation policies in Tambrauw needs to consider the interrelationships between ecological, economic, and rights-securing aspects as a legitimate basis for involving indigenous communities.

Forest Cover as an Ecological Indicator of Conservation Effectiveness

Forest cover is a key ecological indicator in assessing the impact of conservation policies because it reflects the physical and functional condition of ecosystems. Changes in forest cover—whether deforestation, degradation, or stability—are influenced by the interaction between policies, human activities, and environmental factors. Advances in remote sensing technology, such as the use of Landsat and Sentinel satellite imagery, allow for accurate monitoring of forest cover changes over broad spatial and temporal scales. However, these changes cannot be directly attributed to a single policy as they are also influenced by development pressures, regional accessibility, and local economic dynamics. Therefore, in this study, forest cover is positioned as an indicator of ecological impact analyzed within the context of community-based conservation policies and forest management practices in Tambrauw Regency, not as the sole measure of conservation success.

The Impact of Conservation Policies on the Livelihoods of Indigenous Communities

The impact of conservation policies on the local economy is a critical issue because these policies can restrict access to natural resources while simultaneously opening up new economic opportunities through conservation

programs. Various studies have shown that the impact is highly dependent on the local context and policy design; in some areas, conservation can improve well-being through livelihood diversification and economic incentives, while in others, it can actually worsen economic conditions due to reduced access to land and resources (Rasmussen et al., 2018; Oldekop et al., 2019). In community-based conservation, economic benefits for indigenous communities are a key factor in maintaining support and policy sustainability, therefore, indigenous community livelihoods are used as the primary social indicator in this study (Schleicher et al., 2019). In addition, data from the 2024 Tambrauw Regency Regional Statistics and the 2025 Tambrauw Regency in Figures were used as a socio-economic baseline to understand livelihood conditions, access to services, infrastructure, and variations in household responses to opportunities and restrictions arising from conservation policies (BPS Tambrauw Regency, 2024, 2025).

State of the Art of Community-Based Conservation in Papua and Tambrauw

A study of community-based conservation in Tambrauw Regency shows that the success of conservation policies is determined not only by the biophysical conditions of the forest, but also by governance, institutional strategies, and policy implementation at the local level. Previous research has positioned Tambrauw as a region worthy of being developed as a "conservation district" due to its support for various strategic strengths and opportunities (Marten et al., 2019). However, policy effectiveness is highly dependent on the capacity of local government implementation, coordination, and oversight (Iriani, n.d.). Furthermore, the existence of Regional Regulation No. 6 of 2018 concerning the Recognition of Indigenous Communities strengthens the tenure aspect in natural resource management by affirming the rights, obligations, and roles of indigenous communities and customary institutions in conservation governance. Other studies have also shown that the formation of conservation districts is influenced by actor dynamics, biophysical factors, and the need for a collective and adaptive institutional model (Fatem, 2019).

From a socio-economic perspective, official data from the Tambrauw Regency Statistics Agency (BPS) serves as an important basis for understanding development conditions, livelihood dependencies, accessibility, and variations in household welfare among local communities (BPS Tambrauw Regency, 2024, 2025). Although research exists on strategies for establishing conservation districts, policy construction, and their implementation at the regional level, there is limited research integrating remote sensing-based forest cover changes with the economic impacts on indigenous households, while also assessing the role of policy implementation as a connecting mechanism. Therefore, this study contributes by simultaneously measuring ecological and socio-economic impacts through a mixed methods approach that combines spatial evidence and socio-economic data at the village and household levels.

METHODOLOGY

Research Methods and Techniques

This research was designed to analyze the impact of community-based conservation policies on (1) forest cover and (2) the livelihoods of indigenous

communities in Tambrauw Regency. Because the phenomenon studied encompasses interconnected biophysical-spatial and socio-economic/institutional dimensions, the research employed mixed methods to produce comprehensive, contextual, and accountable findings (Creswell & Plano Clark, 2018; Dawson et al., 2021).

Research Variables

Determining research variables is a crucial step to ensure that research objectives can be achieved systematically and measurably. The variables in this research were structured based on a previously developed framework, placing community-based conservation as the primary focus, influencing ecological and socio-economic conditions in Tambrauw Regency. Variable selection also refers to recent conservation literature that emphasizes the importance of using ecological and social indicators simultaneously in evaluating conservation policies (Oldekop et al., 2016; Dawson et al., 2021).

Data Analysis

Data analysis in this study was conducted to answer the research problem formulation and achieve the research objectives related to the impact of community-based conservation in Tambrauw Regency. Given that this study used a mixed methods approach, data analysis was conducted through a combination of quantitative and qualitative analysis, which were then integrated to obtain a comprehensive understanding of the impact of conservation policies on forest cover and the livelihoods of indigenous communities (Creswell & Plano Clark, 2018; Oldekop et al., 2016).

RESULTS

Overview of the Selected Village/Traditional Area

Table 1. Overview of the Research Location

Location	**General character of the area**	**Linkages to forests**	**Initial findings of implementation**
Fef	The center of government activity and access to information is relatively more open than other locations.	Forests remain an environmental buffer and a source of subsistence.	Policy socialization is more frequently mentioned, but has not been translated into community economic programs.
Bamusbama	Village/traditional areas with medium access and community activities are still strongly based on natural resources.	Utilization of forest products, gardens, and customary spaces remains a vital part of their livelihoods.	Customary institutions exist, but they do not yet have a clear operational role in conservation programs.
	Areas with more limited access and	Forests are crucial for	Most people stated that they had not

Syujak	relatively high community dependence on forests.	food, building materials, and cultural activities.	received information or tangible benefits from conservation policies.

Socio-Economic Characteristics of Household Respondents

Table 2. Socio-Economic Characteristics of Household Respondents

Characteristics	**Category**	**Frequency (n)**	**Percentage (%)**
Respondent's gender	male	76	63,3
	Female	44	36,7
Age	< 30 year	18	15,0
	30-39 year	34	28,3
	40-49 year	39	32,5
	>= 50 year	29	24,2
last education	Did not finish elementary school	22	18,3
	Elementary School/Equivalent	41	34,2
	Middle School/Equivalent	30	25,0
	High School/Equivalent	22	18,3
	College	5	4,2
Main job	Farmers/planters	64	53,3
	Fishermen/gatherers/hunters/forest product gatherers	21	17,5
	Informal/service workers	18	15,0
	Village officials/employees/honorary workers	10	8,3
	Other	7	5,9

Table 2 shows that respondents are predominantly of productive age and have primary education. This is important because education level and access to information influence people's ability to understand formal conservation policies. This low level of access to information is also evident in respondents' limited understanding of the content of district conservation policies, community involvement mechanisms, and the types of benefits indigenous communities should receive.

Description of Local Actors and Institutions Involved

Table 3. Actors and Institutional Roles in Conservation Implementation

Actors/Institutions	**Expected role**	**Field findings**	**Main problem**

Indigenous peoples	The main subjects of management and beneficiaries of conservation.	Many citizens do not understand the contents of the policy and do not feel involved.	Participation is still symbolic and not based on real authority.
Traditional figures/institutions	Maintaining customary rules, customary territories, and regulating access to resources.	Recognized by the community, but not yet strongly connected to the program government.	There is no clear working mechanism with OPD.
Village officials	Bridging policy information and community needs.	Often act as transmitters of information, but lack technical guidelines for conservation.	Coordination and budget support are limited.
District government/OPD	Developing programs, funding, monitoring, and evaluation.	The policy already exists, but implementation in the village is not yet consistent.	Attention has not been taken seriously, and there are no routine programs that the community feels.
Companion/NGO	Accompanying communities and strengthening local capacity.	There are several issues/locations, but not evenly distributed.	Programs tend to be limited to certain activities.

General Condition of Forest Areas and Policy Context at the Research Site

The forest area at the research site remains relatively extensive and forms a vital part of the landscape of indigenous communities' lives. Formally, the district conservation policy places forest protection and recognition of indigenous communities as part of the regional development direction. However, observations and interviews revealed a gap between formal policy and implementation on the ground. Some respondents stated that they were familiar with the term "conservation" but did not understand its objectives, benefits, limitations, or positive and negative impacts on their lives. This situation suggests that the primary problem is not simply the lack of regulations, but rather the weak implementation, socialization, mentoring, and translation of policies into concrete programs at the village level. Thus, the policy context at the

research site demonstrates a contradiction between Tambrauw's status as a conservation district and the low level of understanding and perceived benefits of the policy among indigenous communities. Results of Analysis of Community-Based Conservation Policy Implementation

Involvement of Indigenous Communities in Conservation Planning and Management

Table 4. Community Perceptions of Conservation Information and Involvement

Indicator	Yes (%)	No (%)	**Description of findings**
Have you ever heard the term Conservation District?	68,3	31,7	Most people only know the terminology, not the content of the policy.
Understanding the objectives of conservation policy	24,2	75,8	Understanding remains limited and uneven.
Have participated in official socialization	15,8	84,2	Outreach campaigns are not routine and do not reach the majority of households.
Involved in program planning	12,5	87,5	Involvement is still limited to certain key figures.
Understanding the economic benefits of conservation	10,8	89,2	The majority have not seen direct benefits.
Understanding the positive and negative impacts of conservation	18,3	81,7	The public has not received a complete explanation.

Interviews and focus group discussions (FGDs) indicate that indigenous communities' understanding of conservation policies in Tambrauw Regency remains low. While the term "conservation district" is generally familiar, the community is unfamiliar with the programs, benefits, or obligations associated with it. Forest conservation practices are driven more by customary laws and daily needs than by consistent government conservation programs. Furthermore, the lack of government outreach and support has led to conservation being viewed merely as a regional label, rather than as a policy that provides direction for forest management and improved welfare. These findings emphasize that indigenous communities should not be positioned solely as policy recipients, but rather as key actors who need to be actively involved in the planning, implementation, monitoring, and evaluation of conservation policies.

Monitoring, Patrol, Reporting, and Enforcement Mechanisms

Conservation monitoring mechanisms at the village level have not demonstrated a strong pattern. Field observations did not reveal a well-documented, routine community-based patrol system at any of the study sites. Information boards, conservation boundary markers, or educational materials

regarding conservation regulations are also very limited. Reporting of activities with the potential to damage forests occurs more informally through traditional leaders or village officials, rather than through a structured, official reporting system.

Table 5. Condition of Conservation Monitoring Mechanisms at the Research Location

Supervision components	Fef	Bamusbama	Syujak	General conclusion
Routine community patrols	Irregular	Not routine	Not routine	It's not yet a scheduled program.
Conservation information/rule boards	Limited	Not clearly found	Not clearly found	Public information is very weak.
Reporting violations	Informal	Informal	Informal	There are no official channels that the public understands.
Rule Enforcement	Customary rules are more dominant	Customary rules	Customary rules	Not yet integrated with district policies.
Activity Documentation	Limited	Limited	Very limited	Insufficient for policy monitoring.

Community-Based Conservation Implementation (II-KBM) Scores per Site

Table 6. II-KBM Scores per Research Site

Location	Participation	Institutional	Access/management rights	Supervision	Average II-KBM	Category
Fef	2,15	2,20	2,05	1,90	2,08	Low
Bamusba ma	1,85	2,00	1,95	1,65	1,86	Low
Syujak	1,70	1,80	1,75	1,60	1,71	Low
Average	1,90	2,00	1,92	1,72	1,88	Low

The results of the II-KBM (Community Based Conservation) indicate that all research locations fall into the low category. The highest score was for Fef, but it still fell short of the moderate category. The lowest score was for Syujak, characterized by low access to information, weak monitoring mechanisms, and limited links between district policies and village management practices. Therefore, the implementation of community-based conservation at the research locations cannot be considered effective.

Forest Cover Change Analysis Results

Spatial Analysis and Area of Interest (AOI) Overview

The forest cover change analysis was compiled based on a comparison of the pre-policy and post-policy periods. The pre-policy period used a composite of 2014-2017, while the post-policy period used a composite of 2019-2022. The Area of Interest (AOI) was not defined uniformly but followed the actual boundaries of the research districts, based on GIS delineation. Cover classes were differentiated into forest and non-forest to interpret general trends in change. Therefore, the AOI area and forest cover change figures should always be referenced to the final spatial processing results and field validation maps.

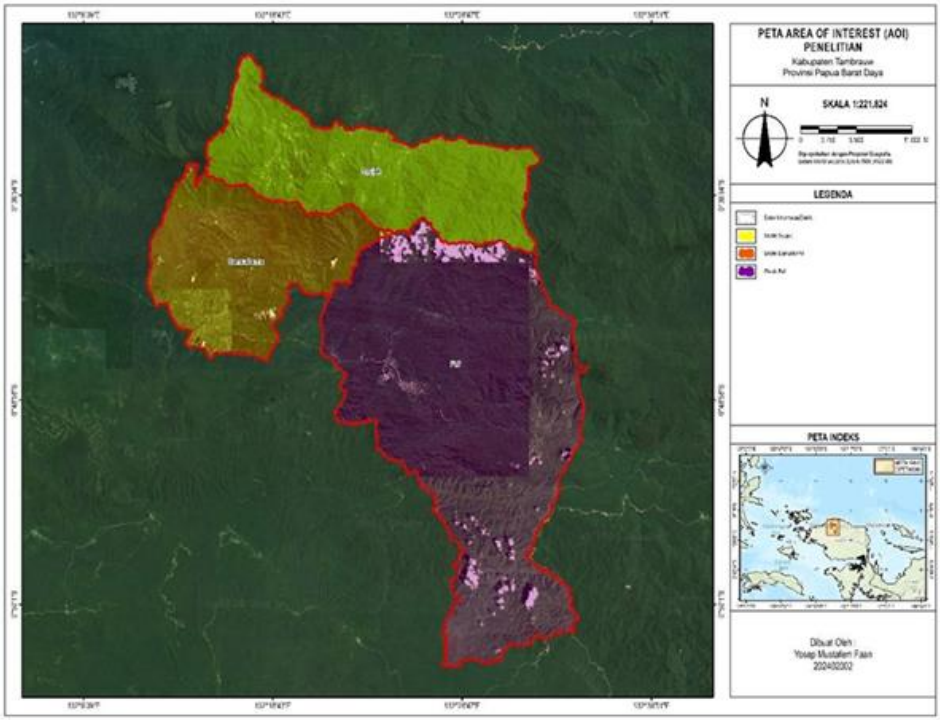

Figure 1. Area of Interest (AOI) Map of the Research Location

Table 7. Area of Interest (AOI) for Forest Cover Analysis

Location	Basis for determining AOI	AOI area (ha)
Fef	Actual district boundaries resulting from GIS delineation	72.605
Bamusbama	Actual district boundaries resulting from GIS delineation	27.230
Syujak	Actual district boundaries resulting from GIS delineation	31.068
Total	Combined all research AOIs	

Forest Cover Classification Results for the Pre-Policy Period (2014-2017)

In the pre-policy period, forest cover at the study site showed a tendency to remain dominant. This condition indicates that before the formal implementation of the conservation district policy, the study area had a relatively

healthy ecological base in the form of forests. However, this initial condition cannot be directly attributed to the conservation policy, as forest cover is also influenced by accessibility, customary tenure, and low pressure from large-scale land clearing.

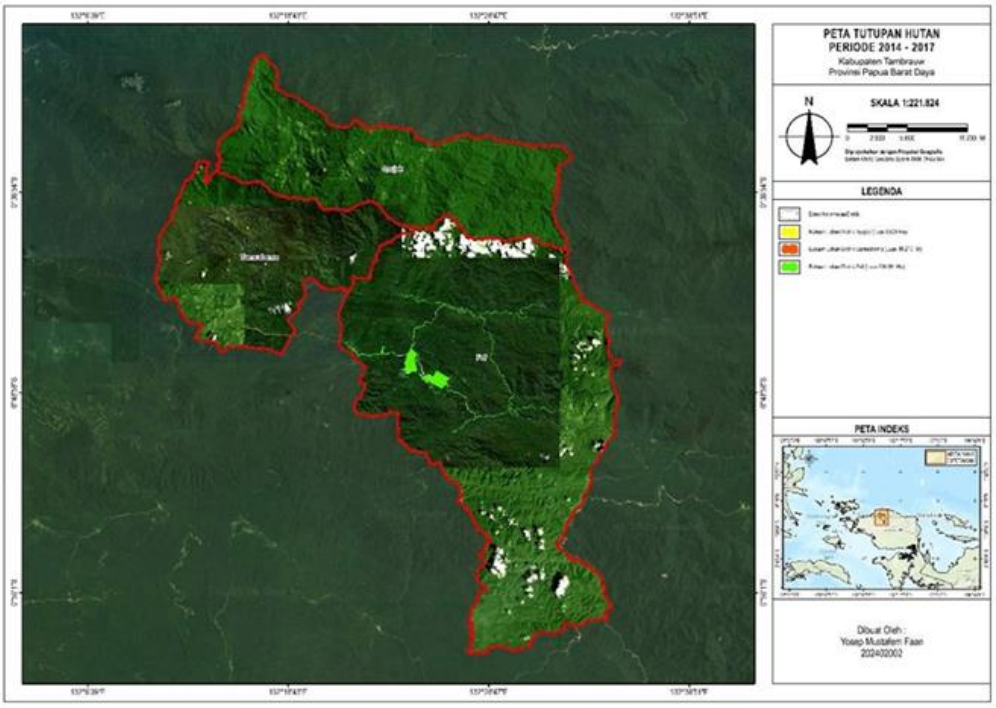

Figure 2. Forest Cover Map for the Period (2014–2017)

Table 8. Forest Cover for the Period Before the Policy (2014–2017)

Location	AOI area (ha)	Forest (ha)	Non-forest (ha)	Forest percentage (%)
Fef	72.605	72.315	290,091	99,60
Bamusbama	27.230	27.192	37,959	99,86
Syujak	31.068	31.059	8,605	99,97
Total	130.903	130.566	336,655	99,74

Forest Cover Classification Results for the Post-Policy Period (2019-2022)

In the post-policy period, forest cover remained dominant, but analysis results indicated limited changes in some locations. These changes should be interpreted with caution, as conservation district status does not automatically halt forest cover change. Without strengthening outreach, monitoring, local institutions, and concrete livelihood programs, conservation policies cannot be claimed as a primary factor in maintaining or changing forest cover.

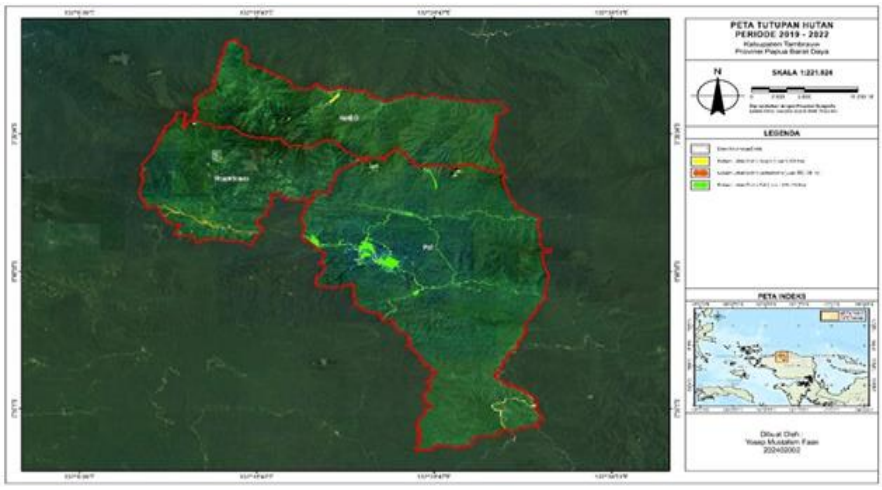

Figure 3. Forest Cover Map for the Period (2019–2022)

Table 9. Forest Cover for the Period after the Policy (2019–2022)

Lokasi	Luas AOI (ha)	Hutan (ha)	Non-hutan (ha)	Persentase hutan (%)
Fef	72.605	71.568	1036,745	98,57
Bamusbama	27.230	27.080	150,134	99,45
Syujak	31.068	31.059	9,305	99,97
Total	130.903	129.707	1196,184	99,09

Changes in Forest Cover Area, Deforestation, and Cover Stability

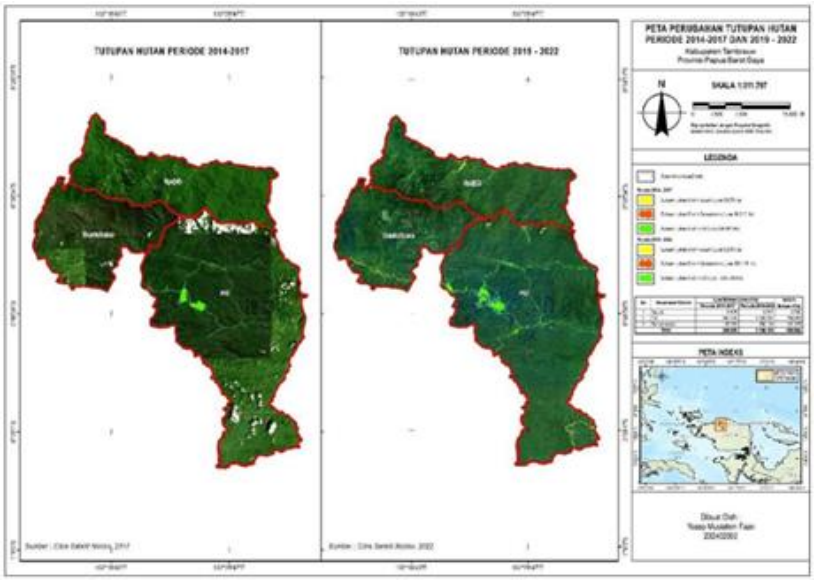

Figure 4. Forest Cover Change Map for Periods T0 and T1

Table 10. Forest Cover Change Between T0 and T1

Location	Forest T0 (ha)	Forest T1 (ha)	Change (ha)	Change (%)
Fef	72.315	71.568	746,65	1,03
Bamusbama	27.192	27.080	112,17	0,41

Syujak	31.059	31.059	0,70	0,00
Total	130.566	129.707	859,53	0,66

Based on the percentage change calculation from T0 to T1, the overall forest area decreased by 859.53 ha, or approximately 0.66% of the initial forest area. The largest decrease occurred in Fef, at 746.65 ha, or 1.03% of the initial forest area in the area. Meanwhile, Bamusbama experienced a decrease of 112.17 ha, or 0.41%. Syujak experienced almost no change, with a decrease of only 0.70 ha, or approximately 0.002%. Therefore, it can be concluded that the change in forest cover during the T0–T1 period was relatively small in percentage terms, but in absolute terms, the most significant decrease occurred in the Fef area.

Results of the Analysis of the Impact on Indigenous Peoples' Livelihoods

Household Income Overview

Survey results indicate that indigenous household income remains relatively low and unstable. Income sources are highly dependent on gardening activities, forest products, informal employment, family assistance, and seasonal work. Conservation policies do not appear to provide a clear increase in income for respondent households. Most respondents stated they had never received incentives, business training, productive economic assistance, or market access directly linked to conservation programs.

Livelihood Structure and Diversification

Table 11. Household Livelihood Structure

Source of livelihood	**Fef (%)**	**Bamusbama (%)**	**Syujak (%)**	**Average (%)**
Local gardens/farms	55,0	62,5	67,5	61,7
Forest products/hunting/gathering	37,5	45,0	57,5	46,7
Informal employment/services	32,5	22,5	15,0	23,3
Honorary/official/employee	17,5	5,0	2,5	8,3
Conservation-related businesses	5,0	2,5	0,0	2,5

Household Dependence on Forest Resources

Household dependence on forest resources remains high, particularly for food, building wood, traditional medicine, and non-timber forest products. Communities view forests not only as an economic resource but also as a cultural space and social identity. This high level of dependence requires careful explanation of conservation policies to avoid being perceived as a threat to community access. However, research findings indicate that policy communication has not adequately clarified the relationship between conservation, indigenous peoples' rights, and livelihood protection.

Table 12. Respondents' Dependence on Forest Resources

Dependency indicators	**Percentage of respondents (%)**	**Interpretation**
Collecting non-timber forest products at least once a month	58,3	Forests remain a source of household needs.
Using local wood for building/home repairs	62,5	Wood is used for domestic purposes.
Hunting/catching wildlife for household consumption	41,7	Activities occur according to local/customary patterns.
Having a garden adjacent to a forest area	70,8	Gardens and forests are interconnected in the community's living space.
Feeling that conservation can limit forest access	52,5	Concerns arise from the lack of clarity.

Economic Benefits from Conservation Activities/Programs

Table 13. Economic Benefits of Conservation Felt by Respondents

Form of benefit	**Ever received (%)**	**Never received (%)**	**Information**
Assistance for productive conservation-related businesses	6,7	93,3	Uneven and unsustainable.
Training in forest product management/sustainable economics	8,3	91,7	Only a small proportion have participated in activities.
Income from ecotourism/conservation	2,5	97,5	Not yet a source of income for the community.
Incentives/payments for environmental services	0,0	100,0	Not found among respondents.
Market access for local conservation-based products	5,0	95,0	There is no clear market system.

Based on these data, it can be confirmed that the positive economic impacts of conservation are not yet apparent. The conservation district designation has not resulted in significant changes in income, livelihood diversification, or access to economic benefits for indigenous communities.

Comparison of Economic Conditions by Level of Policy Implementation

Because all locations fall into the low implementation category, the comparison of economic conditions does not reveal a pattern that higher conservation implementation results in improved community economic well-being. Fef has a higher average income, but this is more related to access and variety of jobs, rather than conservation benefits. Syujak has a higher forest dependency and lower cash income, but its forest stability is relatively better due to limited access and customary social control, rather than a strong conservation program.

Table 14. Summary of the Relationship Between Implementation and the Economy Per Location

Location	Category II-KBM	Average income	Conservation benefits	Conclusion
Fef	Low	Relatively higher	Very limited	The economy is more influenced by access and non-conservation jobs.
Bamusbama	Low	Medium-low	Very limited	There has been no strengthening of a conservation-based economy.
Syujak	Low	Lowest	Not visible	Dependence on forests is high, and the benefits of policies have not yet been felt.

Integration of Quantitative and Qualitative Results

Relationship between Policy Implementation and Forest Cover Change

The integration of results shows that the low level of policy implementation does not align with claims of conservation success. Forest cover remains relatively high and forest change is relatively small, but qualitative data indicate that these conditions cannot be directly linked to the success of the conservation district policy. Communities are unaware of the policy mechanisms, patrols are irregular, and formal oversight is weak. Therefore, forest stability is more accurately understood as a result of local socio-ecological conditions, particularly limited access, customary tenure, and low pressure for large-scale clearing.

Relationship between Policy Implementation and the Livelihoods of Indigenous Communities

From an economic perspective, the relationship between conservation implementation and improved community welfare is not apparent. The majority of respondents did not receive any economic benefits from conservation. Low levels of public awareness mean that communities are unaware of the economic opportunities that can be developed through conservation district status. This

indicates that the policy lacks a benefit-sharing mechanism that can be utilized by indigenous households.

Trade-off or Synergy Between Ecological and Socio-Economic Outcomes

The research findings do not indicate a strong synergy between ecological and socio-economic outcomes. Ecologically, the forest remains relatively well-maintained, but from a socio-economic perspective, communities have yet to reap tangible benefits. Trade-offs have also not emerged strongly in the form of formal access restrictions, as the policy has not been strictly implemented. The resulting situation is an "impact vacuum," meaning that conservation has not improved the community's economy, but has also not established a clear and measurable forest protection system.

Contextual Factors That Strengthen or Weaken Policy Impact

Factors that weaken the policy's impact include minimal outreach, weak coordination between the district government and villages and customary institutions, the absence of a regular conservation economic program, unclear oversight mechanisms, and poor monitoring documentation. Meanwhile, factors that continue to maintain the forest include strong customary ties to the forest, limited accessibility, and community utilization patterns that are still at the household level. This means that customary and geographical factors are more prominent than formal policy factors. 4.5.5 Joint display of research results per village/customary area

Table 15. Joint Display of Integrated Research Results

Location	**Policy implementation**	**Forest cover**	**Community economy**	**Integrative interpretation**
Fef	Low, but relatively more information than other locations.	The initial forest classification decreased by 80 ha.	Income is relatively more diverse, not due to conservation.	Conservation status has not yet become a primary driver of socio-ecological change.
Bamusbama	Low, traditional institutions exist but are not yet connected to programs.	The initial forest classification decreased by 60 ha.	Income is still based on gardens and forest products.	Conservation is not yet present as an economic program or monitoring tool.
Syujak	Lowest in access to information and outreach.	The initial forest classification decreased	Dependence on forests is high, and the	Forests are relatively stable due to access and custom, not formal policies.

		by 40 ha.	benefits of conservation are not visible.	

DISCUSSION

The research results indicate that the effectiveness of community-based conservation implementation in Tambrauw Regency remains low. Although conservation district status has provided formal identity for the region, this policy has not translated into a robust working system at the village level. Indigenous community involvement in planning remains limited, the operational role of customary institutions remains unclear, and village governments have not received adequate technical or budgetary support. This situation indicates that the conservation approach still tends to be top-down and does not adhere to the principle of meaningful participation.

From an ecological perspective, forest cover in the research location remains relatively high, but this does not yet serve as evidence of the success of the conservation district policy. There were no strong indications of routine patrols, formal monitoring, or effective community-based conservation regulations. Therefore, the existence of well-maintained forests is more influenced by geographic factors and long-standing customary practices than by the conservation policy intervention itself.

From a socio-economic perspective, the impact of conservation policies on the livelihoods of indigenous communities is also not yet visible. Communities have not experienced increased income, diversified livelihoods, or direct economic benefits from conservation district status. Poor public understanding of the goals, benefits, and risks of conservation has the potential to create legitimacy issues, as policies can be viewed as government or external agendas that do not directly benefit local communities.

This research also shows that indigenous communities play a strategic role in maintaining forest sustainability through customary rules, territorial control, and local knowledge. However, this potential has not been optimally integrated into conservation policies. Customary institutions have not been positioned as key partners in planning, monitoring, or benefit-sharing, resulting in communities protecting forests more out of local customs and needs than through government-designed community-based conservation systems.

Overall, the research findings support previous theory and research that asserts that successful conservation does not solely depend on regulations or policy labels, but requires community participation, clear rights, economic incentives, strong local institutions, and consistent government support. Therefore, the Tambrauw Regency Government needs to shift the orientation of conservation from mere administrative status to a concrete work system through strengthened outreach, village-level implementation guidelines, joint monitoring mechanisms, and conservation-based economic programs tailored to the needs of indigenous communities.

CONCLUSIONS AND RECOMMENDATIONS

Based on the research results, the implementation of the district conservation policy in Tambrauw is still relatively low because, despite having a formal basis, it has not been followed by effective socialization, strengthening of local institutions, monitoring mechanisms, funding, and programs that are felt by the community. Forest cover is relatively well maintained, but this condition is more influenced by non-policy factors such as limited access, customary social control, low investment pressure, and subsistence utilization patterns, so it cannot be claimed as a direct impact of the policy. On the other hand, the livelihoods of indigenous communities have not received tangible benefits from conservation, due to minimal economic support, training, or forest resource-based programs. Overall, the conservation policy in Tambrauw has not produced a strong socio-ecological impact and remains more symbolic as a regional identity, with various weaknesses in the aspects of implementation, monitoring, and distribution of economic benefits.

FURTHER STUDY

This research still has limitations, so it is necessary to conduct further research related to the topic of Evaluation of the Implementation of Regency Conservation Policies on Forest Cover and the Livelihoods of Indigenous Communities in Tambrauw Regency, Southwest West Papuay in order to perfect this research and increase insight for readers.

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