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MORALITY BEFORE KNOWLEDGE

Evaluation of community-based forest management in addressing dependence on illegal gold mining

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ABSTRACT

Background: This study examines whether illegal gold mining/*penambangan emas tanpa izin* (PETI) remains the primary source of income for households living in community-forest areas and explores the conditions that could encourage a transition toward more sustainable livelihoods. The study particularly focuses on the level of income needed for miners to consider leaving PETI and the influence of local institutions on this decision. **Methods:** Using a qualitative design, the study applies purposive sampling and the Most Significant Change method to gather narratives from three groups: individuals engaged in PETI, those who depend on forest resources, and those with non-forest livelihoods. **Findings:** The findings show that economic pressure drives most decisions. Respondents consistently describe PETI as the only activity that provides fast and reliable income. Many state that a stable earning of around IDR 6 million per month is needed before they would consider leaving mining. Institutional issues deepen this dependence. Local governance structures are seen as unclear, dominated by a small network of families, and weak in carrying out basic functions. These conditions create distrust and limit community participation in forest management. Although people express interest in alternatives such as agroforestry, rattan-based products, or small-scale ecotourism, they view these options as uncertain and less profitable. **Conclusion:** The conclusion is that sustainable forest management cannot succeed without addressing both the economic gap and the governance gap. Furthermore, policies need to provide livelihood options that match the real income expectations of miners, strengthen transparency and fairness within local institutions, and support transition pathways that respect local agency. **Novelty/Originality of this article:** The results offer practical insights for designing interventions that reduce dependence on extractive activities while improving long-term social and ecological resilience.

KEYWORDS: biodiversity; central Kalimantan; illegal gold mining; NTFPs; social forest; village forest.

1. Introduction

Village forests are forest areas that are not yet burdened with permits and utilized for the village's welfare. They are managed by the Village Forest Management Agency or *Lembaga Pengelola Hutan Desa* (LPHD). Village forests are one of the five schemes of the Social Forestry Program. Policies regarding village forests are regulated by the Regulation of the Minister of Forestry of the Republic of Indonesia, which applies to protected forest areas and production forests, with a management period of 35 years that can be extended based on evaluations conducted at least every 5 years (Suwarno et al., 2016).

This forest has different ecosystems, including mangroves, peat swamps, freshwater swamps, heaths, lowlands, highlands, and mountains. The Forest with a Special

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Purpose/*Hutan dengan Tujuan Khusus* (HDTH) area has strategic conservation value due to its rainforest cover, high biodiversity, orangutan habitat, and the presence of the local community. It has many ecological and economic benefits and provides environmental services that allow people to earn a living. It also has an important role in maintaining ecosystem stability, demonstrated by the surviving biodiversity, which includes economically important flora species such as ironwood (*Eusideroxylon zwageri*) and meranti wood (*Shorea spp.*), as well as important fauna such as sun bears (*Helarctos malayanus*), orangutans (*Pongo pygmaeus*), and clouded leopards (*Neofelis diardi*).

However, the sustainability of HDTH faces a number of threats, such as plantation expansion, wildlife hunting, illegal logging, and illegal gold mining. Specifically, illegal gold mining is often seen as a quick way to gain economic benefits. Nonetheless, they have negative environmental impacts, including mercury pollution, soil degradation, damage to aquatic ecosystems, and biodiversity loss (Soe et al., 2022). Based on research, traditional gold mining releases almost all of the mercury it uses into rivers, which pollutes fish, the main source of protein for local communities, and poses long-term health risks (Castilhos et al., 2006; Meutia et al., 2023). It can also cause erosion and make water murkier. Open pits and land clearing break up forest cover, disrupt wildlife habitats, and increase the likelihood of forest fires in the dry season. The results indicate that the short-term financial benefits of mining are less important than the long-term costs to communities, such as healthcare costs, food shortages, and biodiversity loss.

Nevertheless, community-based forest management in a Forest with a Special Purpose/*Hutan dengan Tujuan Khusus* (HDTH) offers more sustainable benefits. For instance, it can develop biodiversity-based ecotourism, including trekking through the forest, exploring the river, and viewing birds, especially hornbills. It also offers cultural activities like honey harvesting and traditional rattan weaving. Non-timber forest products (NTFPs) such as rattan can also generate economic value without sacrificing ecological functions. As a climbing plant, rattan utilizes forest trees as support. Rattan's growth doesn't harm the host tree, contributes to biodiversity and the balance of tropical forest ecosystems by providing habitat for various fauna, and serves as an indicator of the ecological sustainability of forest areas. Additionally, the opportunities for payment for ecosystem services (PES), such as voluntary carbon market schemes that take advantage of the fact that tropical forests can store a lot of carbon, and watershed service payments to protect clean water supply schemes, are increasing, allowing communities to benefit financially from ecosystem services.

Therefore, comparing the deployment of HDTH to illegal gold mining indicates that a conservation-based approach for this social forestry is much more strategic. Biodiversity management plans are crucial in HDTH to maintain ecosystem sustainability and sustainably improve the well-being of village communities (Hutauruk et al., 2018). It can be a model for Indonesian village forests by strengthening community, promoting long-term economic sources, and utilizing ecosystem service mechanisms. It also needs good governance and the idea that the health of the community and the health of the ecosystem are mutually relevant.

This study is based on the idea of Sustainable Forest Management. It emphasizes a balance between ecological integrity, economic viability, and social equity in using forest resources (Putz & Thompson, 2020). Managing conflicts, such as competing demands between short-term economic exploitation (e.g., logging or mining) and long-term ecological sustainability, is essential. It demonstrates the necessity of negotiation, compromise, and adaptive governance to maintain sustainable resource use over time, rather than assuming harmony among the pillars (Sirimorok et al., 2024). It can be seen as a type of social forestry that gives local communities the power to manage forest resources while also protecting biodiversity and ecosystem services, where it coexists with the context of the village forest of HDTH.

Nevertheless, this concept aligns with Elinor Ostrom's theory of Common-Pool Resource management, which argues that, with clear rights and responsibilities, local institutions can manage common resources sustainably (Mol et al., 2025). This theory

leading us to understand resources that are difficult to exclude users from, but whose use is competitive, so that utilization by one party can reduce availability for another. Natural resources such as forests, fisheries, irrigation water, and air are examples. These assets are owned collectively by the community, not by specific individuals. These resources are vulnerable to damage if the community or institution that manages them does not do so properly because of their open and uncontrollable nature. A classic problem that arises is the tragedy of the commons, which is the tendency for everyone to exploit resources as much as possible for their own benefit, which in turn causes damage to resources for everyone.

In HDTH, LPHD represents an institution with the potential to prevent overexploitation of timber and non-timber resources while ensuring that benefits are distributed fairly through locally crafted rules, collective decision-making, and social monitoring. This positions HDTH not as an inevitable site of resource degradation, but as a living laboratory where Ostrom's principles can be observed and tested in practice. Therefore, this theory discusses how joint regulation and management can preserve these resources so that current and future generations can enjoy them (Saunders, 2014; Šestáková & Plichtová, 2019).

Based on this theoretical foundation, this research uses environmental economics theory, particularly that related to externalities, as the method to analyse this case. When the production or consumption activities of one economic actor impact the welfare of other actors outside the market mechanism, this is called externalization. Externalities can be negative or positive (Sreeja, 2024). The costs caused by gold mining activities, for example, are not borne by the miners but are transferred to the community in the form of public health risks, ecosystem damage, and reduced livelihoods. In contrast, village forest emphasizes the internalization of ecological and social values, ensuring that the benefits of forest management are shared fairly among local communities without long-term environmental damage (Allen, 2017).

Furthermore, the study uses the supporting theory of ecological modernization. It is relevant as it states that environmental sustainability can be achieved through institutional reform, technological innovation, and stakeholder participation. Social movements and civil society play an important role in environmental reform, and they do more than advocate for it (Mol & Sonnenfeld, 2014; Xia et al., 2025; York & Rosa, 2003). According to this theory, multi-level governance combines markets, civil society, and government to promote ecological innovation while restructuring society for sustainability. LPHD of HDTH represents such institutional reform by giving communities legal access and responsibility for managing forest areas. This approach integrates conservation with development, which is a more balanced alternative to extractive industries such as illegal mining, which often prioritize short-term economic gains over long-term ecological sustainability.

Finally, this study elaborates on the importance of diversifying livelihood options to reduce vulnerability and strengthen community resilience (Ardikoesoema & Karuniasa, 2025; Chambers et al., 1989). In many rural areas, communities are highly dependent on natural resources for their livelihoods. When illegal mining destroys forests, declining fish populations, agricultural productivity, and access to clean water threaten the long-term sustainability of livelihoods. In contrast, LPHD of HDTH promotes biodiversity-friendly practices, offering alternative pathways that can increase income and well-being without compromising ecological integrity.

Previous studies usually concentrate on what communities do or how they adapt or respond to natural resources, in the context of community-based forest management. However, this study focuses primarily on how communities respond to forest management policies, both in terms of socio-economic adaptation and their involvement in the direct management of natural resources, and how institutions or governments can play a strategic role in influencing community behaviour. It is often assumed that communities play an important role in forest utilization and conservation. This gap becomes particularly critical in the context of illegal mining, where institutional responses determine community compliance.

To tackle illegal mining, which often threatens the sustainability of natural resources, a more holistic approach is needed. This study aims to add a new dimension to the analysis of how institutions address illegal mining and how community behaviour can change. It will further examine how governmental and non-governmental institutions can design effective policies to respond to and address illegal mining, which is often carried out by communities that depend on these natural resources.

It will also explore sustainable methods communities can use. Many studies discuss the importance of biodiversity, but few provide practical solutions for communities to adopt more sustainable practices without sacrificing their income. This research seeks to encourage this change by offering alternative ways to increase community income through sustainable practices. For example, sustainable crop cultivation, non-timber forest product management, or ecotourism can protect ecosystems while providing sustainable economic opportunities.

This study aims to balance increasing community income with environmental preservation by encouraging communities to adopt sustainable practices based on biodiversity principles. Nevertheless, it will form the basis for development and guide the formulation of innovative, context-specific policies that positively impact ecosystems and community welfare around forests.

2. Methods

2.1 Location

This study was conducted in the Tumbang Habangoi Village Forest/*Hutan Desa Tumbang Habangoi* (HDTH), located in Petak Malai, Katingan, Central Kalimantan, covering approximately 3,888 hectares. The location (Figure 1) shows mining zones, residential settlements, and forested areas, forming part of the broader land-use landscape in the region. The diversity of land use and the concentration of PETI actors in this area make Tumbang Habangoi a relevant sample site for examining the spatial distribution of illegal mining activities and the dynamics of livelihood transformation from informal extractive practices toward more legal and sustainable economic sectors.

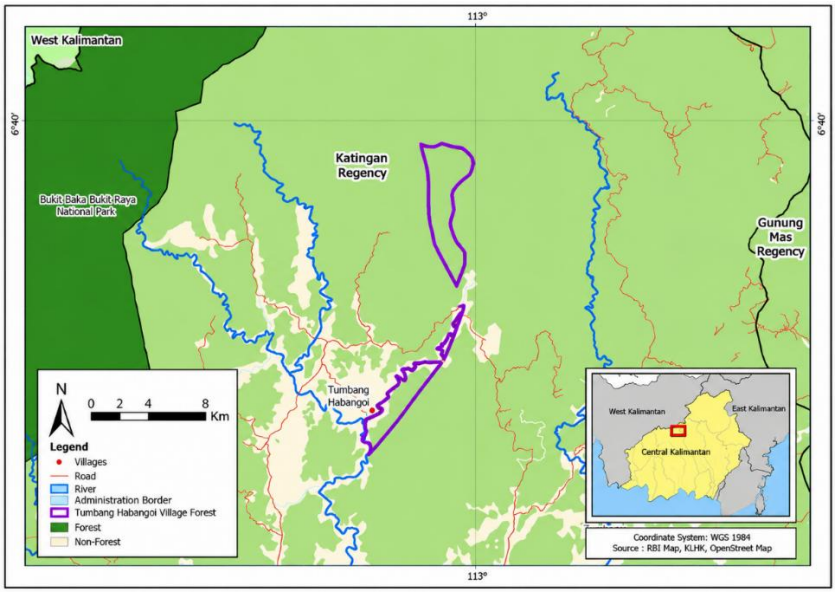


Fig. 1. Tumbang Habangoi Sub-district

2.2 Research design

The purpose of this study is to identify and compare the activities of communities that engage in illegal mining and those that do not. It is hoped that by making comparisons and

finding out the minimum threshold for an illegal miner to switch to another job, this can provide an overview for an approach to job replacement. Through research, it is possible to change community habits in the long term. This research will provide an overview of how sustainable forest management can be achieved through negotiations that are more empowerment-oriented and encourage community participation, which can be done by analyzing the role of institutions. To achieve the objectives of this study, this research uses a qualitative approach.

This study uses a qualitative approach. A qualitative approach is a research method that aims to understand phenomena related to what research subjects experience, such as behaviour, perceptions, motivations, actions, etc., holistically and descriptively in words and language, in a specific natural context and using various scientific methods (Moleong, 2017). Meanwhile, another definition states that a qualitative approach is a research approach that aims to understand phenomena related to what is experienced by research subjects, such as perceptions, motivations, actions, and so on, through descriptions in the form of words and language, in a specific natural context and using natural methods (Mardalis, 2008; Maxwell & Reybold, 2015). In emphasizing the topics raised, qualitative research provides more scope for data exploration. With this approach, efforts will be made to avoid being hindered by dynamic data changes during data collection (Garcia et al., 2015).

Furthermore, this approach will provide a comprehensive picture of the conditions of the forestry community, including its context and problems. This approach is highly effective in capturing the dynamics of change occurring between those working in illegal gold mining and those who have begun to seek alternative activities. This characteristic means that, in addition to providing flexibility in data collection, the qualitative approach can provide a contextual description of a research topic. At this stage, qualitative benefits can be seen in the ability to adjust to any changes in field findings. Because every study can change at any time, it is inevitable that the initial plan will differ from the results obtained.

The study used the Most Significant Change (MSC) basic research approach. MSC is a participatory monitoring and evaluation method. MSC focuses on stories about significant changes experienced by individuals or communities as a result of programs or interventions, rather than relying on statistical figures. In the fields of community development, education, health, and women's empowerment, this technique is used because it is able to capture qualitative effects that are often overlooked by quantitative methods (Dart & Davies, 2003; Sharma et al., 2024). By using the MSC method, this study can describe the changes that occur in society in a broader context. In practice, MSC will collect stories from informants.

2.3 Data collection techniques

This study used purposive sampling to determine informants. Purposive sampling is a commonly used non-probability technique and is an integral part of qualitative and mixed research, due to its focus on detailed and contextual understanding. Purposive sampling, defined as the deliberate selection of specific units (such as individuals, cases, or events) based on their relevance to the research questions, allows researchers to gain deep insights into complex phenomena (Dincer & Dincer, 2024; Tajik, 2012) . Categorization is important in determining informants. This study created three categories of informants: (1) individuals who have been engaged in illegal gold mining for at least one year, (2) individuals who work in forest-dependent occupations, and (3) individuals who work in occupations that are not dependent on the forest. These three categories can serve as a basis for comparing those who work in illegal gold mining with those who do not.

In this study, the researcher used two types of data: primary data and secondary data. Primary data is data obtained directly from the first person; this data does not originate from second-hand sources and so on in the form of files and so forth. Another definition states that primary data is data collected directly by researchers from the original source. This research aims to obtain primary sources by conducting interviews and direct observations with the village community, in this case those who are active in the area

surrounding the village and illegal gold miners. Secondary data, on the other hand, is data obtained to support primary data requirements, such as books, journals, documents, photographs, graphs, and other physical data. Methodological triangulation, which enhances the credibility and depth of findings by validating information obtained from various perspectives, is supported by the use of this diverse data flow. In addition to the data validation process, triangulation is able to provide diversity of data to obtain a more in-depth and comprehensive analysis.

In practice, to collect stories, researchers conducted in-depth interviews by visiting each informant individually. This was done to gather information about the stories and understand the background of each story. An interview is defined as a meeting between two people to exchange information and ideas through questions and answers, so that meaning can be constructed on a particular topic (Dincer & Dincer, 2024). In this research, the MSC approach was adapted for the data collection method to explore the changes experienced by the informants, without further participatory discussion in a forum. This method is used because the objective of this research is to understand individual experiences as a beneficiary of the changes, rather than to decide participative changes' priority.

Despite the limitations of this data collection method, conducting in-depth interviews with 30 informants is considered sufficient to collect the information are contextual to one village. This shows that with a sufficient number of informants, subjectivity can be minimized and generalizations can be made to understand the context of the village community. In addition, this study observed the activities of the village community, especially those working in the forestry sector and those working in illegal mining. The observation was conducted not only to validate the interview data, but also to obtain a complete picture of the issues raised in this study.

2.4 Qualitative narrative analysis (QNA)

After the data is collected, the main purpose of coding is to organize and simplify complex data into parts that are easier to analyze and interpret. Based on Creswell (1998) theory, the steps taken are: (1) Managing and organizing data, (2) Identifying and recording interesting ideas from the data. (3) Describing and labeling or coding parts of the data and grouping the codes into main themes. (4) Drawing conclusions and interpretations from the themes that have been found (Garcia et al., 2015). These themes were then compared across informant categories to identify behavioral and institutional differences between illegal miners and non-miners. In the process of describing the data, theoretical frameworks guided the interpretation and categorization of data during analysis. While the analytical process follows Creswell's theory above, the data analysis technique is operationalized through Bungin's (2022) practical framework of reduction, display, and conclusion drawing (Bungin, 2022). The integration of these two approaches allows the analysis to remain both systematic and responsive to contextual nuances in the field during field data processing.

The reduction stage begins with data collection, with the aim of classifying any data that is irrelevant or inconsistent with the objectives of the researcher's research. At this stage, the researcher performs reductions based on the theory used. The next stage is to present the data obtained from informants in the field based on individual experiences, thereby forming a display of data that narrates the existing data. This presentation of data is predominantly qualitative in nature, while tables, diagrams, charts, and matrices are used to support the data when necessary to reinforce it.

The last stage is to draw conclusions in the form of meanings contained in the data. The researcher is encouraged to interpret the data and describe it in the form of scientific writing to answer the research questions that the researcher asked at the beginning. Therefore, in every data analysis process, data verification is necessary to ensure the validity of the data obtained by the researcher.

Thematic analysis was used to analyse the data in this study because it is suitable for exploring patterns and themes from qualitative data collected through observation and interviews. It allows researchers to find the main themes related to respondents'

perceptions and experiences of the phenomenon being studied. In addition, this method allows researchers to conduct a more in-depth examination of the data and enables them to organize narrative data into more structured categories. Furthermore, this method is highly relevant because the purpose of the study is to analyze the experiences and perceptions of respondents through the disclosure of their subjective understanding and personal views.

This method was chosen because it is suitable for research questions that prioritize understanding diverse and complex phenomena. Thematic analysis differs from other methods such as grounded theory or phenomenological analysis because it allows for more systematic data grouping and facilitates drawing conclusions based on dominant themes. In addition, this method strengthens research findings by enabling data triangulation, which allows researchers to verify the consistency of themes that emerge through various data sources.

3. Results and Discussion

This section presents the general results of research conducted through field questionnaires and interviews. The results explore the rational evaluation of economic gains, institutional trust, and perceived fairness. While community-based forest management through the Village Forest Management Agency/*Lembaga Pengelola Hutan Desa* (LPHD) provides an important structural framework, it is not the central determinant of behaviour. Instead, people's engagement with either sustainable livelihoods or artisanal gold mining/*Pertambangan Emas Tanpa Izin* (PETI) reflects their calculation of relative benefits, risks, and reliability of income sources within a given social environment.

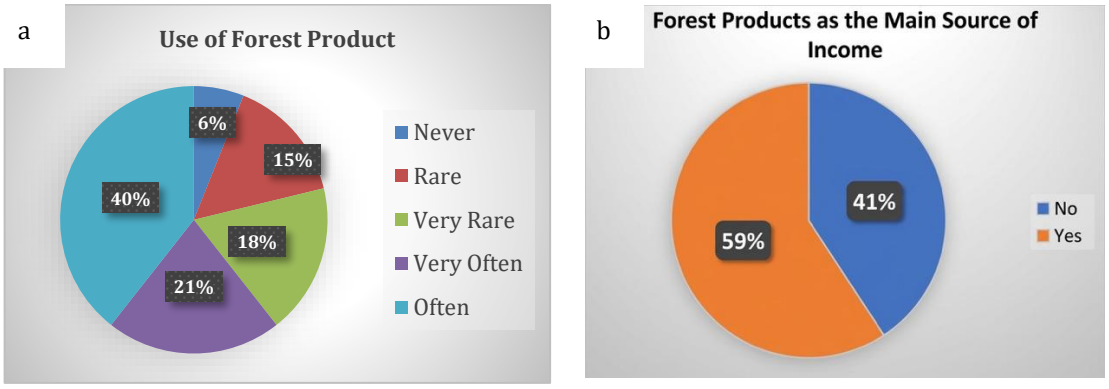


Fig. 2. (a) Intensity of community use of forest products; (b) Forest products as the main source of income

Based on the diagram above (Figure 2), almost 60% of the informants had lived in the area for decades, with their main source of income being small-scale agriculture and non-timber forest products (NTFPs), such as rattan and honey. We also see that almost all informants use forest products in their lives. Further, some informants said they engage in artisanal mining briefly during the dry season, when crops don't produce as much. This diversification of livelihoods, while providing temporary resilience, exposes economic fragility that shapes many subsequent attitudes. One informant said,

> *"Sometimes I have to help my husband with mining work during the dry season, because the crops aren't enough."* (L, 50)

Others said that collecting rattan or farming has been their whole lives:
"I lived here since childhood, farming and picking up rattan for extras." (T, 46)

This statement illustrates that informants experience economic instability and dependence on various forest resources. For most respondents, PETI represents not moral

defiance but economic pragmatism. The activity offers quick liquidity and relatively high daily returns compared to formal or sustainable alternatives. As one miner explained,

> *"If you mine for a day, you can get two to three grams; you can sell it immediately and use the money right then and there."* (L, 44)

In contrast, forest-based or agricultural livelihoods provide income that is smaller, delayed, and uncertain.

"With rattan or a farm, the returns are uncertain." said another respondent (U, 55).

This contrast reveals a key behavioral threshold: individuals are likely to abandon PETI only when alternative livelihoods approach the same level of net benefit, not just in monetary terms, but in effort, time, and risk. The notion of "enough" is therefore both economic and psychological; people weigh not only the amount earned but the immediacy and security of that earning. However, income comparison alone does not explain persistence in mining. Respondents also refer to the entry cost of alternatives: land preparation, access to buyers, and dependence on LPHD's bureaucratic process. One participant described it succinctly:

> *"If you want to plant crops, you have to get permission first—there are meetings; it takes a long time. But with mining, you can start working right away."* (U, 55)

This highlights a deeper structural barrier: the transaction costs of formal livelihoods sometimes outweigh their potential rewards.

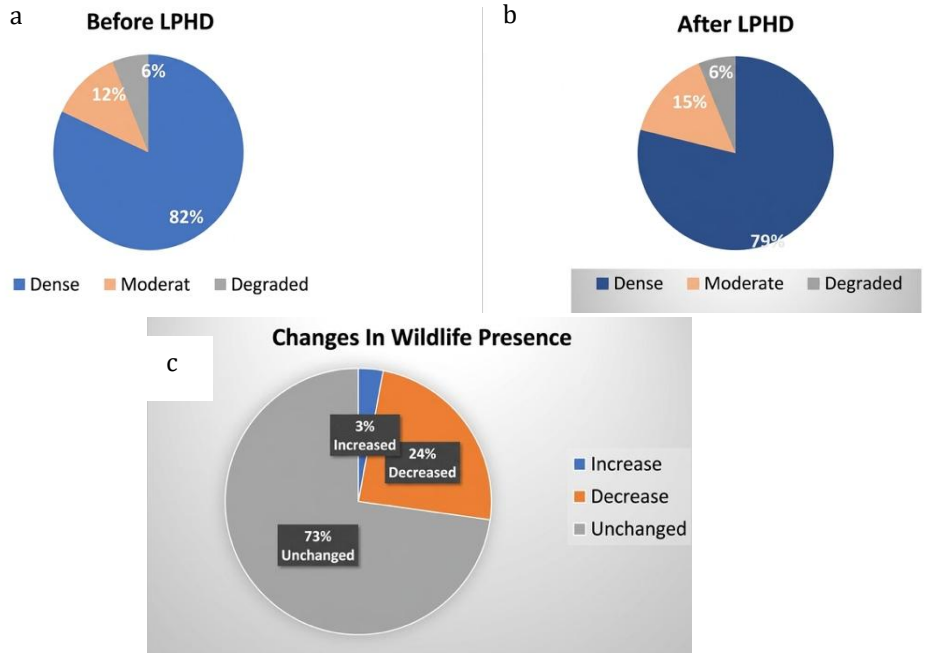


Fig. 3. (a) Before LPHD; (b) After LPHD; (c) Wildlife presence

Based on figure above (Figure 3), the impact is not significantly noticed by the majorities of informants. They believe the condition of the forest and its wildlife has not changed significantly. However, given the community's dynamics, the LPHD functions to maintain the HDTH, minimize illegal intervention, and keep forest products and wildlife higher in each period.

Taken together, these findings suggest that transitions away from PETI cannot rely solely on moral persuasion or environmental awareness. They depend on altering the

economic and institutional equation that shapes everyday rationality. Sustainable alternatives must compete not only in profit but in immediacy, simplicity, and perceived fairness. In other words, behavioural change follows when the combined monetary and trust return from legal livelihoods exceeds that of illegal ones.

Institutional context, especially trust in LPHD, strongly shapes people's willingness to transition. While the organization exists as a legal entity, its social legitimacy remains contested. Field findings show that each informant understands LPHD differently. Some informants can explain how it works and its rules, while others only know its name. LPHD is understood as a formal organization because it has documents, offices, and recognized leaders. Different people know about LPHD in different ways. Some survey respondents could explain how it worked and what its rules were, while others only knew its name and didn't know what it was for. The difference between institutional visibility and social legitimacy is a common theme. LPHD is known as a formal organization because it has papers, an office, and known leaders. However, it is not as well-known as a group that represents the interests of the community. One person who answered said,

"I know about the LPHD, but I don't understand the rules." (E, 46)

Someone else said,

"There are Articles of Association and Bylaws, but who actually uses them? They are often prepared for the benefit of external parties." (TH, 34)

These accounts indicate that LPHD's role, while formally institutionalized, is not socially ingrained among numerous members. Participation in LPHD shows similar imbalances. Many people are officially listed as members, but they don't really do anything. Meetings don't happen often, and information usually comes from the top down rather than through open discussion. Informants said they were passive or symbolic members:

"We are just members, but even when there are meetings, we are rarely informed." (Y, 40)

Sometimes you know the decision. In some cases, functional departments exist only on paper, and a few people who aren't in charge of them handle operational tasks informally. For example, one person remarked,

"There is a transportation sector, but it never actually functions; the people handling transportation are just the same old rattan folks." (H, 45)

These explanations show that formal job allocation doesn't support effective collective governance, since only a small number of economically engaged people do most of the labour. Leadership actions are a key source of conflict. Several interviewees said power often shifted from one family member to another, a pattern often described as hereditary leadership. The passing of the chairmanship from a deceased father to his son was interpreted as favoritism and a lack of accountability.

"The chairman used to be the late village head; now it's his son." (J, 32)

One insider said, adding,

"The people sitting on the board are just the same old family members." (B, 40)

Although this regular rotation of leaders may look stable, it weakens transparency and confidence. When a single family holds all decision-making authority, the sense of shared ownership LPHD was designed to instill in everyone is lost. Another issue that keeps coming up is being open about money. A lot of the people who answered said they didn't know how

the money from sales or management fees is split up. Some people say that some of LPHD's money goes into an administrative fund, but members don't see financial reports very often and don't know how the money is spent. People often say things like,

> *"The committee members take the lion's share of the proceeds—supposedly for the LPHD fund—but we never see any financial reports."* (W, 45)

and *"There are deductions for the committee, but it's unclear what the money is used for." (A, 55)*

People say that LPHD largely favors its leaders over the broader community because its financial records are hard to read. When the economy isn't transparent and honest, it not only damages trust but also makes people less inclined to participate on their own. This makes the patterns of disengagement previously discussed even worse.

Conflict and resistance can take many forms. Some people who answer quietly stop participating in LPHD activities, while others openly say they are unhappy or return to their own ways of making a living, such as small-scale mining, even though they know the risks to the environment. Their reasoning is based on what works, not on what they believe: when collective management doesn't work, survival comes first. One participant said,

> *"If that's the case, it's better to go back to mining, get money quickly."* (S, 36)

Someone else said,

> *"Disappointed people eventually return to traditional mining."* (I, 55)

These anecdotes suggest that governance failures directly shape people's decisions about how to make a living. This suggests that when institutions fail, individuals turn to activities that harm the environment.

These things are frustrating, yet there is still hope. Many people say they have conditional trust, meaning they're willing to get involved again if improvements in how things are conducted prove genuine. They only want LPHD to be honest about its money, pick leaders properly, and stay out of people's homes. Words like this capture the feeling.

> *"I would be willing to participate again if the transparency of the funds is clear,"*

and *"If the leadership is chosen openly, we could trust them again."* (M, 42)

Informants were also interested in other environmentally friendly ways to make money, such as ecotourism or value-added non-timber forest product (NTFP) enterprises, as long as they could obtain government aid and earn their fair share of the profits.

The survey states that the community is caught between wanting to be positive about the future and being bored with institutions. Many individuals have stopped participating because they believe the rules are unfair and unclear. However, if the rules were fairer and clearer, those same people might be willing to come back. This indicates that the legitimacy issue confronting LPHD is transient.

Based on data extracted above, the analysis reveals that community decisions in Tumbang Habangoi are influenced by a dynamic interaction among economic thresholds, institutional credibility, and perceived fairness. These results confirm that livelihood transitions are influenced not only by income disparities but also by social and ecological rationality, reflecting a behavioral negotiation between immediate survival and long-term sustainability. Strengthening institutional transparency, clarifying participation rules, and ensuring fair benefit distribution may therefore help rebuild community trust and encourage renewed participation in LPHD. Such measures are essential to aligning local livelihood needs with long-term forest conservation objectives.

3.1 Economic threshold and livelihood elasticity

The perceived economic threshold is central to behavioral decision-making, representing the minimum income necessary for individuals to transition from artisanal gold mining (PETI) to sustainable livelihoods. Field data demonstrate that PETI produces rapid and significant earnings, averaging IDR 800,000–1,200,000 per day, amounting to approximately IDR 15–25 million per month, contingent on gold purity and seasonal variations.

Sustainable forest-related activities, such as rattan harvesting and small-scale farming, produce lower yet more stable returns, approximately IDR 2–4 million per cycle (every two to three months). Respondents consistently indicated that these activities yield benefits in the future rather than in the present, reflecting the concept of temporal discounting as described by behavioral economists: the inclination to favor immediate rewards over delayed benefits (Kahneman, 2011).

Findings at the household level indicate that PETI accounts for 40–88% of total household income, highlighting its significant economic role. Respondents indicated that the minimum income required to cease mining ranged from IDR 2 to 9 million per month, depending on family size and land ownership. This range delineates the perceived threshold for livelihood substitution, indicating the juncture at which alternative livelihoods are considered rational replacements.

Consistent with research on rural livelihood elasticity (Chambers et al., 1989; Rahman & Akter, 2014), respondents expressed readiness to transition if alternative income sources could achieve at least 50–60% of PETI returns, provided they offered greater predictability and reduced risk. Economic incentives matter not only in magnitude but also in timing and reliability. The issue lies not in a lack of awareness regarding environmental risks, but rather in the disparity between immediate and delayed financial returns (Sreeja, 2024).

3.2. Institutional credibility and the trust multiplier

Economic factors strongly affect institutional trust, which can encourage or discourage behavioral change. The LPHD, which was meant to be a participatory governance body, lacks legitimacy. Leadership continuity through familial ties can foster perceptions of nepotism, while communication gaps undermine confidence in procedures. Trust acts as a behavioral multiplier: when communities see fairness and predictability, even small rewards can lead to cooperation; when they see favoritism, participation falls apart. Respondents consistently associated the readiness to cooperate with transparency. The lack of regular reporting or clear roles raises the psychological cost of participating (Mol et al., 2014). Governance, in this context, is not merely a matter of policy but a mechanism for cost redistribution. When institutions function transparently, they lower the social and psychological risk of cooperation. When they don't, informal systems like PETI appear more reliable.

The literature on community-based resource management stresses that common-pool institutions work best when they have clear boundaries, rules everyone can agree on, and locally enforced punishments (Saunders, 2014). LPHD meets some of these formal requirements, but not all. Its legitimacy comes from the bureaucracy, not from relationships. This gap hinders both compliance and innovation, corroborating Sirimorok et al. (2024) conclusion that adaptive governance requires negotiation and ongoing institutional learning rather than mere adherence to procedures. In practice, the absence of strong relational legitimacy may limit community members' willingness to participate actively in decision-making and respond collectively to emerging resource-management challenges. Consequently, strengthening LPHD's institutional capacity requires not only clearer administrative mechanisms but also sustained interaction, trust-building, and opportunities for communities to contribute to formulating and adjusting local rules.

3.3 Perceived fairness and risk trade-off

The ethical dimension of economic conduct emerges as another pivotal element. Respondents consistently evaluated PETI and LPHD not in legal terms but through the lens of fairness. Conversely, institutional programs are regarded as opaque and exclusionary, with benefits predominantly accruing to insiders.

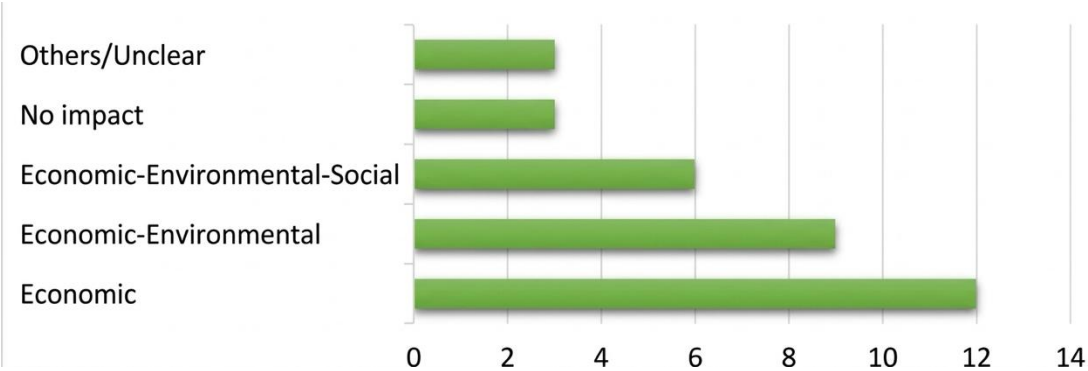


Fig. 4. Perceived impact reported by informants

Most responses indicate that the most felt impact of the Village Forest on the community is economic. This confirms that residents most easily recognize and quickly feel economic benefits. Meanwhile, a small number of responses stated that they have not felt the impact, and none did, indicating that the perception of benefits is not yet evenly distributed across all community groups. These findings illustrate that the sustainability of ecological and social benefits is still considered secondary, and the level of community engagement with conservation functions has not yet fully developed.

This is in line with moral economy theory (Scott, 1976; Carrier, 2018), which says that peasants make economic decisions based on what they think is fair, not just what will make them the most money. Fairness acts as a risk discount factor; when individuals perceive that benefits are allocated justly, they accept reduced income and extended waiting times. When fairness is not present, even safer options are perceived as hazardous.

Risk is not formally eradicated but rather socially redistributed. Putz & Thompson (2020) note that in sustainable forest management, communities use practical risk-sharing to find a balance between protecting the environment and making sure people have jobs. PETI's equal sharing structure in Tumbang Habangoi shows reciprocity, but institutional programs are still abstract. This perceived immediacy makes PETI seem fairer, even though it is riskier.

3.4 Behavioral interaction and utility equilibrium

These variables interact dynamically. The decision to switch livelihoods can be modeled as a comparative utility equilibrium:

$$U_s = (I_s - C_s) + T + F - RU_p = (I_p - C_p) \quad \text{(Eq. 1)}$$

where U_s and $U_p$represent the perceived utility of sustainable and mining livelihoods; I= income, C= transactional cost, T= trust premium, F= fairness perception, and R= perceived risk. Transition occurs when $U_s \geq U_p$. Currently, $I_p >> I_s$, but C_p (health risk, illegality) and R(uncertainty of enforcement) remain underweighted due to habituation and local normalization (Tversky et al., 1981). To increase U_s, governance must raise $T$and F, lowering the effective risk and transaction cost of collective participation.

Empirically, results suggest a minimum compensation ratio of 0.5–0.6: if sustainable livelihoods reach 50–60% of PETI earnings while ensuring transparent and fair governance,

transition becomes economically and psychologically feasible. Beyond that, additional income produces diminishing behavioral effect without credibility reinforcement.

Table 1. Training needed the most

Needs	Requested by informant (times)
Business management	24
Market access	17
Branding	9
Tour guide	3
Wildlife monitoring	2
Digital finance	1

Based on the table above (Table 1), the greatest need clearly boils down to Business Management and Market Access, two economic foundations that determine whether village enterprises can operate and generate stable income. Branding emerged as the next layer, society became aware that product/service differentiation is now important for attracting external markets. Needs such as tour guides socialisation, wildlife monitoring, and digital finance training are more minor, but they indicate a diversification of aspirations, such as, some residents envision ecotourism, while others see the need for more modern data and financial management.

These also closely related to the livelihood decision-making balance model, which describes how individuals assess the relative benefits between sustainable employment and PETI. Business management training, market access, and branding are not merely technical skills, it is about reducing transition costs (C_s), strengthen self-efficacy, and lower risk perceptions when starting more sustainable effort. At the same time, needs such as wildlife guides or monitoring provide non-monetary incentives in the form of social identity and a sense of belonging to the landscape, which increases the trust premium (T) and perceptions of fairness (F). The combination of reduced costs, increased sense of competence, and the presence of these social incentives helps to raise the utility of sustainable livelihoods (U_s), thus narrowing the gap with the utility of PETI (U_p). Thus, training is not just skill upgrading, but an important mechanism that drives economic and psychological transitions toward more sustainable livelihood options.

3.5 Structural Vulnerability and Reversion Risk

The field assessment cautioned that mining activities could resume within five years if economic alternatives remained inadequate. One enumerator noted:

> *"If there is no adequate substitute, people will certainly go back to mining within five years."*

This prediction is an example of what Allen (2017) calls the externality trap, when people keep short-term profits for themselves while passing on long-term social and environmental costs to the community. This weakness shows that just replacing income won't make behavior permanent. If institutions aren't stable and enforcement isn't credible, transitions that last aren't permanent. York & Rosa (2003) say that ecological modernization only works when there is multi-level governance that brings together civil society, the market, and the state. LPHD is currently operating in isolation, devoid of vertical support and horizontal trust.

Although the community clearly recognizes the tourism potential—especially the natural beauty, wildlife, and local culture—this has not been enough to mitigate the risk of reversion. The dominance of the answer natural beauty indicates that they see opportunities but have not yet experienced a tangible economic path. The tourism potential is still at the perception level, not income.

Tumbang Habangoi Village has considerable potential that could be developed into economic opportunities in the tourism sector. Based on the interview results, almost 70% of the informants identified natural beauty as the main tourism potential, followed by wildlife, cultural attractions, and Bukit Raya. These potentials are also among LPHD's development priorities, including developing nationally standardized bottled drinking water sourced from natural springs. Tumbang Habangoi's natural beauty offers various tourism opportunities, including waterfalls, Bukit Raya, and agro-tourism or village forest tourism activities such as white-water rafting, river trekking, camping, tracking, and fishing. Effective and structured management could help transform these resources into sources of economic income for the local community. Table 2 summarizes the identified tourism potentials and associated development opportunities.

Table 2. Tourism potential in Tumbang Habangoi Village

Tourism segment	Specific attraction (based on informants)	Relevance to Conservation
Natural beauty	Forest panorama, hill views, natural rivers, Bukit Raya landscape	Natural beauty can only be preserved if deforestation and PETI activities are suppressed. It serves as an ecological incentive because the quality of the landscape is a major tourism asset.
Wildlife	Wildlife observation (orangutans, hornbills, other endemic Kalimantan fauna)	It depends on habitat sustainability. It's a strong argument for maintaining forest cover, reducing hunting, and minimizing disturbance from mining activities.
Local culture	Local traditions, community activities, traditional crafts	Culture is often linked to sustainable ecological practices. Cultural tourism enhances citizens' sense of ownership and motivates landscape protection as part of their identity.
Waterfall	Waterfall, spring source, clear river flow	It depends directly on water quality. This creates a collective interest in rejecting PETI because gold suction directly damages rivers.
Bukit Raya & other natural objects	Trekking trails, hiking, natural photo locations	Requires zoning and protection of the ecotourism trail. If the forest is damaged, the immediate appeal is lost, thus creating pressure to maintain forest cover.

In the context of reversion risk, this means the inability to monetize ecological assets keeps communities dependent on the short-term economic logic of PETI. In other words, the existence of potential does not automatically reduce dependence on mining: without market access, entrepreneurial capacity, and credible governance structures, tourism potential turns into unused capital. This situation reinforces the risk that, when economic pressure increases or support programs weaken, people will return to PETI activities because the alternatives they know have not yet become truly viable options.

3.6 Emerging alternative narratives

Even with these problems, there are signs that people are learning how to adapt. Some younger respondents try out hybrid livelihoods, like collecting rattan and working part-time in mining. This is an example of what Chambers et al. (1989) called livelihood diversification under constraint. Others are hopeful about new ways to make money, such as coffee, peanuts, and ecosystem services. Someone said,

"If it's possible to get paid for protecting the forest, that's better than mining." (S, 40)

These stories show hidden socio-ecological resilience, which is the ability to change how people make a living without losing their sense of place (Folke et al., 2010). They show that opposing institutional programs doesn't mean rejecting sustainability; it means

criticizing unfairness and wastefulness. More importantly, these adaptive responses suggest that local communities are not simply passive recipients of development or conservation interventions. Their livelihood choices reflect an ongoing negotiation between economic necessity, environmental stewardship, and the institutional conditions that shape access to alternative income sources.

This negotiation also indicates that livelihood adaptation is not necessarily a linear transition from environmentally harmful activities toward more sustainable ones. Instead, households may combine different livelihood strategies depending on the risks, opportunities, and constraints they face at a given time. Such flexibility can provide short-term economic security while maintaining connections to land, forests, and other locally available resources. However, the capacity to diversify is unevenly distributed, as access to markets, skills, capital, infrastructure, and institutional support may determine which households can pursue alternative livelihoods. Consequently, strengthening socio-ecological resilience requires more than introducing new livelihood programs; it also requires creating enabling conditions that allow local communities to participate meaningfully in defining, accessing, and sustaining those opportunities.

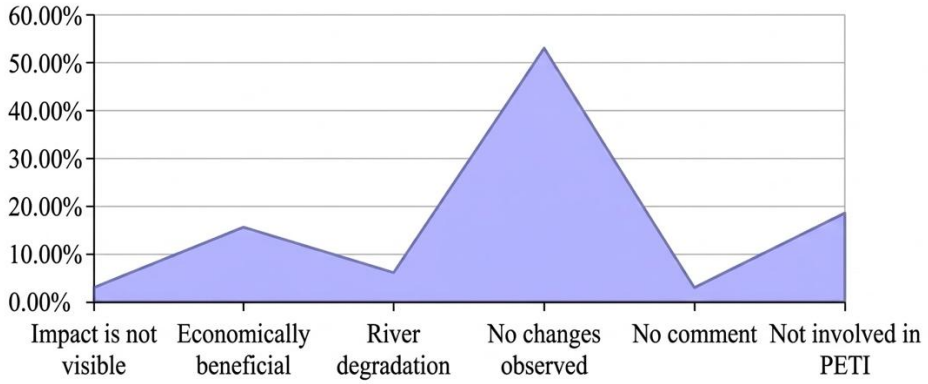


Fig. 5. The most significant changes caused by illegal gold mining activities

Nevertheless, based on deep interview, majority of the informant is not aware of the most significant changes. This depends on how closely each individual is exposed to PETI activities. Other individuals not exposed to the activity cannot indicate the change, so the ecological impact cannot be shown as subtly as daily perception. Besides, the lack of reporting and socialisation of ecological degradation indicates the normalization of risk, despite how damaging PETI itself is. On the other hand, some informants who commit PETI prioritise quick economic benefits over sustainability.

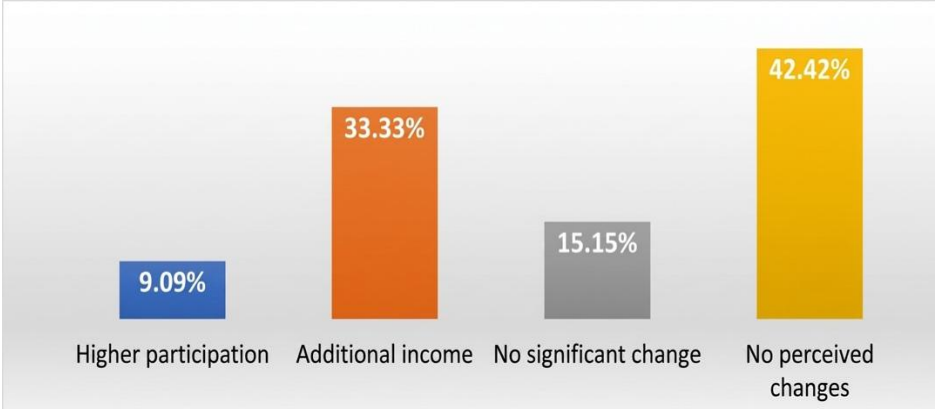


Fig. 6. The most significant changes after LPHD intervention

Furthermore, informants show four main patterns of the response. A small portion of informants mentioned an increase in community involvement, although the numbers were

relatively low, indicating that collective dynamics had not shifted widely. The larger group of informants saw the most tangible benefits in the form of additional income from village activities, signaling that the most noticeable changes were precisely practical economic ones, not social transformations. In other hand, another informant's state that the condition remains the same without significant changes, indicating that the village's interventions have not addressed aspects they consider relevant in their daily lives. The largest group consists of those who did not feel any change because they were not involved, highlighting a gap, both motivational and structural, between the village program and most of the community (Figure 5).

After 6 categorizations above, the study's findings on livelihood transitions in Tumbang Habangoi highlight the intricate relationship among economic incentives, institutional trust, and perceptions of justice, which collectively influence community decision-making. These dynamics align with previous studies on rural livelihoods and governance, emphasizing the complex character of change processes.

The notion of economic thresholds, vital to decision-making, has been thoroughly examined in the literature, notably by Chambers et al. (1984) and Ellis (1999), who emphasize the significance of income levels and the flexibility of livelihoods in rural contexts. The research indicates that residents of Tumbang Habangoi are mostly driven by economic considerations, with the perceived economic threshold, characterized as the minimum income required to shift from artisanal mining to more sustainable livelihoods, being pivotal. An economic incentive exists for individuals to transition from traditional mining (PETI) to more sustainable livelihoods: when other income sources can yield 50-60% of the cash generated by mining, individuals are more likely to consider this transition. This conclusion aligns with Sreeja (2024), who highlights the importance of economic incentives in shaping livelihood choices, arguing that the shift toward sustainability involves not only aligning income levels but also mitigating risk and improving predictability.

The literature on community resource management has thoroughly examined how institutional credibility shapes behaviour, particularly through Ostrom (1990) and Saunders (2014). These thinkers argue that good governance depends on legitimacy, clear rules, and transparent procedures. The Tumbang Habangoi instance reinforces this idea, demonstrating that the absence of institutional trust diminishes community engagement in alternative livelihood initiatives. The community's readiness to collaborate was significantly influenced by the perceived equity and transparency of institutional processes, a conclusion that corresponds with Mol & Sonnenfeld's (2000) research on ecological modernization, which emphasizes the critical role of trust in promoting collaboration. The research indicates that when institutional initiatives are viewed as unclear or discriminatory, they fail, corroborating Ostrom's (1990) claim that common-pool resources are most effectively administered by institutions that exhibit legitimacy and equity in their operations.

A major element emphasized in the research is the impression of equity in decision-making, which reflects the moral economy hypothesis posited. This theory posits that decision-making in peasant economies is influenced not alone by profit maximization but also by ethical considerations of fairness. In Tumbang Habangoi, the community assesses PETI and alternative livelihoods based on equity rather than legality or profitability. The research indicates that when individuals view institutional programs as unjust, they are less inclined to engage, favouring the more transparent and ostensibly egalitarian approach of PETI, despite its environmental hazards. This finding aligns with Putz & Thompson (2020), who argue that equity is a fundamental component of risk-sharing in community-based resource management. The Tumbang Habangoi case illustrates that perceived equity can strongly influence behaviour, even when it conflicts with long-term sustainability objectives.

Hence, people's trust in institutions affects how they respond to issues. The study shows that people do not trust the LPHD, the local group that manages the forest. This makes it harder for people to join projects that help them earn money in other ways. This

issue relates to governance rules that must be fair, clear, and transparent. Findings in Tumbang Habangoi support this idea. The community does not want to take part in LPHD projects because they see them as unfair and unclear. Some people think PETI is a fairer and more open system, even if it can harm the environment. This shows how important it is for the government to be fair. Putz & Thompson (2020) say fairness is essential for managing community resources.

The study also emphasizes the importance of a balanced utility equilibrium, in which the perceived usefulness of different lives is evaluated not only by economic returns but also by social characteristics such as trust and fairness. This viewpoint draws on behavioural economics, which shows that humans often make decisions influenced by biases, such as an inclination toward immediate rewards over delayed benefits (temporal discounting). In Tumbang Habangoi, readiness to shift to sustainable livelihoods hinges not only on achieving economic equivalence with mining but also on addressing the psychological and social repercussions of these changes. The research indicates that governance frameworks must encompass both economic and social aspects of sustainability to enable enduring transformations.

Furthermore, the study's results align with the notion of structural vulnerability and reversion risk, a subject Allen (2024) examines in his externality trap hypothesis. Research indicates that, without sufficient and consistent alternative revenue streams, communities in Tumbang Habangoi may resort to mining within a few years. This supports York & Rosa (2003), who argue that ecological modernization requires multi-level governance involving local communities, the state, and market forces. The lack of multi-tiered support for the LPHD limits its ability to facilitate the transition to sustainable livelihoods, since the community views these programs as fragmented and ineffective.

The data also show that risk and structural vulnerability are important issues. The study shows that without solid, reliable income alternatives, communities are very likely to return to mining in the next few years. This means prioritizing short-term earnings over long-term social and environmental costs. For example, if communities return to PETI activities because they are uncertain about income from the alternatives offered, the potential for further damage to forests and surrounding ecosystems increases. Deforestation from illegal mining accelerates forest degradation, which in turn reduces the carbon stored in forest vegetation. This certainly exacerbates the ongoing global climate change. Furthermore, forest loss from illegal mining also threatens the hydrological functions that support ecosystem balance. Tropical forests such as those in Tumbang Habangoi play a vital role in regulating the water cycle, reducing soil erosion, and preventing floods and droughts.

Notwithstanding these limitations, the study also uncovers growing alternative narratives that provide optimism for long-term sustainability. These include hybrid livelihoods and new economic opportunities, such as coffee, peanuts, and environmental services. These findings align with Chambers et al. (1984) and Folke et al. (2000), who emphasize the importance of livelihood diversification amid restrictions and socio-ecological resilience. The youth of Tumbang Habangoi are exploring innovative ways to reconcile mining with sustainable livelihoods, showing an adaptive response to socio-economic challenges. This underscores the potential for social-ecological resilience, wherein people devise new solutions to livelihood issues while maintaining their connection to the land and traditional traditions.

In conclusion, this study's findings indicate that transitioning from one lifestyle to another within the country is more complex than simply generating income. Transitioning toward sustainable livelihoods requires viable economic incentives, credible institutions, and ecological safeguards. Research on livelihood transitions in Tumbang Habangoi offers significant insights into the interplay among economic incentives, institutional trust, and perceptions of fairness, all of which influence community decisions toward sustainable development. This synthesis seeks to integrate these findings into a broader theoretical framework while acknowledging the study's limitations.

These findings help explain what influences people's choices to change livelihoods. However, the study has limits. The sample size is small and drawn from only one area. This means it might not reflect other rural communities. The study also focuses mainly on economic and institutional factors. It does not consider cultural values or social networks. These factors can also influence what communities do. Future research should include these aspects to better understand changes in rural livelihoods.

4. Conclusions

This study found that moving from illegal gold mining to safer jobs depends on money, rules, and community factors. Illegal mining gives quick money but harms the environment. It causes mercury pollution, soil damage, and fewer plants and animals. The Village Forest Management Institution uses community-based forest management. In this context, it provides income from forest products, ecotourism, and ecosystem services. Also, sustainable jobs pay less right away. These issues make it hard for people to stop illegal mining. This study shows that economic factors matter but cannot change habits on their own. Therefore, sustainable livelihood alternatives must not only offer comparable financial returns to illicit mining but also ensure greater stability and mitigate associated risks.

Ecotourism, non-timber forest product management, and payments for ecosystem services offer promising opportunities to increase community income while preserving environmental integrity. Encouraging livelihood diversification is essential to reduce reliance on a single, often unreliable income source. Promoting hybrid livelihoods that integrate forest-based activities with alternative income sources, such as agriculture or small-scale agroforestry, can help mitigate economic disruptions. These alternatives, such as exploring new income opportunities like coffee or peanuts, should be advanced through training, capacity development, and improved market access to ensure their viability as economic options for the community. The government ought to offer incentives or subsidies to support the transition to these alternatives.

In this context, LPHD must enhance its credibility by maintaining transparency in financial activities and governance procedures. Thus, consistent financial reporting and support for inclusive policy and decision-making are essential to strengthen the institution's social legitimacy. Emphasizing the equitable allocation of benefits and guarantee that the advantages of forest management are justly shared among all members of the community is also vital in addressing the moral economy issues. Institutional reforms should aim to rectify power disparities, especially the hereditary leadership structures that contribute to perceptions of nepotism. This initiative will enhance LPHD’s status as a reputable community-centred organization and foster increased trust and engagement among local residents. This may entail developing transparent and equitable profit-sharing arrangements, particularly in the administration of NTFPs and ecotourism initiatives.

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During the preparation of this work, the author used Grammarly to improve the grammar, clarity, and academic tone of the manuscript. After using this tool, the author reviewed and edited the content as needed and took full responsibility for the publication.

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