



Changing Livelihood Strategies in a Mountainous Region of Vietnam Under Climate and Institutional Pressures

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Abstract

The dynamic change of livelihoods in ethnic minority areas has become increasingly critical under the combined pressures of climate change, market integration, and institutional reform. This study aims to identify how livelihood strategies have evolved among mountainous households in Quang Tri province, Vietnam, and to explain why livelihood transition does not always reduce vulnerability. Evidence was collected from focus group discussions across three livelihood groups: forestry-based, non-farm, and mixed-livelihood households. The findings reveal significant livelihood changes during the 2015-2024 period, shaped by the expansion of the East-West Economic Corridor, stricter forest governance, Payments for Forest Environmental Services, and repeated climate-related shocks. Mixed-livelihood households showed stronger adaptive capacity due to diversified income portfolios and social networks, while forestry-dependent households remained vulnerable because of declining forest resources, limited market access, and dependence on long-rotation plantations. Non-farm households achieved relatively more stable incomes but became increasingly exposed to labor market volatility. By applying a Drivers-Strategies-Outcomes analytical framework, this study clarifies the mechanisms through which institutional, market, and environmental drivers translate into uneven livelihood outcomes. The findings contribute to livelihood adaptation research by showing that adaptive effectiveness is determined less by the type of livelihood activity than by households' capacity to access markets, mobilize resources, and organize production.

Keywords: Institutional Pressure, Livelihood Strategies, Livelihood Transformation, Mountainous Region, Vietnam.

Introduction

Vietnam has placed strong emphasis on promoting sustainable livelihoods for ethnic minority and mountainous communities through the National Target Program for the 2021-2025 period. The program aims to reduce poverty, improve access to social services, and strengthen resilience to climate change. These objectives are closely aligned with several Sustainable Development Goals, including poverty eradication (SDG 1), sustainable agriculture (SDG 2), and climate action (SDG 13). Despite these policy efforts, ethnic minority and upland communities remain among the most vulnerable social groups because of limitations in education, adaptive capacity, livelihood assets, and effective access to public policies (1-5). This pattern of livelihood vulnerability is particularly evident in the mountainous districts of Quang Tri province, including Huong Hoa and Dakrong. These districts are highly exposed to storms, flash floods, landslides, and periods of prolonged inundation, which repeatedly affect lives, assets, infrastructure, and agricultural production (6). More than half of the local population belongs to the Van Kieu and Pa Co ethnic groups, whose livelihoods rely heavily on small-scale agriculture, plantation forestry, and the collection of non-timber forest products. Although policy initiatives such as the National New Rural Development Program and the National Climate Change Strategy have been implemented, their effects at household level remain uneven. Understanding why these constraints persist is important if livelihood interventions are to move beyond short-term assistance. Existing literature on rural livelihoods in Vietnam has tended to focus either on measuring specific adaptation responses or on providing descriptive snapshots of livelihood systems at a single point in time (7-9). Less attention has been given to how livelihoods evolve over longer periods and to how institutions, market integration, and community-level capacities interact with households in shaping adaptive processes under climate stress.

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(10). This gap is especially apparent in mountainous Quang Tri, where livelihood change has been documented but is less frequently examined as an ongoing adaptive process shaped by climate, forest governance, infrastructure, and household capabilities. Livelihood strategies refer to the set of activities undertaken by households to sustain and improve their living conditions, usually based on the combination of natural resources, agriculture, wage employment, small trade, and social networks. The Sustainable Livelihoods Framework emphasizes the role of different forms of livelihood capital in shaping household choices and adaptive capacity in response to environmental and economic shocks (11, 12). Building on this tradition, livelihood strategies are understood in this study as dynamic combinations of activities and assets that change over time under the influence of environmental stressors, institutional arrangements, market conditions, and household capabilities (13, 14). In the Vietnamese context, livelihood selection and development have been influenced by economic reforms, state policies, globalization, and development programs. Land and forest allocation policies, forest protection regulations, and Payments for Forest Environmental Services (PFES) have directly affected household livelihood structures in upland areas. At the same time, infrastructure development, particularly the East-West Economic Corridor (EWEC), has expanded opportunities for market participation, wage labor, small trading, and services. However, such opportunities are unevenly captured because households differ in labor availability, education, skills, social capital, and access to markets. A major limitation of livelihood studies in Vietnam is the scarcity of longitudinal and process-based evidence, particularly for upland farming households. Climate variation and rural household welfare have been assessed using econometric models, while livelihood trajectories in central Vietnam have also been examined in coastal contexts (15, 16). These studies provide important insights but do not fully explain how shocks, institutional pressures, infrastructure development, and adaptive choices interact in vulnerable mountainous contexts. This study conceptualizes livelihood transition not as a simple change from one source of income to

another, but as a process of reallocating labour, land, forest resources, social networks and market opportunities under multiple pressures. The analysis is structured around a Drivers-Strategies-Outcomes framework. Drivers include climate-related hazards, forest governance, PFES, EWEC-related infrastructure development, market access and household assets. Strategies include forestry-based, non-farm and mixed livelihood pathways. Outcomes include income stability, vulnerability reduction, exposure to market risks and adaptive capacity.

The originality of this study lies in its process-oriented interpretation of livelihood transition in a mountainous ethnic minority context. Instead of treating diversification as an inherently positive outcome, the study examines why some livelihood shifts reduce vulnerability while others reproduce or create new forms of risk. This perspective adds to existing livelihood research by linking climate stress, institutional change, infrastructure development, and household implementation capacity within a single analytical framework.

Against this background, the study addresses four research questions: (a) What livelihood shifts occurred among mountainous households in Quang Tri province during the 2015-2024 period? (b) How did climate pressures, forest governance, PFES, and EWEC-related infrastructure development shape these livelihood shifts? (c) How did livelihood outcomes differ among forestry-based, non-farm, and mixed-livelihood households? (d) To what extent did livelihood transitions reduce or reproduce household vulnerability?

Methodology

This study employs an exploratory qualitative approach to analyze livelihood transitions among mountainous households in Quang Tri province under conditions of climate change, forest governance reform, and market integration, as shown in Figure 1. Primary data were collected through focus group discussions (FGDs) organized in Huong Hoa and Dakrong districts, two mountainous districts located along or near the East-West Economic Corridor. The approximate district-center coordinates are 16° 42' 0" N, 106° 42' 0" E for Huong Hoa and 16° 32' 30.48" N, 106° 58' 23.16" E for Dakrong. These coordinates are reported to provide geographic transparency and

should be understood as indicative district-level coordinates rather than household-level location. The 2015–2024-time frame was selected for three reasons. First, it is sufficiently long to capture observable changes in livelihood strategies rather than short-term livelihood fluctuations. Second, it covers a period in which forest governance, PFES implementation, and local development programs became increasingly relevant to upland livelihoods. Third, it allows the study to examine the temporal relationship between livelihood shifts and EWEC-related infrastructure development, including improved road connectivity, market access, wage employment, and small trading opportunities. This period therefore provides a suitable window for understanding how institutional and infrastructure changes interacted with climate-related pressures.

Three household groups were identified based on their primary income sources: (a) forestry-based households; (b) non-farm households; and (c) mixed-livelihood households. A total of 202 participants representing these groups were selected using purposive sampling. Inclusion criteria were: residence in the study area for at least ten years; a major role in household income

generation; direct experience with livelihood changes during the 2015–2024 period; belonging to one of the three livelihood groups; and willingness to participate in the FGDs. Exclusion criteria were: households newly moving into the study area after 2015; participants unable to recall livelihood changes during the study period; households not fitting the three livelihood categories; and individuals who declined to participate or withdrew consent.

Each FGD lasted approximately 90–120 minutes and was facilitated by the research team with support from field note-takers. The discussion topics covered main income sources, livelihood changes during 2015–2024, market access opportunities, the role of the EWEC, perceptions of climate change, PFES and forest governance, and barriers to livelihood transition. Participants were asked to estimate the relative contribution of different livelihood sources and their changes over time. These estimates were recorded only when group consensus was reached. The numerical data presented in this study are therefore semi-quantitative in nature and are used to support comparisons across household groups rather than to provide precise income measurements.

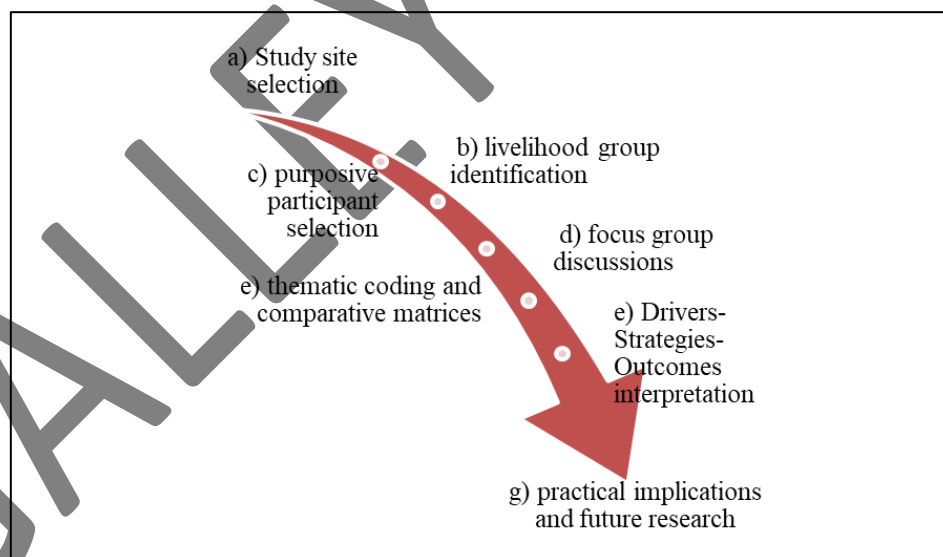


Figure 1. Research Design and Analytical Workflow

FGDs are particularly suitable for capturing collective perceptions of livelihood change in settings where quantitative longitudinal data are scarce. Although the study does not aim at statistical generalization, it provides in-depth contextual insights into livelihood dynamics in vulnerable mountainous settings. The study

followed ethical principles in social research, including voluntary participation, the right to withdraw at any time, and the protection of personal information. Prior to participation, respondents were informed about the study objectives and data usage. Verbal informed consent was obtained due to field conditions and

the characteristics of mountainous communities. No personal identifiers were recorded, and all quotations are anonymized using household group codes and general descriptors.

Results

Characteristics of the Survey Groups

The FGD sample consists of 20 households residing in mountainous areas of Quang Tri province. Participants were purposively selected to capture the diversity of livelihood systems within the community. Table 1 showed that households were classified into three groups based on the structure

Table 1. Characteristics of the FGD Groups

Household Group	Number of Participants	Main Livelihood Characteristics	Classification Criterion
Forestry-based	9	Acacia plantation, NTFPs, perennial crops such as coffee and tea	More than 50% of income from forest-related sources
Non-farm	6	Small trading, EWEC-related wage labor, basic services	More than 50% of income from non-farm sources
Mixed	5	Crop cultivation such as banana and ginger, NTFPs, and hired labor	No dominant income source

Note: The table is based on consensus information from focus group discussions conducted in 2025.

The non-farm group includes six participants whose households obtain more than half of their income from non-agricultural activities, including small-scale trading and wage labor along the EWEC. The mixed-livelihood group comprises five participants characterized by diversified income portfolios, with no single source dominating. Their livelihoods combine crop cultivation with hired labor and forest-related activities. The income-based classification provides a basis for analyzing differences in adaptive capacity and livelihood vulnerability across household groups. In 2015, a major share of household livelihoods in mountainous Quang Tri still depended on forest resources and small-scale agriculture. Forestry-based households indicated the largest share of income from plantation forestry, timber extraction, and NTFPs. Most outputs were used for household consumption, with limited market integration, reflecting a traditional forest-based livelihood system before stronger market connection and stricter forest governance. Non-farm households had started engaging in small trading, seasonal wage labor, and basic services but incomes were unstable and highly seasonal. Mixed-livelihood households combined agriculture, forest extraction, and service

of their primary income sources, ensuring analytical comparability in terms of livelihood strategies and vulnerability levels. The forestry-based group represents the largest share, with nine participants. These households derive more than 50% of their income from forest-related activities, primarily acacia plantation, non-timber forest product (NTFP) collection, and perennial crops such as coffee and tea. This group exhibits the strongest dependence on forest resources, reflecting the traditional livelihood pattern of the region.

Dynamic Change of Livelihood Strategies

The results show significant changes in the livelihoods of households in the mountains of Quang Tri in the period 2015-2024, as shown in Table 2. In 2015, livelihoods were mainly based on forests and agriculture, especially for households in the forestry sector whose income was mainly derived from plantation forestry and timber extraction, mainly for subsistence use. One participant recalled: "Back then, collecting timber and bamboo shoots from the forest was enough to survive; selling them brought very little as the market was far away." Non-farm households engaged in small trade and wage labor but their income was unstable and precarious. Mixed households combined forest, agricultural and service activities but still heavily depended on forest resources. By 2024, livelihood structures had shifted markedly toward commercialization and diversification. These changes were driven by the expansion of the EWEC, stricter control of natural forest exploitation, PFES implementation, rising labor demand, and repeated climate-related shocks. Forestry households reduced timber

extraction and adopted longer-rotation acacia plantations, sustainable forest management, and NTFP collection. However, this transition was largely reactive, resulting in unstable incomes and exposure to price volatility and pest outbreaks. Several households explained: "We can no longer enter the forest to cut timber; now we rely on acacia planting and selling honey." Non-farm households expanded small businesses along the EWEC, joined industrial and service related labor markets, and participated in community-based tourism. These changes contributed to higher incomes but also increased vulnerability to labor market fluctuations, particularly during shocks such as COVID-19. Mixed-livelihood households demonstrated the highest adaptive capacity by flexibly reallocating labor and leveraging social networks, resulting in more stable income streams. A village leader summarized this pattern as follows: "Households with multiple livelihoods worry less."

Table 2: Comparison of Major Livelihood Transitions by Household Group, 2015-2024

Household Group	Main Livelihood Activities In 2015	Estimated Income Contribution In 2015	Key Observed Changes	Main Livelihood Activities In 2024	Estimated Income Contribution In 2024
Forestry-based	Timber extraction and acacia plantation	High; approximately 60-70% from timber-related activities	Shift toward sustainable management and increased NTFPs	Sustainable forest management and NTFPs	Medium; 40-50% timber and 50-60% NTFPs
Non-farm	Construction, wage labor, and basic services	Low to medium; 50-60% from labor	Growth driven by infrastructure, tourism, and investment	Tourism, small business, and wage labor	Medium to high; 40-50% services and 30-40% business
Mixed	Forestry and agriculture	Medium; around 40% forestry and 40% agriculture	Income diversification and labor reallocation	Agriculture and NTFPs	Medium to high; 40-50% agriculture and 30-40% NTFPs

Note: Income values are consensus-based estimates from FGDs, reflecting relative trends rather than precise quantitative measurements.

Table 3: Changes In Livelihood Strategies and Income Outcomes, 2015-2024

Household Group	Year	Main Livelihood Strategy	Estimated Total Income	Estimated Income Structure
Forestry-based	2015	Timber extraction and perennial crops	Low to medium	60-70% timber; 10-20% NTFPs; remainder from other sources
Forestry-based	2024	Sustainable forest management and NTFPs	Lower-medium	40-50% sustainable timber; 50-60% NTFPs; around 10% other
Non-farm	2015	Wage labor	Very low to low	50-60% labor; 20-30% agriculture
Non-farm	2024	Tourism, small business, and wage labor	Medium to high	40-50% tourism and services; 30-40% business; around 20% labor
Mixed	2015	Forestry, agriculture, and non-farm activities	Medium	40% forestry; 40% agriculture; 20% other
Mixed	2024	Agriculture and NTFPs	Medium to high	40-50% diversified agriculture; 30-40% NTFPs; 10-20% other

Note: The estimates are semi-quantitative and represent group consensus from FGDs rather than precise household income measurements.

Table 3 showed different changes in livelihood strategies and income outcomes during 2015-2024. These transitions suggest that livelihood risks have not disappeared but have shifted from dependence on natural resources to dependence on markets. Adaptive outcomes increasingly

depend on households' market access, production organization, and capabilities rather than on livelihood type alone. This shift is reflected in participant's remark: "In the past, we worried about crop failure; now we worry about falling prices."

Discussion

The findings indicate that livelihood transitions in mountainous Quang Tri are not merely spontaneous household responses to environmental and market changes. They reflect structured adaptation mechanism in which drivers, strategies, and outcomes interact closely. The Drivers-Strategies-Outcomes framework provides a systematic explanation for divergent livelihood trajectories and uneven vulnerability across household groups (17, 18).

First, institutional and environmental drivers play a decisive role. Stricter forest governance, PFES implementation, and declining forest resources have forced forestry-dependent households to abandon traditional extraction-based livelihoods (19, 20). Evidence from Lao PDR also shows that households may shift toward NTFPs and ecosystem services when access to forest resources changes (21). At the same time, the expansion of the EWEC functions as an economic catalyst by facilitating market access, trade services, and wage employment. The temporal relationship between infrastructure development and livelihood change is therefore visible in the movement from subsistence-oriented forest dependence in 2015 toward market-oriented activities by 2024.

Second, adaptive strategies are strongly shaped by internal household resources. Mixed-livelihood households show greater diversification capacity because of stronger social capital, broader networks, and better access to market information. Forestry households, despite significant livelihood shifts, often lack non-farm skills and remain locked into long-rotation plantation models with unstable returns. Non-farm households maintain relatively more stable incomes but are highly exposed to labor market volatility along the EWEC, which is consistent with evidence from economic corridor regions in the Greater Mekong Sub-region (22). Third, the outcomes show a clear stratification in adaptive success. Mixed households are more successful with greater income stability, reduced

forest dependency and increased market integration (11, 12). Forestry households, in contrast, are exposed to new risks from acacia price volatility, pests and rising input costs. This partial transition leaves households highly vulnerable even when they have technically changed their livelihood activities. This finding is consistent with broader evidence showing that livelihood transitions do not automatically reduce vulnerability when technical support, market access and organisational capacity are weak (23-26).

A key contribution of this study is the identification of implementation capacity as a critical condition for adaptive effectiveness. Several households tried to start small businesses or community-based tourism but failed because of limited management skills, poor product development, and weak connections to stable markets. These findings suggest that capacity constraints and market access, rather than livelihood selection alone, determine whether adaptation becomes sustainable. In this sense, diversification without capability-building may simply replace one form of vulnerability with another.

The practical implication is that policy should move beyond promoting livelihood diversification in general terms. Forestry-dependent households require technical support for sustainable forest management, better PFES implementation, and access to market information. Non-farm households need vocational skills, employment protection, and support for small enterprise development. Mixed-livelihood households require access to credit, value-chain linkages, cooperative organization, and risk management tools. Such differentiated policy support would be more appropriate than uniform livelihood programs in mountainous and ethnic minority areas.

Conclusion

This study provides an in-depth understanding of livelihood adaptation among mountainous households in Quang Tri province under conditions of climate change and evolving institutional-market contexts. The findings indicate that livelihood transitions intensified during the 2015-2024 period following the expansion of the EWEC, the tightening of forest governance, and the implementation of PFES. The

three household groups exhibit distinct adaptation trajectories. Mixed-livelihood households demonstrate the highest degree of flexibility supported by diversified activities and stronger social networks. Forestry-dependent households continue to experience high vulnerability due to declining forest resources and limited market capabilities. Non-farm households show relatively more stable incomes but remain exposed to employment fluctuations along the EWEC. The study makes an important contribution by clarifying the Drivers-Strategies-Outcomes mechanism. While policies and markets create enabling conditions, household capabilities ultimately determine adaptive effectiveness and vulnerability outcomes. The findings show that livelihood transition does not automatically translate into reduced vulnerability. Many adaptive strategies remain ineffective because of limited business skills, weak market access, low PFES payments, policy support that is poorly aligned with local needs, and weak organizational capacity at the community level. This highlights a substantial gap between policy design and the realization of tangible benefits at the household scale. The study has several limitations. First, it is based on FGDs and retrospective livelihood narratives which may be affected by recall bias. Second, the small qualitative sample limits statistical generalization. Third, the analysis focuses on selected mountainous communities in Quang Tri and therefore may not fully represent all upland regions in Vietnam. Finally, the study does not quantify income changes or establish causal effects. These limitations, however, are consistent with the exploratory purpose of the study, which is to unpack mechanisms of livelihood transition rather than to estimate causal impacts. Future research should combine qualitative enquiry with larger household surveys, panel data, spatial analysis, and GIS-based infrastructure indicators. Such approaches would allow a more precise assessment of how road connectivity, PFES, climate exposure, household assets, and market participation influence livelihood outcomes. Comparative studies across different mountainous provinces in Vietnam and mainland Southeast Asia would also help determine whether the mechanisms identified in Quang Tri are context-specific or regionally generalizable.

In a nutshell, the development of sustainable livelihoods in mountainous Quang Tri should not be perceived as merely opening up economic opportunities but as a capacity building process that facilitates market access, resource management, production organization and collective action of vulnerable households. These policy implications are particularly important in the context of intensifying climate change impacts and continued border-area infrastructure development.

Abbreviations

DSO: Drivers-Strategies-Outcomes; EWEC: East-West Economic Corridor; FGD: Focus group discussion; NTFP: Non-timber forest product; PFES: Payments for Forest Environmental Services; SDG: Sustainable Development Goal; SLF: Sustainable Livelihoods Framework.

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Author Contributions

Bui Duc Tinh: Conceptualization, Methodology, Data Collection, Data Analysis, Manuscript Drafting, Revision, Dao Duy Minh: Conceptualization, Methodology, Data Collection, Data Analysis, Manuscript Drafting, Revision. Both the authors approved the final version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request. Due to confidentiality considerations, raw FGD notes and participant-related qualitative data are not publicly available.

Declaration of Artificial Intelligence (AI) Assistance

AI-assisted tools were used only for spelling, grammar, formatting checks, and language polishing. The authors reviewed and approved all

content and are responsible for the final manuscript.

Ethics Approval

This study followed ethical principles for social research. Participation was voluntary, and verbal informed consent was obtained before the focus group discussions. No personal identifiers were recorded.

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