



The Role of Forests in Supporting Sustainable Livelihoods for Indigenous Communities in the Central Highlands, Vietnam

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ABSTRACT: This study focuses on analyzing the role of forests in supporting sustainable livelihoods for ethnic minority communities in the Central Highlands of Vietnam, in the context of increasingly severe climate change and environmental degradation. Based on a survey of 350 households in Đắk Lắk, Kon Tum, and Gia Lai, the research clarifies that forests are not only a source of natural resources such as timber, non-timber forest products, and water, but are also closely connected to the beliefs, culture, and livelihoods of local communities. Initiatives such as Payments for Forest Environmental Services (PES), forest protection contracts, and agroforestry models have proven effective in improving incomes and conserving forests. PES provides a stable income of 5–10 million VND per household per year, while forest-based ecotourism and indigenous cultural tourism contribute an additional 15–20 million VND per household per year. However, the study highlights major challenges such as forest degradation due to the expansion of industrial crops, prolonged droughts, soil erosion, and land conflicts arising from free migration and the lack of legal land use rights. The research proposes solutions such as strengthening forest contracting, providing financial and technical support for agroforestry, raising community awareness, and developing sustainable ecotourism. Notably, improving resource management policies and land ownership rights plays a decisive role in ensuring the balance between conservation and economic development. These findings shed light on the relationship between forests and livelihoods, while also providing a scientific basis for guiding sustainable development policies in the Central Highlands.

Keywords: Agroforestry, ethnic minority communities, forest conservation, forest environmental services, sustainable livelihoods.

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1. Introduction

The Central Highlands, encompassing five provinces—Kon Tum, Gia Lai, Dak Lak, Dak Nong, and Lam Dong—with a total area of over 5.6 million hectares, is a strategic region for Vietnam in terms of economy, environment, and national security (Bui, 2021). It is home to longstanding ethnic minority communities, including indigenous groups such as the Ede, Gia-rai, Mhong, and Ba-na. The Central Highlands is characterized by its rich and diverse forest ecosystems, which provide valuable natural resources and maintain the ecological balance of the region (Benton & Short, 1999; Nguyen & Ho, 2019). Forests in the Central Highlands not only serve as a source of timber and non-timber forest products but are also intricately linked to the culture and beliefs of ethnic minority communities. Ancient forests are regarded as sacred spaces, home to spiritual deities, according to the traditional beliefs of local residents.

However, in recent decades, the area of natural forests has decreased significantly, leading to severe environmental, economic, and social consequences (Van phong Chinh phu, 2017; CSA Vietnam, 2018). Global climate change, coupled with unsustainable forest exploitation, has posed serious challenges for the Central Highlands. The forest area in this region has shrunk from approximately 50% of natural land area in the 1940s to just 22% by 1993, with this degradation continuing at an alarming rate (Dinh et al., 2019). Land clearing and the conversion of forests to agricultural land for industrial crops such as coffee, pepper, and rubber have led to the loss of forest

ecosystems and the environmental services they provide (Chu, 2022). In addition to environmental impacts, the reduction of forest area has heavily affected the livelihoods of ethnic minority communities, who depend largely on forest resources. Forest products such as timber, non-timber forest products, and other natural resources are the primary sources of income for many households, especially in remote areas (Phan et al., 2021). Furthermore, the cultural and traditional values of ethnic minorities, which are closely tied to forest spaces, are at risk of being eroded (Nguyen & Ho, 2019).

The forests of the Central Highlands are not only a source of material resources but also an integral part of sustainable livelihoods. According to Do (2011) and Phan et al. (2021), the primary livelihood activities of households in the Central Highlands include agricultural cultivation on forest land, harvesting non-timber forest products, and livestock farming. However, the livelihoods of local people are heavily dependent on their access to and use of forests. Forests provide environmental services such as soil protection, water regulation, and biodiversity resources (Phan, 2001). Specifically, ethnic minority communities in the Central Highlands view forests as cultural and spiritual spaces. Sacred forests, often located in upstream areas, are strictly protected under traditional customary laws (Salemink, 1997; Dournes, 2018). These regulations not only help conserve forests but also preserve the cultural values of the communities (Sikor & Tan, 2011).

Rapid economic development, combined with inadequate policies, has led to numerous challenges in forest management and conservation in the Central Highlands. One major issue is the conflict between modern resource management policies and the traditional customary law systems of ethnic minority communities (Sunderlin & Huynh, 2005). While customary laws emphasize community ownership and responsibility, modern policies favor centralized management, resulting in a "state ownership" model where no clear responsibility is assigned (Truong, Nguyen & Hoang, 2015). Additionally, population growth, especially due to free migration, has increased pressure on forest resources. From 2005 to 2017, the Central Highlands received over 58,000 households of free migrants, creating significant demand for agricultural and residential land, leading to deforestation and various social issues (Phan et al., 2021).

Despite facing numerous challenges, the Central Highlands still has many opportunities for sustainable development. Policies on land and forest allocation to communities have yielded positive results in forest conservation and improving local livelihoods. Furthermore, PES programs have been implemented to encourage community participation in forest protection (Vuong, 2001). Combining the traditional values of customary laws with modern policies could be an important approach for forest conservation and sustainable development. Studies have shown that communities empowered to manage forests often achieve better conservation outcomes compared to centralized management systems (Nguyen, 2015; Bui, 2021). This study focuses on two main objectives: i) To clarify the role of forests in supporting sustainable livelihoods of ethnic minority communities in the Central Highlands. ii) To analyze the challenges and opportunities for forest conservation and ensuring sustainable livelihoods in the context of climate change.

2. Theoretical framework

2.1. Sustainable Livelihoods Framework (SLF)

The Sustainable Livelihoods Framework (SLF) is a useful analytical tool in studying the relationship between humans and the environment. SLF defines sustainable livelihoods as the ability of individuals or communities to utilize livelihood assets to ensure current well-being, adapt to external shocks, and avoid harming natural resources in the future

(Chambers & Conway, 1992). In the context of the Central Highlands, applying SLF helps clarify the complex relationship between the livelihood factors of ethnic minority communities and forest resources.

i) Natural capital: The forests of the Central Highlands are a vital source of natural capital, providing timber, non-timber forest products, and ecosystem services such as soil protection, water regulation, and biodiversity maintenance. Local communities depend heavily on forests for their daily living and production needs. However, forest area decline due to exploitation and conversion into industrial crop plantations has left many households facing shortages of essential natural resources (Le & Pham, 2014; Ministry of Agriculture and Rural Development, 2020a).

ii) Human capital: Human capital includes people's skills, knowledge, and health. Ethnic minority communities in the Central Highlands possess rich indigenous knowledge related to forest management and use. However, they face challenges such as high poverty rates and limited access to education and healthcare, which constrain their ability to develop sustainable livelihoods (Government of the Socialist Republic of Vietnam, 2015).

iii) Social capital: Social networks and traditional institutions, such as customary laws, play an important role in forest resource management. Customary laws not only ensure fair resource allocation but also help preserve the cultural and spiritual values of communities (Dam, 2017). However, conflicts between customary laws and modern management policies have weakened these community-based management systems.

iv) Financial capital: The income of households in the Central Highlands primarily comes from agriculture, livestock farming, and forest product harvesting. However, limited access to credit and financial support policies restrict their opportunities to improve livelihoods (Ministry of Agriculture and Rural Development, 2020b).

v) Physical capital: Infrastructure such as transportation, irrigation systems, and production equipment are crucial elements for supporting sustainable livelihoods. In the Central Highlands, infrastructure remains weak in many areas, particularly in remote regions (Bui, 2021; An, 2023).

2.2. Concept of Forest Cultural Ecosystems

The concept of "forest cultural ecosystems" emphasizes the close link between humans, the natural environment, and cultural values within forest spaces (Hajer, 1995; Nguyen, 2020b). This concept is important for understanding the role of forests in the livelihoods and cultures of ethnic minority communities in the Central Highlands. Forests not only provide material resources but also enable ethnic communities to sustain their livelihoods across generations. From timber and bamboo to non-timber forest products like rattan, mushrooms, and medicinal plants, forests serve as the lifeline for thousands of households in the Central Highlands (Nguyen, 2020a).

For many ethnic minorities in the Central Highlands, forests are sacred spaces, home to deities and ancestors. Sacred forests, often protected by customary laws, play a significant role in maintaining ecological balance and spiritual values (Condominas, 2003; Luu, 2014). The destruction of these forests threatens not only the environment but also the survival of traditional cultural values. Forests are also venues for important cultural activities such as festivals, rituals, and other creative cultural expressions. These traditions not only reflect the harmonious relationship between humans and nature but also strengthen community solidarity (Vietnam Academy of Social Sciences, 2019).

2.3. Environmental Changes

Environmental changes are increasing pressure on forest resources in the Central

Highlands and profoundly affecting the livelihoods of ethnic minority communities. Key factors include climate change, migration, and socio-economic policies. Extreme weather events such as droughts, floods, and soil erosion are becoming more frequent in the Central Highlands. These impacts reduce agricultural productivity and cause forest resource losses, directly affecting local livelihoods (Truong, 2016; Nguyen & Nguyen, 2022). Additionally, the loss of forest vegetation has diminished the region's capacity to absorb CO₂ and regulate the climate.

The rise in free migration over recent decades has placed considerable pressure on forest resources in the Central Highlands. Migration not only increases the demand for agricultural land but also leads to resource-use conflicts between local communities and migrants (Council for Ethnic Minorities, 2018; La et al., 2020).

Policies converting forest land into agricultural or industrial land have caused severe deforestation in the Central Highlands. Although these policies bring short-term economic benefits, they result in long-term environmental and social consequences. The lack of community participation in decision-making processes has further exacerbated inequalities and conflicts in forest resource management (Central Economic Commission, 2020).

In summary, the theoretical framework of sustainable livelihoods, forest cultural ecosystems, and environmental changes provides a critical foundation for studying the role of forests in supporting the sustainable livelihoods of ethnic minority communities in the Central Highlands. These concepts not only illuminate the complex relationship between humans and the environment but also offer a scientific basis for proposing appropriate policies to protect forests and promote sustainable development.

3. Research methodology

3.1. Approach

To address the research questions regarding the role of forests in the sustainable livelihoods of ethnic minority communities in the Central Highlands, this study employs a mixed-method approach combining qualitative and quantitative methods. The qualitative approach focuses on collecting in-depth information through methods such as interviews and focus group discussions, allowing for a better understanding of the cultural, social, and livelihood contexts of ethnic communities. Meanwhile, the quantitative approach is used to measure and analyze factors related to sustainable livelihoods and the impact of forests on economic, social, and environmental dimensions. This combined approach ensures that the research is both comprehensive and capable of producing results that are comparable and applicable for policymaking. By integrating qualitative and quantitative methods, the study aims to elucidate complex relationships and propose evidence-based solutions.

3.2. Study Area

The research was conducted in key provinces of the Central Highlands, including Dak Lak, Kon Tum, and Gia Lai. These provinces were chosen due to their diverse demographic characteristics, levels of forest dependence, and challenges in forest resource management. They are also home to a large population of ethnic minorities such as the Ede, Gia-rai, and Ba-na, communities deeply connected to forests and significantly impacted by economic, social, and environmental changes.

- Dak Lak: A province with extensive and diverse forest areas, known for forest product exploitation and industrial crop development.
- Kon Tum: Renowned for its pristine forests, home to ethnic communities with a tradition of forest conservation through customary laws.

- Gia Lai: A large province with many special-use and production forests, facing issues related to free migration and land-use conversion.

This study area represents the ecological, economic, and social diversity of the Central Highlands, providing a foundation for an in-depth analysis of factors influencing sustainable livelihoods.

3.3. Scope and Research Subjects

Data were collected from 350 households across the three study provinces, distributed as follows:

- Dak Lak: 120 households
- Gia Lai: 110 households
- Kon Tum: 120 households

Households were randomly selected from ethnic minority communities such as the Ede, Gia-rai, and Ba-na. Selection criteria included the level of forest dependence, diversity in livelihoods, and participation in forest conservation programs.

Additionally, in-depth interviews were conducted with 30 local leaders and village elders, along with 15 focus group discussions representing ethnic minority communities to gather multi-dimensional perspectives.

3.4. Data Collection

The study employed a variety of data collection methods to ensure comprehensiveness:

- i) In-depth interviews: Interviews with 30 village elders (Gia lang) and local leaders, focusing on the role of forests in livelihoods and challenges in resource management.
- ii) Focus group discussions: Organized 15 discussions with representatives from ethnic minority communities to explore cultural and social values related to forests.
- iii) Household surveys: Conducted surveys with 350 households using quantitative questionnaires to collect information on income sources, forest dependence, and factors affecting livelihoods.
- iv) Secondary data analysis: Compiled information from policy reports, previous studies, and documents from international organizations.

3.5. Data Analysis

The data were processed and analyzed using appropriate tools and methods:

- i) Quantitative analysis: Survey data were analyzed using Excel and SPSS software. Descriptive statistics and regression analysis were applied to identify relationships between livelihood factors and forest resources.
- ii) Qualitative analysis: Data from in-depth interviews and focus group discussions were coded and categorized to extract key themes.
- iii) SWOT analysis: Strengths, weaknesses, opportunities, and threats were assessed in forest conservation and sustainable livelihoods.

The combined qualitative and quantitative approach, along with diverse data collection and analysis methods, ensures that the research provides a comprehensive and in-depth understanding of the role of forests in the sustainable livelihoods of ethnic minority communities in the Central Highlands. The selection of representative study areas, coupled with modern analytical tools, enhances the practicality and applicability of the research findings.

4. Research findings

4.1. The Role of Forests in Livelihoods

Based on survey data from 350 households across three provinces in the Central Highlands (Dak Lak, Kon Tum, and Gia Lai), the study highlights specific aspects of the role of forests in livelihoods, particularly concerning natural capital, social and cultural capital, and financial capital. Forests not only provide essential resources for sustaining

livelihoods but also support the sustainable cultural, social, and economic values of ethnic minority communities in the region.

i) Natural capital

The natural capital of the Central Highlands' forests includes timber, non-timber forest products (NTFPs), water resources, and arable land. These resources are vital not only for meeting the daily living and production needs of local people but also for maintaining a sustainable ecosystem.

Table 1: Allocation of Natural Capital in Household Livelihoods

Natural Factor	Capital	Percentage Participating Households (%)	of Detailed Description
Non-Timber Forest Products (NTFPs)	Forest	72	Harvesting honey, rattan, mushrooms; contributes 25% of household income; highest in Kon Tum (80%).
Water from Forest Headwaters	Forest	65	Forests provide irrigation water, regulate water flows; crucial in Dak Lak and Gia Lai.
Forest Land for Agroforestry	Forest	40	Intercropping industrial and forestry trees; yields increase by 15–20% in coffee-acacia models.

(Illustration of the utilization rates of natural capital such as non-timber forest products, arable land, and water resources across provinces in the study area)

According to the survey results, over 72% of households engage in harvesting non-timber forest products (NTFPs), such as honey, rattan, mushrooms, and medicinal plants. The value derived from NTFPs accounts for an average of 25% of household income, with higher dependency in remote forested areas. Notably, in Kon Tum, 80% of households rely directly on these resources due to the relatively pristine state of forests in the province compared to other regions.

In-depth interviews revealed that products like rattan are used for making traditional handicrafts, while forest honey and mushrooms are collected for sale in local markets. These activities not only generate income but also sustain traditional, sustainable harvesting practices across generations.

The survey results indicated that 65% of households in Dak Lak and Gia Lai view upstream forests as critical for providing water for irrigation and domestic use. Forests in these areas regulate water flows and reduce soil erosion, especially during prolonged dry seasons. Some households noted that streams within the forests serve as the main water source for agricultural production, particularly for coffee and pepper cultivation. Focus group discussions in Gia Lai revealed that many communities perform spiritual rituals to protect upstream forests. These efforts not only help maintain clean water sources but also preserve traditional cultural values.

Approximately 40% of households in the study areas utilize forest land for agroforestry models. These systems often involve intercropping industrial crops (coffee, rubber) with forest trees (bamboo, fruit trees) and medicinal plants. Agroforestry models not only enhance productivity but also mitigate soil erosion and preserve soil fertility.

In Dak Lak, some households have adopted an intercropping model of coffee and acacia trees, demonstrating high economic efficiency while maintaining forest cover. These households reported a 15–20% increase in coffee yields compared to monoculture farming, thanks to improved microclimates and soil moisture provided by the acacia trees.

ii) Social and Cultural Capital

Beyond its material role, forests make a significant contribution to the social and cultural capital of ethnic minority communities in the Central Highlands. Forests are not merely a resource but also a symbol of community cohesion and ethnic identity.

Table 2: Social and Cultural Roles of Forests for Communities

Cultural-Social Factor	Percentage Participating Households (%)	Detailed Description
Sacred Forests and Spiritual Beliefs	95	Forests are tied to rituals such as forest worship ceremonies, harvest festivals, and gong festivals.
Materials for Traditional Crafts	60	Forests provide rattan, bamboo, and inspiration for maintaining traditional crafts like brocade weaving.
Cultural-Spiritual Tourism Attraction	-	Spiritual rituals related to forests attract tourists and help preserve indigenous cultural heritage.

(Summary of Forest Dependency in Cultural and Spiritual Activities of Indigenous Communities)

95% of surveyed households emphasized that forests are sacred spaces closely linked to their beliefs and spirituality. Sacred forests are often strictly protected under traditional customary laws and serve as venues for important rituals such as forest worship ceremonies, harvest celebrations, and gong festivals. A village leader in Kon Tum stated, "Sacred forests not only protect water sources and resources but also serve as a bridge connecting people with their ancestors." This underscores the strong connection between indigenous culture and forest conservation.

Traditional cultural activities such as weaving brocade, crafting rattan items, and organizing gong festivals are closely tied to forests. Nearly 60% of households participating in focus group discussions indicated that forests provide inspiration and raw materials essential for sustaining traditional crafts. Additionally, spiritual rituals related to forests have attracted the interest of tourists, creating opportunities to combine cultural preservation with economic development.

iii) Financial Capital

Forests not only provide resources but also serve as a critical source of income through the extraction of forest products and economic support programs.

Table 3: Financial Contributions of Forests to Livelihoods

Income Source from Forests	Percentage Participating Households (%)	Average Income (Million VND/Year)	Practical Application
Exploiting and Selling Forest Products	20–30	10–15	Kon Tum: Harvesting and selling rattan at local markets.
Payments for Forest Environmental Services (PES)	48	5–10	Dak Lak: PES funds support infrastructure development.
Forest and Indigenous Culture-Based Ecotourism	30	15–20	Gong performances and selling handcrafted products during tourism events.

(Analysis of Income Proportion from Forest Products and Financial Support Programs such as PES)

Approximately 20–30% of total household income is derived from the extraction and sale of forest products. These products include timber, rattan, and valuable medicinal plants. Households in Kon Tum reported earning an average of 10–15 million VND per year from harvesting and selling rattan at local markets. Additionally, 48% of households participating in the PES program across the three provinces received average payments ranging from 5–10 million VND per year. PES not only incentivizes households to engage in forest protection but also helps boost their income, particularly during economically challenging periods.

A village leader in Dak Lak noted that PES payments are used by the community to build infrastructure such as cultural centers, improve water supply systems, and support tuition fees for children in the village. Nearly 30% of households participated in ecotourism activities based on indigenous culture, such as organizing sacred forest tours, gong performances, and selling handcrafted forest products. These activities not only increase income but also create opportunities to introduce local culture to both domestic and international tourists.

The role of forests in the livelihoods of ethnic minority communities in the Central Highlands is comprehensive, encompassing natural capital provision, cultural value preservation, and economic opportunity creation. However, the high dependence on forests also poses challenges for sustainable resource management, requiring effective policies to conserve forests and ensure long-term livelihood development.

4.2. Key Challenges

Survey results from 350 households in the Central Highlands, combined with in-depth interviews and focus group discussions, revealed three major challenges to forest conservation and sustainable livelihood development: forest degradation, climate change, and land-use conflicts. These issues not only directly impact the economic well-being of ethnic minority communities but also threaten cultural values and sustainable environmental practices in the region.

i) Forest Degradation

Forest degradation is a prominent issue in the Central Highlands, with rapid deforestation caused by human activities. This problem is identified by households and local communities as one of the main factors contributing to livelihood instability and environmental quality decline.

Table 4: Causes and Impacts of Forest Degradation

Cause of Forest Degradation	Percentage of Households Identifying (%)	Main Impact	Heavily Affected Area
Conversion of Forest Land to Industrial Crops	58	Loss of traditional forests, reduction in NTFPs; income decreases by 20–30%	Kon Tum: Conversion to coffee and rubber plantations.
Illegal Logging	30	Increased illegal logging, reduced environmental quality	Gia Lai: Illegal logging is widespread.

(Statistics on Major Causes of Deforestation and the Impacts of Forest Degradation on Households)

Survey results indicate that 58% of households identified the primary cause of forest

degradation as the conversion of forest land into areas for coffee, rubber, and pepper cultivation. These industrial crops provide short-term economic benefits but require large tracts of land and are often not managed sustainably. In Kon Tum, households reported that the expansion of coffee plantations has resulted in the loss of traditional forest areas where they used to harvest non-timber forest products to sustain their livelihoods.

Additionally, illegal logging and insufficient oversight by authorities were noted as contributing factors to forest loss. Thirty percent of households in Gia Lai reported witnessing illegal logging activities in areas near their communities.

Forest degradation has led to severe consequences for livelihoods and the environment. Seventy percent of households observed a decline in non-timber forest products (such as rattan, honey, and mushrooms) and water resources, directly impacting income and agricultural activities. Households in remote areas, which rely heavily on non-timber forest products for sale in local markets, reported a 20–30% decrease in income over the past five years. Furthermore, deforestation has increased the risk of flooding and soil erosion. In-depth interviews in Dak Lak revealed that many households have had to relocate or reduce their farming areas due to more frequent landslides.

ii) Climate Change

Climate change is a global challenge, but its impacts are particularly severe in the Central Highlands, where livelihoods are heavily dependent on agriculture and forest resources. Extreme weather events and shifts in climatic cycles have increased the pressure on household livelihoods in this region.

Table 5: Impacts of Climate Change on Livelihoods

Impact of Climate Change	Percentage of Affected Areas or Households (%)	Main Impact	Heavily Affected Area
Prolonged Drought	65	20–30% reduction in coffee yield; impacts irrigation water supply	Dak Lak and Gia Lai: Severe drought conditions.
Soil Erosion	50	Loss of topsoil, reduced productivity, and increased soil restoration costs	Dak Lak: High-slope areas heavily affected by erosion.
Temperature Changes and Extreme Weather	-	Disruption of planting schedules, increased risk of crop failure	Kon Tum: Shifts in planting schedules due to extreme weather.

(Analysis of Extreme Weather, Drought, and Soil Erosion Impacts on Agricultural Productivity)

Sixty-five percent of surveyed households reported experiencing prolonged droughts over the past five years. Provinces such as Dak Lak and Gia Lai were the most severely affected, with significantly reduced rainfall impacting irrigation and agricultural production. Some coffee-growing households in Gia Lai recorded a 20–30% decrease in yields compared to annual averages, as coffee plants failed to thrive under extended dry conditions.

Soil erosion was reported in 50% of the study areas, particularly in hilly regions like Dak Lak. The loss of topsoil has reduced agricultural productivity and increased the cost of soil restoration. Some households have had to switch to growing less soil-dependent

crops, but these alternatives have not yielded equivalent economic benefits.

The average temperature in the Central Highlands has slightly increased over the past two decades, accompanied by a rise in extreme weather events such as storms and prolonged droughts. This has disrupted the traditional planting schedules of ethnic minority communities. Focus group discussions in Kon Tum revealed that many households are unable to predict optimal planting and harvesting times, leading to lower yields and higher risks of crop failure.

iii) Land-Use Conflicts

Land-use conflicts are a complex and sensitive issue in the Central Highlands, reflecting competition between economic interests and forest resource conservation. These conflicts not only reduce the effectiveness of resource management but also undermine community cohesion.

Table 6: Land-Use Conflicts in the Context of Economic Development

Cause of Land-Use Conflict	Percentage of Affected Households (%)	Main Impact	Heavily Affected Area
Expansion of Industrial Crops	35	Loss of arable land, marginalization from economic development	Dak Lak: Priority given to land allocation for industrial crops.
Spontaneous Migration	-	Pressure on land and forest resources, conflicts between resident groups	Central Highlands: Increased pressure due to spontaneous migration.
Lack of Legal Documentation for Land Use Rights	40	Reduced forest management efficiency, increased illegal exploitation	Kon Tum and Dak Lak: Common land disputes.

(Statistics on the Number of Households Affected by Industrial Projects and Land Disputes)

Thirty-five percent of surveyed households reported difficulties in protecting their land use rights due to the expansion of industrial crops or free migration. This issue is most prevalent in Dak Lak, where rubber and pepper plantation projects are often prioritized for land allocation, while ethnic minority communities lack legal documentation to prove land use rights. A village elder in Kon Tum remarked, "We have lived here for hundreds of years, yet our land ownership is still not recognized."

Additionally, free migration from other regions to the Central Highlands has increased pressure on land and forest resources. Many ethnic minority communities feel marginalized as free migrant groups occupy land for cultivation. These conflicts not only lead to land loss but also create tensions between different population groups.

Land disputes significantly impact the livelihoods of ethnic minority communities. Forty percent of households reported losing part or all of their farmland to economic development projects. Land loss has forced many households to shift to other activities, such as working as laborers on plantations, but their income remains unstable. Moreover, the lack of clarity in land management policies has reduced the effectiveness of forest conservation programs. For instance, community forests are often encroached upon by illegal loggers or migrant farmers, making it difficult to maintain these forested areas.

The major challenges in the Central Highlands, including forest degradation, climate

change, and land disputes, are severely undermining the role of forests in supporting livelihoods and maintaining ecosystems. These issues arise not only from unsustainable economic development but also from ineffective management and policies. Addressing these challenges requires strong intervention strategies to balance forest conservation with livelihood development while ensuring the rights of ethnic minority communities.

4.3. Opportunities for Sustainable Development

The research findings highlight several important opportunities to promote sustainable development in the Central Highlands. These opportunities not only support forest conservation but also enhance community livelihoods through initiatives such as forest protection contracts and PES, ecotourism development, and the adoption of agroforestry models.

i) Forest Protection Contracts and Payments for Forest Environmental Services (PES)

Forest protection contracts are a strategic solution for sustainable forest conservation. The government and organizations have allocated forest management responsibilities to communities, providing regular financial support. This approach not only helps conserve forests but also creates jobs and improves incomes for local people.

Table 7: Effectiveness of Forest Protection Contracts and PES Programs

Support Program	Percentage of Participating Households (%)	Main Benefits	Challenges
Forest Protection Contracts	48	Increased income by 5–10 million VND/household/year; improved forest quality	Need to expand coverage and increase financial support.
Payments for Forest Environmental Services (PES)	48	Stable financial resources; investments in education, infrastructure, and agricultural production	Lack of transparency in fund management; delayed payments.

(Assessment of Household Participation and Economic Impacts from These Programs)

According to the survey, 48% of households participating in forest protection contracts reported significant benefits. Specifically:

- Income from contracts increased by an average of 5–10 million VND per household per year, depending on the allocated forest area.
- Households involved in forest patrolling, water source protection, and fire prevention noted improvements in forest quality and ecosystem services.

The PES program is a key initiative to encourage community involvement in forest conservation. Based on the principle that users of forest environmental services (such as hydropower companies and water utilities) pay communities to protect forests, the program has created a stable financial resource. In-depth interviews with households participating in PES revealed that payments were used for:

- Investing in children's education (approximately 35% of households allocated PES income for this purpose).
- Improving local infrastructure, such as building roads and cultural centers.
- Increasing agricultural production capital, particularly for purchasing seeds and fertilizers.

However, challenges remain in the PES program, including a lack of transparency in fund allocation and delays in payments. These issues require improvements in management mechanisms to maximize the program's potential.

ii) Ecotourism

Forest-based and indigenous culture-based ecotourism is one of the greatest opportunities to promote sustainable development in the Central Highlands.

Table 8: Potential for Ecotourism Development Based on Forest Resources

Tourism Potential Factor	Key Features	Percentage of Community Participation (%)	Average Income (Million VND/Year)	Challenges
Natural Resources	Dray Nur Waterfall, Yok Don National Park, primary forests	-	-	Limited infrastructure; lack of transportation and amenities.
Indigenous Culture	Gong festivals, brocade weaving, spiritual rituals	30	15–20 from tourism and handicrafts	Lack of skills and knowledge in tourism management.

(Summary of Economic Contributions and Community Participation in Ecotourism Activities)

With abundant natural resources and unique cultural heritage, ethnic minority communities in the Central Highlands have started participating in tourism activities, generating significant income.

- Natural resources: The Central Highlands boasts stunning natural landscapes such as Dray Nur Waterfall, Yok Don National Park, and pristine forests, providing ideal conditions for developing nature-based tourism experiences.
- Indigenous culture: Ethnic minority communities such as the Gia-rai, Ede, and Ba-na have rich cultural traditions, including gong festivals, brocade weaving, and spiritual rituals. These are valuable tourism assets that attract both domestic and international visitors.

Nearly 30% of communities have engaged in providing ecotourism services, ranging from serving as tour guides and offering accommodation (homestays) to selling traditional handicraft products. Focus group discussions in Dak Lak revealed that some villages have attracted over 500 tourists annually, generating an average income of 15–20 million VND per household from tourism-related activities.

While ecotourism brings numerous benefits, challenges remain:

- Limited infrastructure, particularly in transportation and visitor amenities.
- Lack of skills and knowledge in tourism management among local communities.

Proposed solutions:

- Training communities in tourism skills, financial management, and marketing.
- Supporting the development of appropriate infrastructure that does not disrupt the natural landscape.
- Enhancing the promotion of Central Highlands ecotourism to potential markets.

iii) Agroforestry

Agroforestry is one of the most effective solutions for balancing agricultural production with forest conservation.

Table 9: Application of Agroforestry in Sustainable Livelihoods

Agroforestry Model	Economic Benefits	Environmental Benefits	Challenges
Intercropping Industrial and Forestry Trees	Increased productivity, improved soil quality	Maintains forest cover	Limited access to technology in remote areas.
Medicinal Plant Cultivation	Generates higher income compared to traditional crops	Enhances biodiversity	Underdeveloped market for medicinal plants.
Sustainable Farming on Sloping Land	Reduces erosion, protects soil fertility	Minimizes soil erosion	Lack of preferential credit for investment in the model.

(Analysis of Popular Agroforestry Models and Their Economic and Environmental Benefits)

Survey results indicate that 40% of households have adopted agroforestry models and reported significant improvements in livelihoods and the environment. Common agroforestry models implemented in the Central Highlands include:

- Intercropping industrial crops with forest trees: For example, planting coffee alongside acacia or fruit trees helps maintain forest cover, increase yields, and improve soil quality.
- Cultivation of medicinal plants: Some households in Kon Tum have integrated medicinal plants like *Morinda officinalis* and *Polyscias fruticosa* with forest trees, generating higher income compared to traditional crops.
- Sustainable farming on sloping land: Households in Gia Lai have adopted terrace systems combined with reforestation, reducing soil erosion and preserving soil fertility.

Dual Benefits of Agroforestry Models

- Economic benefits: Income from these models increased by an average of 15–20% compared to traditional farming. Households also reduced fertilizer and pesticide costs by adopting natural farming practices.
- Environmental benefits: These models maintain forest cover, reduce soil erosion, and enhance biodiversity. Some households observed the return of wildlife in areas where agroforestry was practiced.

Despite these benefits, some households face challenges in accessing agroforestry techniques, particularly in remote areas. Additionally, the market for products derived from agroforestry remains underdeveloped.

Proposed solutions:

- Provide training and technical support to households.
- Connect markets and promote the consumption of agroforestry products.
- Offer preferential credit to households adopting these models.

In summary, the Central Highlands has numerous opportunities for sustainable development through initiatives such as forest protection contracts, PES, ecotourism, and agroforestry. However, to fully leverage these opportunities, strong support from local authorities, international organizations, and active participation from local communities is essential. These solutions not only help conserve natural resources but also create sustainable income streams and improve the quality of life for ethnic minority communities in the Central Highlands.

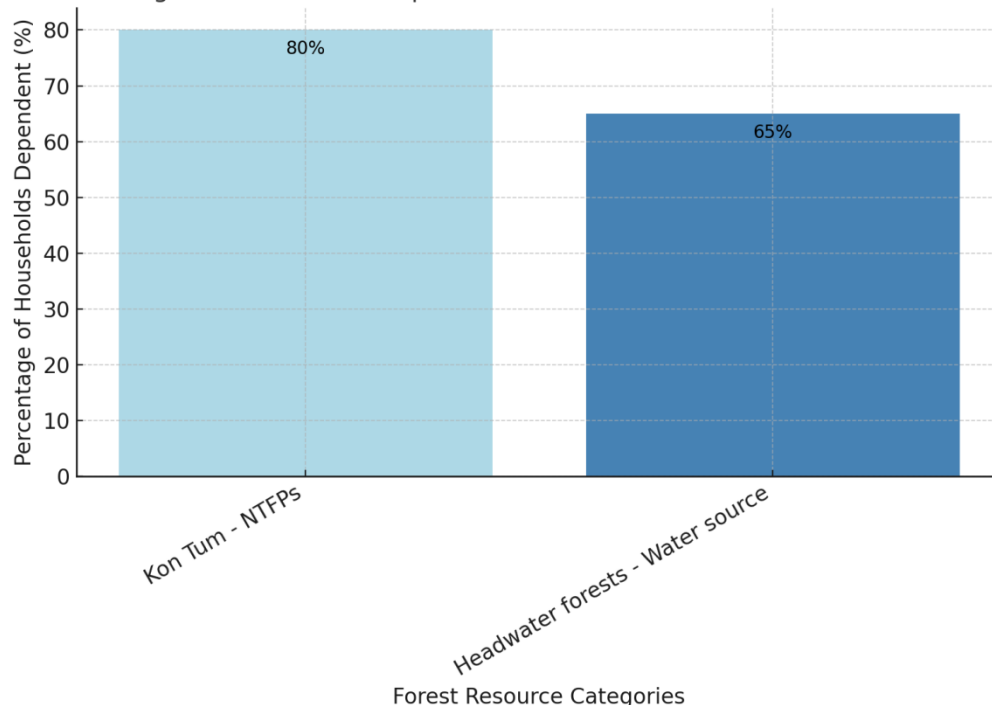
5. Discussion

5.1. Comparison of Research Findings with Similar Studies

The findings on the role of forests in the sustainable livelihoods of ethnic minority

communities in the Central Highlands align with many previous studies at both national and international levels. However, this study also introduces noteworthy new insights, particularly regarding the specific ways forests impact livelihoods, the unique challenges of the region, and the potential for sustainable development.

Figure 1: Percentage of Households Dependent on Forests for Livelihoods in the Central Highlands



(Proportion of Households Harvesting Non-Timber Forest Products by Province (Dak Lak, Kon Tum, Gia Lai) and Level of Forest Resource Dependence)

The study reaffirms that forests play an indispensable role in supporting the livelihoods of ethnic minority communities, a conclusion supported by previous research. For example, Nguyen and Ho (2019) emphasized that forests in the Central Highlands provide natural resources such as timber, non-timber forest products (NTFPs), and water, while also protecting land and maintaining ecosystems. Our findings align with this, showing that 72% of households in the Central Highlands participate in harvesting NTFPs, contributing 25% of their total household income.

Another study by FAO (2005) on the role of forests in rural communities in Southeast Asia concluded that NTFPs not only provide income but also reduce economic risks, especially during difficult periods. Similarly, our study found that households in the Central Highlands utilize NTFPs to cope with times of scarcity, such as during lean seasons.

Compared to previous research, this study offers more detailed data on resource utilization models in the Central Highlands:

- NTFPs such as honey and rattan are the most commonly harvested resources, with 80% of households in Kon Tum relying on these resources.
- Upstream forests provide water for 65% of households, which is especially crucial for water-dependent crops like coffee and pepper.

Forest degradation in the Central Highlands due to exploitation and land conversion for cultivation has been documented in numerous prior studies.

Chart 2: Impacts of Forest Degradation on Ethnic Communities' Livelihoods



(Comparison of Income Reduction from Non-Timber Forest Products and Domestic Water Resources Among Households in Three Central Highlands Provinces)

Dinh et al. (2019) and Hoang (2021) identified forest conversion into coffee and rubber plantations as the primary cause of deforestation in the region. Our study aligns with these findings, as 58% of households reported witnessing deforestation primarily due to the expansion of industrial crops. However, this study adds insights into the direct impacts of forest degradation on livelihoods:

- 70% of households observed a decline in non-timber forest products (NTFPs) and water resources.
- Some households reported a 30% reduction in income from NTFPs over the past five years, significantly affecting their economic stability.

Nepstad et al. (2006), in their study on the Amazon rainforest, similarly noted that forest degradation impacts community livelihoods by limiting access to NTFPs. Like communities in the Amazon, households in the Central Highlands face challenges when deforestation restricts NTFP harvesting. However, our research emphasizes that the development of industrial crops in the Central Highlands exerts a far greater pressure than other factors.

Climate change is a global factor impacting forest ecosystems and livelihoods. The World Bank (2011) warned that communities dependent on agriculture and forests in Southeast Asia would face severe impacts from climate change, such as prolonged droughts and increased soil erosion. Our findings are consistent with this, as 65% of households in the Central Highlands reported prolonged droughts directly affecting agricultural productivity.

This study provides specific data on climate change impacts in the Central Highlands:

- Crop yields have decreased by 20–30% over the past five years due to droughts and soil erosion.

- 50% of the study areas reported severe soil erosion, reducing arable land and increasing soil restoration costs.

Furthermore, changes in climatic cycles have disrupted the traditional planting schedules of ethnic minority communities. This issue, less emphasized in previous studies, was clarified through focus group interviews in Kon Tum.

Forest protection contracts and PES are key initiatives for forest conservation and improving community livelihoods. This study found that 48% of households participating in PES programs experienced an average financial benefit increase of 5–10 million VND per household per year, consistent with previous research findings.

Dam (2017) and Nguyen et al. (2021), in their study on PES in Vietnam, also noted that the program increased income and encouraged community participation in forest conservation. However, our research highlights additional non-financial benefits of PES, including:

- Improved community awareness of forest protection.
- PES payments being invested in education and infrastructure, such as roads and cultural centers.

Ecotourism remains an underutilized opportunity in the Central Highlands. Our study found that 30% of communities participated in ecotourism services, with household incomes increasing by an average of 15–20 million VND per year. This aligns with FAO (2018), which concluded that forest areas with cultural significance can become key tourism destinations, bringing economic benefits and raising conservation awareness.

This study highlights the role of indigenous culture in ecotourism development in the Central Highlands:

- Festivals such as gong performances and spiritual forest rituals have attracted tourists while providing opportunities to preserve cultural heritage.
- Forest-based handicrafts like brocade and rattan products have been integrated into community tourism initiatives.

Agroforestry has been widely recognized as an effective method for balancing forest conservation with economic development. Our study confirms that 40% of households adopting agroforestry have reported improved income and soil protection.

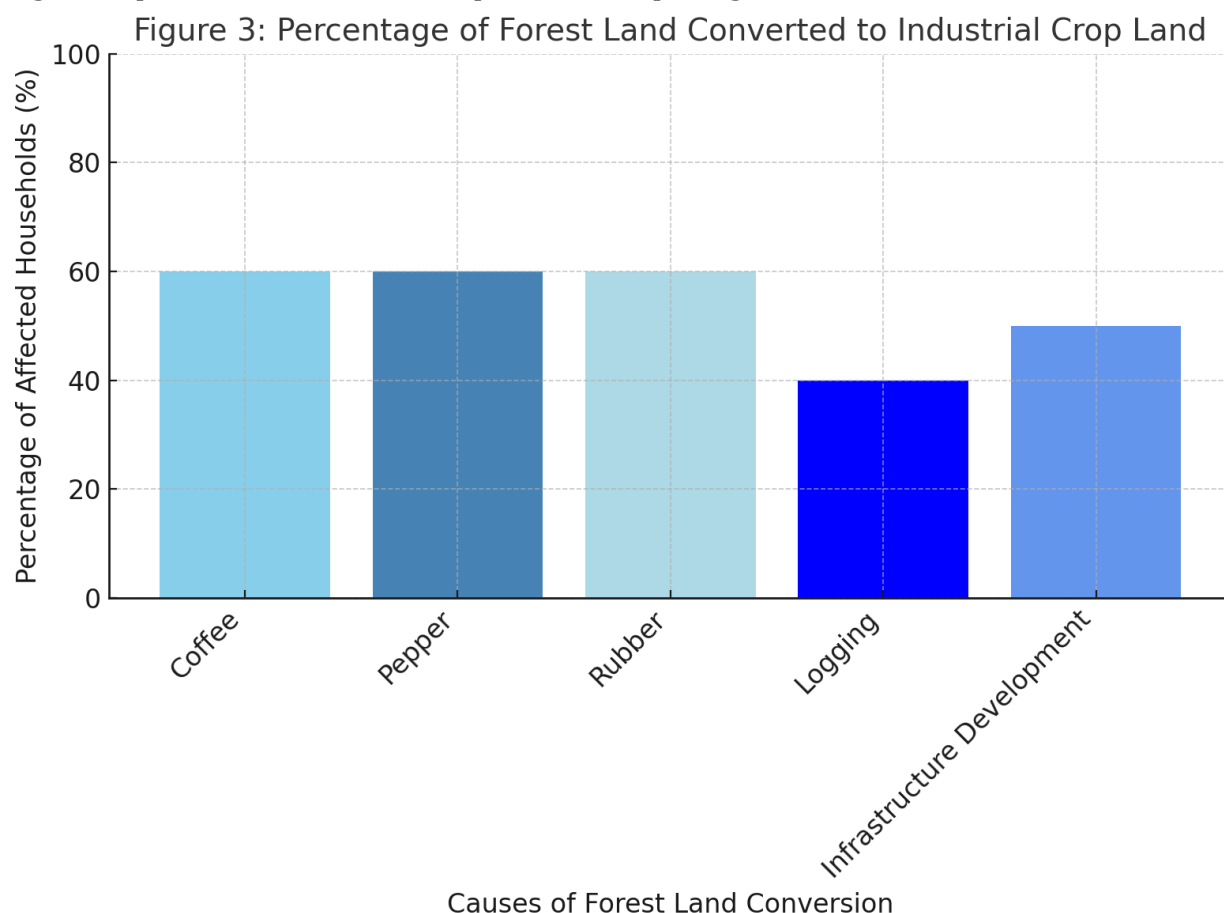
FAO (2005) emphasized that agroforestry helps maintain forest cover, reduce soil erosion, and increase productivity. However, our research provides additional information on specific agroforestry models in the Central Highlands, such as intercropping coffee with acacia trees, which has increased coffee yields by 15–20%.

In comparison with previous studies, our findings align with general conclusions about the role of forests in livelihoods and the challenges faced by forest-dependent communities. However, this study adds detailed and novel data, particularly regarding the impacts of forest degradation and climate change in the Central Highlands, as well as the potential of sustainable development initiatives like PES, ecotourism, and agroforestry. These contributions provide a more comprehensive picture of the relationship between forests and livelihoods in the region and offer a foundation for proposing appropriate future policies.

5.2. Discussion on the Balance Between Forest Conservation and Economic Development Needs

Balancing forest conservation and economic development is one of the greatest challenges in the Central Highlands. This study highlights the conflict between protecting forest resources to sustain ecosystems and indigenous culture and the need to exploit forests for economic development, particularly through agricultural activities and industrialization. Achieving a balance between these two objectives is not only an

urgent requirement but also a complex issue requiring coordinated solutions.



(Illustration of Forest Land Conversion for Industrial Crop Cultivation, such as Coffee, Pepper, and Rubber in the Central Highlands)

Survey results indicate that 58% of households identified forest land conversion into industrial crop plantations as the primary cause of forest degradation. The Central Highlands has witnessed a boom in coffee, rubber, and pepper plantations over recent decades. While these crops provide high short-term economic value, they also lead to severe environmental consequences, including deforestation, soil erosion, and reduced water availability.

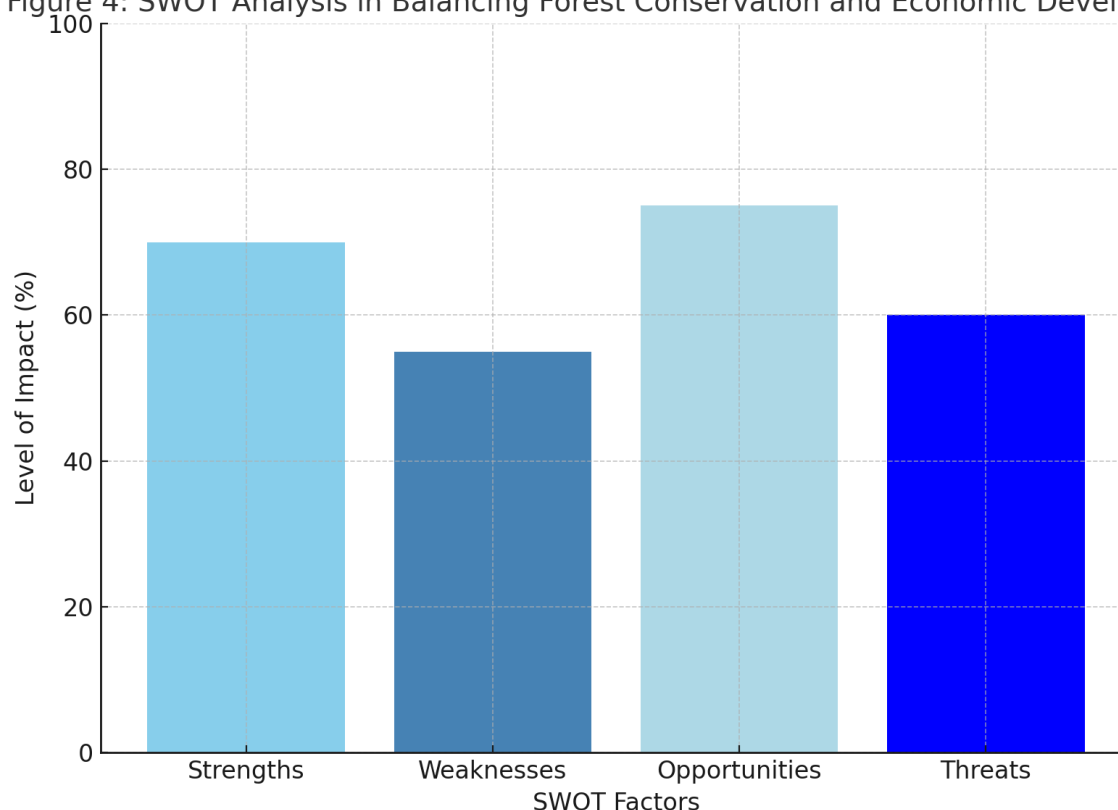
In-depth interviews with households in Dak Lak revealed that, despite being aware of the negative impacts of deforestation, many families prioritized expanding their agricultural land for industrial crops to increase income. This reflects the heavy economic pressures on ethnic minority communities, where alternative livelihood options remain limited.

Illegal logging also represents a major conflict between conservation and development. Thirty percent of households in Gia Lai reported engaging in small-scale logging activities to improve their income, particularly during economically challenging periods. However, these activities not only contribute to forest loss but also increase conflicts with conservation policies.

Infrastructure and industrial development projects, such as hydropower dams and road expansion, have also contributed to deforestation. For example, hydropower projects in Kon Tum have resulted in the loss of thousands of hectares of forest and significantly impacted local ecosystems. Thirty-five percent of households in the area reported losing farmland or being forced to relocate to make way for these projects.

To achieve a balance between forest conservation and economic development, a combination of natural resource protection, promotion of sustainable economic development, and improved resource management policies is required.

Figure 4: SWOT Analysis in Balancing Forest Conservation and Economic Development



(Analysis of Strengths, Weaknesses, Opportunities, and Threats in Forest Conservation in the Central Highlands)

Several sustainable economic models have been successfully implemented in the Central Highlands, such as PES programs and ecotourism. These models not only help conserve forests but also generate long-term income for ethnic minority communities:

- PES: Approximately 48% of households participating in PES reported receiving payments ranging from 5–10 million VND per year, contributing to financial stability and reducing dependence on logging.
- Ecotourism: Nearly 30% of communities engaged in ecotourism activities, such as hosting homestays, guiding forest tours, and showcasing traditional cultural performances. Income from these activities averages 15–20 million VND per year.

These results demonstrate the significant potential of integrating conservation and economic development, emphasizing the role of supportive policies in scaling up these models.

Agroforestry has proven effective in balancing conservation and development in the Central Highlands. Forty percent of households adopting agroforestry models reported a 15–20% increase in income, along with reduced soil erosion and improved forest cover. Specific models include:

- Intercropping coffee with forest trees, reducing pressure on forest lands.
- Combining medicinal plant cultivation, such as *Morinda officinalis* and *Polyscias fruticosa*, with industrial crops to create additional economic value.

In-depth interviews in Kon Tum revealed that many households lack full awareness of

the long-term benefits of forest conservation. Therefore, educational programs on natural resource protection and sustainable development need to be strengthened. Training communities in agroforestry techniques, resource management, and ecotourism development can drive positive changes in behavior and mindset.

Policy plays a decisive role in establishing a balance between conservation and development. Effective policies should enable communities to actively participate in resource management while supporting sustainable economic models.

Forest protection contracts have yielded positive results but need to be expanded to cover more communities. While 48% of households participating in this program reported clear benefits, management processes remain limited, particularly in ensuring fairness in resource allocation.

Land-use planning must integrate conservation and economic development considerations. Ensuring legal land use rights for ethnic minority communities can help reduce conflicts and enhance accountability in forest protection.

Governments should invest in advanced technologies and techniques to support sustainable agroforestry production and ecotourism development. This approach not only boosts productivity but also reduces pressure on forest resources. Examples from around the world provide valuable lessons for the Central Highlands:

- Amazon: Community forest management programs in the Amazon have helped protect the world's largest forest area while generating stable income through the sustainable extraction of non-timber forest products.
- Southeast Asia: Agroforestry in Indonesia has reduced pressure on tropical forests while creating sustainable production systems involving community participation.

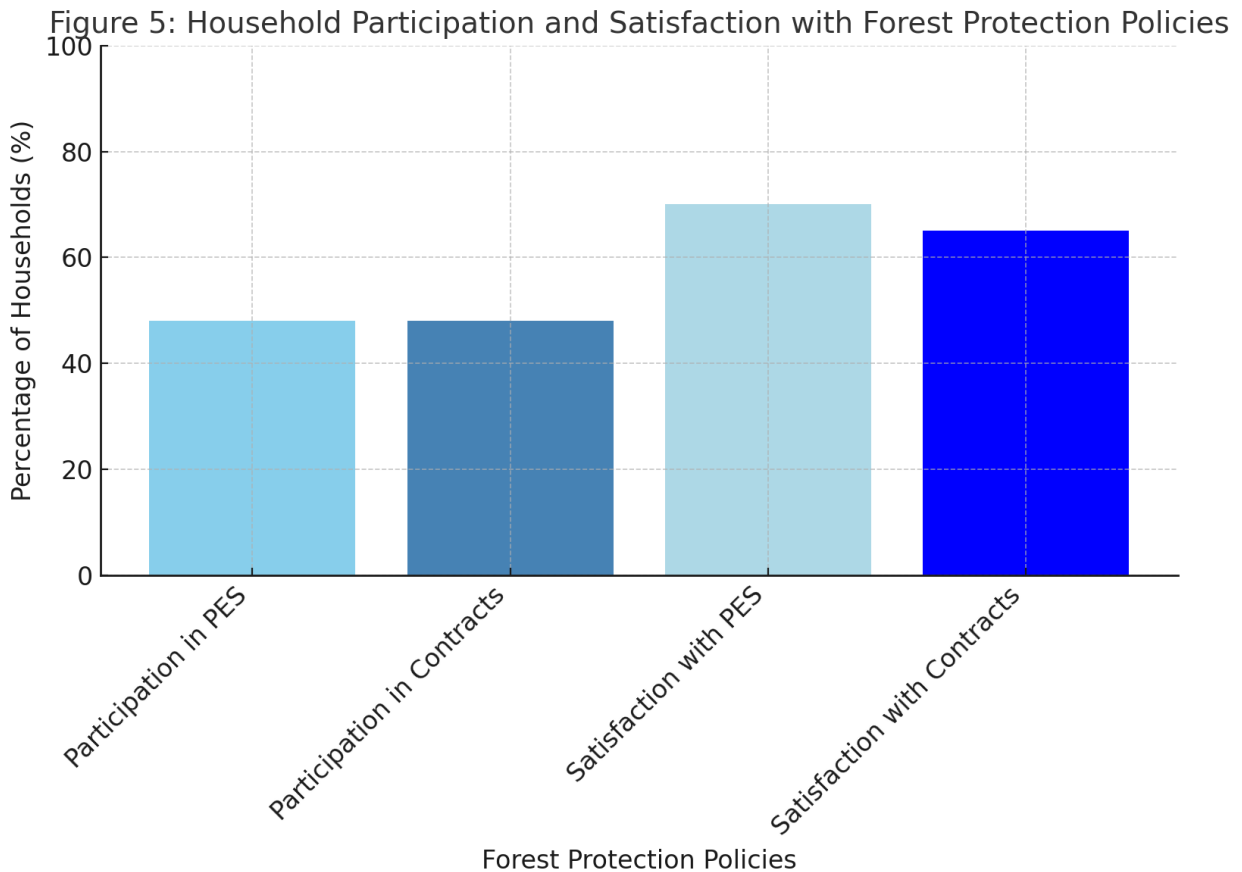
Balancing forest conservation and economic development in the Central Highlands is a complex challenge but not an impossible one. Initiatives such as PES, ecotourism, and agroforestry have demonstrated significant potential to achieve this dual objective. However, success will require robust policy support, active community participation, and targeted investments in education and infrastructure.

These solutions not only protect natural resources but also enable sustainable development for the Central Highlands in the future.

5.3. The Role of Policy in Addressing Challenges

Policy plays a pivotal role in addressing challenges related to forest conservation and sustainable development in the Central Highlands. Issues such as forest degradation, climate change, and land-use conflicts require policy interventions at multiple levels to ensure that forest protection initiatives and livelihood support are effectively implemented. This study highlights the role of existing policies while emphasizing areas for improvement to address long-term challenges.

The forest protection contract policy is one of the Government's most significant initiatives to encourage local community participation in forest resource management. In the Central Highlands, this program has achieved remarkable successes but still faces certain limitations that need to be addressed.



(Statistics on Households Participating in PES and Forest Protection Contracts, Along with Satisfaction Levels Regarding Policy Effectiveness)

Survey data indicate that 48% of households participating in forest protection contracts reported financial benefits, with an average income increase of 5–10 million VND per household per year. Participating households were tasked with forest patrols, preventing illegal logging, and protecting wildlife. In-depth interviews in Kon Tum revealed that the program has helped reduce deforestation and heightened community awareness of resource conservation. Additionally, income from forest protection contracts has been used to meet basic needs such as education and housing improvements, while reducing reliance on unsustainable activities like logging.

While the program has seen many successes, it still faces several limitations:

- Unequal allocation: Not all communities have equal access to forest protection contracts. Households in remote areas are often excluded from this program.
- Insufficient financial support: Some households feel that the compensation is inadequate to cover the time and effort spent on forest protection.

To improve, the program must be expanded to all ethnic minority communities in the Central Highlands and increase financial support. Additionally, it should include training activities to enhance community resource management capacity.

PES (Payments for Forest Environmental Services) is an innovative policy designed to provide financial incentives for forest conservation. This study shows that PES has brought positive benefits but still has potential for expansion and optimization.

- Participation and Benefits: Forty-eight percent of households participating in PES reported receiving payments ranging from 5–10 million VND per year, improving livelihoods and alleviating economic pressures. These payments were used for investments in education, infrastructure, and agricultural production.

- Increased Awareness: PES also enhanced community awareness of forest protection. Some households voluntarily participated in forest patrols and reported violations of illegal logging.

Despite its effectiveness, the PES program faces some challenges:

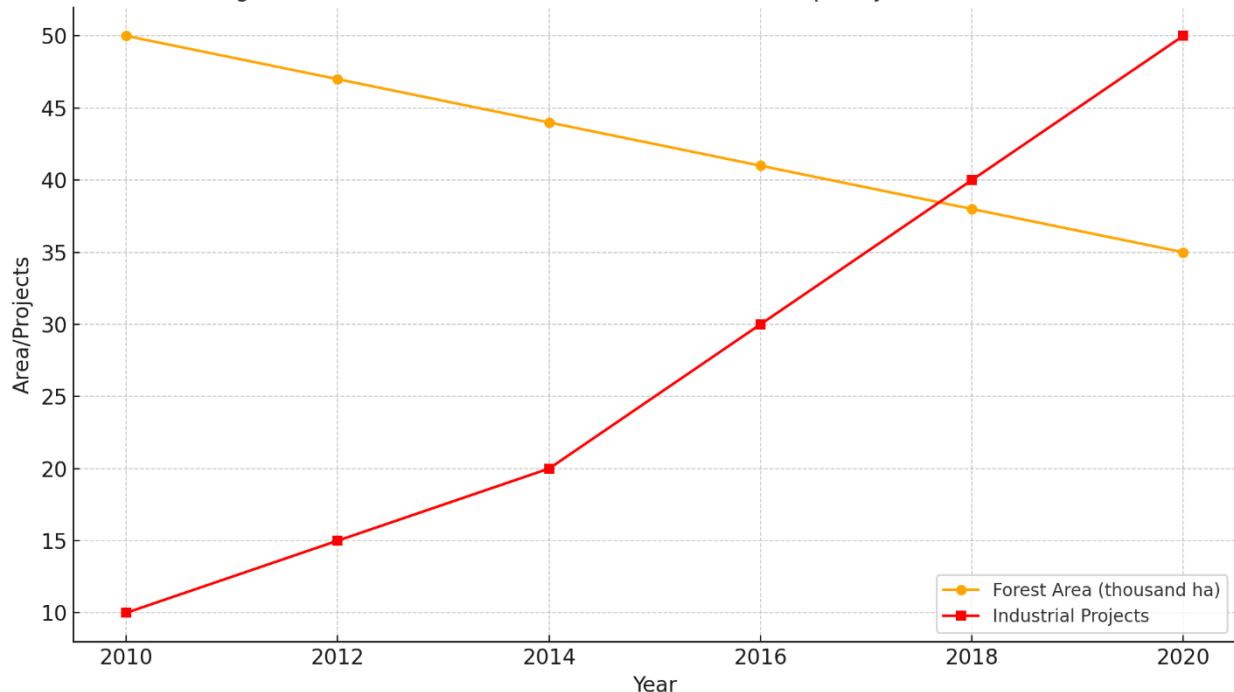
- Transparency in fund allocation: Some communities reported not receiving full payments due to a lack of transparency in fund management.
- Payment delays: Some households reported waiting six months or more to receive PES payments, causing difficulties in planning their usage.

Recommendations for Optimizing PES:

- Establish a transparent management system with community oversight.
- Shorten payment times and ensure payments are delivered to the right beneficiaries.

Land-use planning is a crucial factor in addressing land-use conflicts and protecting forests in the Central Highlands. However, existing policies have not fully guaranteed the rights of ethnic minority communities.

Figure 6: Trends in Forest Area and Industrial Crop Projects (2010-2020)



(Monitoring the Decline in Natural Forest Area and the Increase in Economic Projects Impacting Forest Land from 2010 to 2020)

Survey results indicate that 35% of households face difficulties in protecting their land use rights against the expansion of industrial crops or infrastructure development projects. Many communities lack legal documentation to prove land ownership, leading to land loss or forced relocation. To address this issue, land-use policies need to be improved:

- Grant legal land use rights to ethnic minority communities.
- Implement transparent forest land-use planning with the participation of stakeholders, especially local communities.

Sustainable economic development policies, such as supporting agroforestry models and ecotourism, are critical tools for balancing forest conservation and economic growth. About 40% of households have successfully adopted agroforestry models, reporting improvements in income and soil protection. However, many households lack

the technical knowledge and capital needed to implement these models.

Government Recommendations:

- Train communities in agroforestry techniques.
- Provide preferential credit to households participating in agroforestry models.

Forest-based and indigenous culture-based ecotourism remains a largely untapped opportunity in the Central Highlands. Policies to support tourism development should focus on:

- Investing in tourism infrastructure, such as transportation and accommodation for visitors.
- Supporting communities in developing tourism products and services, such as homestays and forest tours.

A critical factor in policy implementation is educating and raising community awareness. Research findings show that many households in the Central Highlands lack a full understanding of the value of forests and sustainable development models. The Government and non-governmental organizations should organize training programs to improve people's awareness and skills in:

- Forest resource conservation.
- Agroforestry techniques.
- Managing and developing ecotourism.

Strong communication campaigns on forest protection and sustainable development should be implemented, especially in areas at high risk of forest degradation.

Policy is the cornerstone for addressing challenges in the Central Highlands, from forest degradation and climate change to land-use conflicts. Initiatives such as forest protection contracts, PES, land-use planning, and sustainable economic development have shown great potential in balancing conservation and development. However, to maximize the effectiveness of these policies, improvements in management, transparency, and active community participation are essential. Close coordination among government authorities, international organizations, and ethnic minority communities will be key to achieving the goals of forest conservation and sustainable development in the Central Highlands.

6. Conclusion and recommendations

6.1. Conclusion

The study reaffirms the irreplaceable role of forests in supporting the sustainable livelihoods of ethnic minority communities in the Central Highlands. Forests provide essential natural capital such as timber, non-timber forest products (NTFPs), water, and arable land, while also playing a vital role in maintaining social and cultural capital and generating financial income through initiatives like Payments for Forest Environmental Services (PES), ecotourism, and agroforestry.

However, the region faces significant challenges, including forest degradation, climate change, and land-use conflicts. Policy initiatives such as forest protection contracts, PES, and land-use planning have achieved initial successes. Nevertheless, addressing these challenges and promoting sustainable development requires close collaboration among local governments, international organizations, and local communities.

The study also highlights the substantial potential of sustainable development solutions, particularly in integrating forest conservation with economic development through models like agroforestry and ecotourism. These models not only alleviate pressure on forest resources but also improve the quality of life for local communities.

6.2. Recommendations

Based on the research findings, the following specific recommendations are proposed:

- i) **Strengthening Forest Protection Policies:** Expand the scope and increase financial support for forest protection contract programs. This will encourage community participation in forest conservation while improving household incomes. Ensure transparent management of PES funds, shorten payment times, and enhance community oversight to prevent resource misallocation.
- ii) **Land-Use Planning and Community Rights:** Guarantee legal land use rights for ethnic minority communities by issuing land-use certificates and implementing transparent forest land-use planning. Thoroughly assess the environmental impact of economic development projects, such as industrial crop cultivation and infrastructure construction, and involve local communities in decision-making processes.
- iii) **Promoting Sustainable Economic Models:** Accelerate the adoption of agroforestry, particularly in hilly areas. Provide technical support, preferential credit, and market connections to help households develop these models more effectively. Invest in tourism infrastructure and train communities in tourism management to attract visitors. Preserve and promote indigenous cultural values, such as gong festivals, brocade weaving, and spiritual rituals, as part of ecotourism initiatives.
- iv) **Enhancing Community Capacity and Awareness:** Organize training programs on agroforestry techniques, resource management, and ecotourism development. Educate communities about the sustainable value of forests to change perceptions and behaviors. Support ethnic minority communities in participating in forest management to enhance efficiency and accountability in resource protection.
- v) **Addressing Climate Change:** Develop early warning systems to deal with extreme weather events such as droughts and floods. Utilize advanced technologies like GIS and remote sensing to monitor and manage forest resources and forecast climate-related risks.

6.3. Future Research Directions

To further clarify and expand the findings, the following research directions are suggested:

- i) **In-depth Evaluation of Forest Protection Policies:** Assess the long-term effectiveness of policies such as forest protection contracts and PES to propose appropriate improvements.
- ii) **Analysis of Climate Change Impacts:** Conduct detailed studies on the impacts of climate change on livelihoods and forest resources in the Central Highlands, with a focus on long-term forecasting models.
- iii) **Exploration of Innovative Economic Models:** Research additional sustainable economic models, such as agroforestry, medicinal plant cultivation, and the development of NTFPs, to replicate successful practices.
- iv) **Development of Management Support Tools:** Create tools and systems to support forest resource management using modern technologies to improve the management capacity of communities and authorities.

The findings emphasize that forests are both the lifeblood and the cultural foundation of ethnic minority communities in the Central Highlands. However, resource degradation and environmental and social challenges demand close collaboration among stakeholders to conserve forests and ensure sustainable livelihoods. Appropriate policies, combined with active community participation, will be key to achieving this goal, thereby protecting natural resources and fostering sustainable development for the future.

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