

Models of residential space for ethnic minorities in Thanh Hoa Province associated with sustainable livelihoods

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Abstract

Thanh Hoa Province has 11 mountainous districts with seven ethnic minority groups, and the three largest ethnic groups are the Muong, Thai, and H'Mong. This region has great potential for developing a forest-based economy, ecotourism, community-based tourism, and cultural heritage tourism that is associated with cultural festivals, customs, lifestyles, and traditional housing architecture. However, developing a family-based economy, such as engaging in community-based tourism or agricultural production, has negatively affected and disrupted the structure of village spaces, spatial planning, and traditional house design. The arbitrary construction of additional service spaces and spaces for resident guests within the village space and the precinct of a house has reduced the area of the garden and agricultural land. The self-initiated modification, expansion, and use of non-traditional materials in traditional housing structures by residents to serve tourists have resulted in the loss of the architectural value of traditional homes. The exploitation of agricultural land has affected the natural forest area, the forest protection area at the headwaters, and the vegetation cover and natural ecosystems. Moreover, agricultural economic activities have not been linked to service activities, handicraft production, or tourism, and there are no adaptive residential space models, thus failing to create sustainable livelihood activities. Therefore, the article proposes settlement space models and orientations for residential space development including village spaces, house precincts, and traditional housing spaces of ethnic minorities in Thanh Hoa Province, associated with sustainable livelihoods based on the exploitation of traditional housing architectural heritage values to ensure local economic development. These models are closely linked with the conservation and promotion of ethnic cultural values, landscape preservation, environmental protection, and contribution to poverty reduction for residents.

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1. Introduction

Residential space is a combination of functional spaces used for habitation. These include dining space, living space, activity space, production space, cultural space, and spiritual space [1]. Residential space can be

understood equivalently at different levels: community spaces, village spaces (including production space), house precincts, and traditional housing spaces [2].

The term “traditional cultural heritage” refers to spiritual and material products with historical, cultural, and scientific value, which are transmitted from one generation to another, preserved, recreated, and developed [3].

Sustainable livelihoods refer to the production activities of rural people in which they can cope with and recover from damage, shocks, and stresses and maintain or enhance their capabilities and assets both now and in the future, without undermining environmental resources [4].

Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It involves a balanced development among economic, social, and environmental factors [5].

With its varied topography, climate, vast forests, mountains, and seas, Thanh Hoa Province brings together all the elements of nature and offers a plethora of picturesque locations that have contributed to the Western mountainous region's transformation into a stunning area. The land has a great deal of potential for the growth of the tourism and forest industries. Thanh Hoa has 11 mountainous districts and 27 district-level administrative units in the province, with 790 villages and hamlets, within an area of more than 8,000 km², accounting for three-quarters of the province's area. The population is approximately 1 million, nearly one-third of the province's population [6]. There are six ethnic groups living together, including Muong, Thai, Mong, Tho, Dao, and Kho Mu. The three most populous ethnic groups are Muong with 329,741 people, Thai with 200,071 people, and Mong with 17,880 people [7]. Ethnic minority groups in the mountainous Thanh Hoa currently keep their traditional cultural heritage imbued with their own identity, including tangible cultural heritage such as the spatial structure of villages, house architecture, natural landscapes, ecosystems, forest vegetation, cuisine, costumes, and production tools. They also possess intangible cultural heritage, including traditional cultural festivals, lifestyles, customs, religions, and beliefs. All these values can be harnessed and promoted in the organization of livelihood activities for local people.

Despite being blessed with natural landscapes, the mountainous districts of Thanh Hoa Province have not yet effectively restructured agricultural production. The majority of the agricultural labor force, primarily unskilled labor, accounts for 57.37%. Furthermore, the economic strengths of cultural heritage tourism, eco-tourism, and community-based tourism have not been adequately promoted, resulting in less sustainable livelihood activities for the people. The economy in the areas where ethnic minorities reside still faces significant challenges. Currently, 7 out of the 11 mountainous districts in Thanh Hoa Province are among the poorest districts in the country, with 46,470 poor households (accounting for 68.6% of the province's total) and 47,446 near-poor households (accounting for 54.5% of the province's total). In 2021, the per capita income was the lowest, reaching only 23,150 million VND compared to the income of people in other cities and towns in the province [8].

Given these shortcomings, the local government of Thanh Hoa Province has developed many specific policies and solutions to strive for sustainable poverty reduction among ethnic minorities in the mountainous districts. However, to promote local economic development in ethnic minority areas, the cooperation of all levels, sectors, communities, and experts is necessary. Unlike urban houses, residential spaces in rural areas are always associated with the livelihood activities of each household, forming a symbiotic relationship between eating, living, and doing business. Therefore, to approach the creation of spatial models associated with sustainable livelihoods, it is necessary for us, experts in the field of planning and architecture, to address the following research questions. Firstly, how are residential spaces, including village and village spaces, production spaces, house premises spaces, and housing spaces for ethnic minorities in Thanh Hoa Province, organized, renovated, and decorated to support economic activities for the people, ensuring sustainable livelihood activities? Secondly, how can residential spaces be developed to strengthen local economic support while preserving architectural values and promoting the traditional cultural heritage values of ethnic minorities?

Based on the research questions, the article focuses on proposing several residential space development models including village spaces, house precincts, and residential spaces associated with sustainable and inclusive livelihoods. At the same time, it provides an orientation to explore the heritage values of traditional residential architecture to preserve and promote heritage values of traditional culture, contributing to preserving the indigenous cultural identity of ethnic minorities in mountainous areas.

2. Research method

These four research methods were used in the study:

- 1) A collecting and synthesis method was used to collect, synthesize, and analyze information and documents relevant to the research. This approach involved gathering and synthesizing important published scientific works, analyzing, and assessing published research findings to identify knowledge gaps and, consequently, propose solutions and research questions;
- 2) A method of inheriting statistical and survey data from published studies for use as secondary data to supplement the article. Using this method, the research team inherited published data and documents to contribute to the practical foundation of the research;
- 3) Field investigation survey method, combined with sociological investigation method. The authors conducted field surveys, documented observations, and captured photographs in 9 out of 11 districts in the mountainous regions of Thanh Hoa Province, as listed in Table 1.

Table 1. Statistics of the districts and villages surveyed on-site

No.	District	Commune	Village	Ethnicity
1	Cam Thuy	Cam Luong	Luong Ngoc	
2	Ngoc Lac	Thach Lap	Lap Thang	Muong
3	Thach Thanh	Dang Thuong	Thach Lam	
4	Ba Thuoc	Co Lung	Hieu	
		Lung Cao	Son	
5	Quan Son	Son Dien	Ngam	
6	Quan Hoa	Nam Xuan	But	Thai
		Phu Le	Hang	
7	Thuong Xuan	Bat Mot	Vin	
8	Lang Chanh	Tri Nang	Nang Cat	
		Tam Chung	Poom Khuông	
9	Muong Lat		Suoi Phai	Mong
		Muong Ly	Sai Khao	

In order to develop the household economy, the authors also employed sociological survey methods with the target group being the residents to gather information about people's needs and preferences in terms of livelihood activities. The sociological survey form included two samples; the first form for the hosts, including 25 questions on the form was centered around the needs of hosts in promoting community tourism. A total of 90 hosts, 13 village heads or managers in 13 villages, and hamlets in 9 districts (as indicated in Table 1) of 3 ethnic groups—Muong, Thai, and Mong—were surveyed and interviewed. The second form for tourists included 24 questions focusing on tourists' desires for the destination's image in terms of meeting the needs of community tourism. The survey and interviews with 300 tourists were conducted in 10 villages (Luong Ngoc, Lap Thang, Hieu, Son, Ngam, But, Hang, Can, Nang Cat) in nine districts representing two ethnic groups Muong and Thai. Due to the lack of tourism development, three villages where the Mong ethnic group lives are inaccessible to tourists.

- 4) The evaluation method: this technique aided in identifying the best model for organizing residential space so that it can be tailored to each kind of local production. The article also focuses primarily on examining the living spaces of the three major ethnic minorities—the Muong, Thai, and Mong - that make up the majority of the population in the mountainous region of Thanh Hoa. This analysis serves as a foundation for proposing residential space models associated with adaptive sustainable livelihoods.

3. Overview of related research works

An overview of studies on the direction of building models of residential spaces in ethnic minorities in Thanh Hoa Province associated with sustainable livelihoods refers to a number of related studies. Ian Scoones, the author of the research paper on "Sustainable Livelihoods and Rural Development," proposed that sustainable livelihoods and rural development require an approach encompassing social policy and local government management, focusing on four aspects: institutional management policy, local people, community knowledge, and the ecological environment [9].

In the research paper "Approaches to Sustainable Livelihoods for the Rural Poor," Diana Carnay proposed a sustainable livelihood approach for impoverished rural populations to help them develop their strengths and realize their potential while acknowledging the impact of policies and external development trends. The aim is to minimize constraints on livelihood development and poverty reduction development [10].

Naresh C. Singh, the author of the study "Community Adaptation and Sustainable Livelihoods: Basic Issues and Principles," analyzed the fundamental issues and principles for adaptive communities and sustainable livelihoods. The study demonstrated that the pursuit of sustainable livelihoods involves seeking harmony between activities, the economic development process, and the ecosystem [11].

In the research report "Housing for livelihoods: The lifecycle of housing and infrastructure through a whole-of-system approach in remote Aboriginal settlements," the group of authors, including Kurt Seemann, Matthew Parnell, Stephen McFallan, and Selwyn Tucker, assessed sustainable investment in the economic, technical, and social life cycle of desert settlements, particularly in Aboriginal areas. The report offers suggestions for sustainable contributions to local livelihood outcomes through housing and infrastructure for these settlements [12]. A research study conducted by Namibia University of Science and Technology, which focused on "Land, Livelihoods and Housing," presented an integrated approach to land, livelihood, and housing in Namibia, engaging various stakeholders in the land sector [13].

In the study "Sustainable Livelihoods in Upland Vietnam: Land allocation and beyond," authors Elaine Morison and Olivier Dubois identified several key issues related to forest land use in the highlands of Vietnam. The study emphasized the importance of forest management involving different stakeholders working together with farmers [14]. The authors Kai Xie, Yin Zhang, and Wenyang Han employed an optimization strategy and a standard green design approach in their paper "Architectural Heritage Preservation for Rural Revitalization: Typical Case of Traditional Village Retrofitting in China" to conserve their country's architectural and cultural legacy. Preliminary results indicated that the green restructuring concept was locally feasible for sustainable rural revitalization with the preservation of local heritage. For rural construction and modernization, the study could offer typical design references and application prototypes that take local heritage preservation into account, particularly for traditional village systems in underdeveloped nations [15].

In his research paper "The Principles of Sustainable Villages Through Gandhi's Gram Swaraj," authors Tishwarya and Dr. Tagar described Gram Swaraj as an independent village and a unique idea of rural reconstruction presented by Mahatma Gandhi long before India gained its independence. His idea of Gram Swaraj, which centers on the holistic development of a society where people are placed at the center of the economic system, is regarded as one of the alternative models of rural reconstruction. The purpose of this research work was to provide insight into Gandhi's thinking on rural development. As a result, an attempt has been made to reconsider Gandhi's view of Gram Swaraj and its applicability to the current context of architectural developments [16].

In the research study "Rural Tourism in Mountain Rural Communities - Possible Directions/Strategies: Case Study Mountain Area from Bihor County", Cosmin Alin Popescu and colleagues pointed out that the strategy for some mountainous rural communities to simultaneously conserve and utilize local resources sustainably was to combine traditional activities with those related to accommodation and entertainment in the form of rural tourism activities. Based on a case study examining development in a mountainous rural community through tourism activities in Bihor County on the Apuseni mountain range which has prominent but untapped development potential, the article addressed the focus on resources representing each constituent community of the selected area, using specific questionnaire forms, and proposing feasible directions/strategies to ensure future development of this community through rural tourism activities [17].

Azarniou and his colleagues used the DIMTEL technique to identify factors affecting the sustainability of rural housing in Belyan district, Kazerun City, and to introduce effective and efficient elements in the research article "Affecting Factors Analysis on Sustainability of Rural Housing - Case Study: Balyan Southern, Kazerun township". The stratification method and, in certain cases, the snowball method were used to determine the sample size based on the regional scale. The design of the DIMTEL questionnaire, which is the primary research instrument in field research, was based on seven factors totaling twenty-one items [18]. The study "Conservation and Revitalization of Rural Heritage: A Case Study of the Mountainous Traditional Village" by author Shuyi Li stressed the critical role that rural heritage plays in the development of rural communities. It is a pillar supporting rural economic growth and offers potential job opportunities. The typical mountain village of Shixia serves as an effective example of protecting and promoting rural heritage. The study presented Shixia's transformation journey from poverty to rejuvenation, highlighted the village's tangible and intangible cultural heritage resources, and analyzed the challenges and limitations the village faced in previous stages of development in the Rural Heritage Recovery Action (RHRA). The study dissected the recovery strategies used in this successful case of rural heritage revival, aiming to inspire the development of other traditional craft villages [19].

The research article "The impact of rural tourism development on the local community - case study: Sâncraiu village, Cluj County, Romania" by author Lia-Maria Cioanca listed and assessed all the tourist attractions in the territory of Sâncraiu village as well as festivals organized by the local community. The case study demonstrated how local people, supported by the local government, through specific projects, actively participated in promoting the region and its ancient traditions, helping to create sustainable development plans in any ancient regions [20]. The book "Traditional Houses of Vietnamese Ethnic Groups" by Nguyen Khac Tung analyzes the spatial structure, forms, and styles of traditional houses belonging to Vietnamese ethnic groups [21].

In the study "Organizing the Architectural Space of Traditional Houses of the Black Thai Ethnic Group in Ban Hieu, Pu Luong, Thanh Hoa for Community Tourism," author Luong Thi Hien assesses the current status of the architectural structure of Ban Hieu and Pu Luong in Thanh Hoa. The study proposes solutions for organizing the architectural space of Ban Hieu to serve community tourism [22].

In general, the research works related to the current research issue mainly focus on five areas:

Area 1: Developing sustainable livelihoods for remote and ethnic minority areas by proposing mechanisms and policies and exploring the relationship between stakeholders and the community; Area 2: Developing sustainable livelihoods through production land and afforestation land management; Area 3: Assessing economic, technical, and social investment for the housing life cycle and technical infrastructure of settlements to promote sustainable livelihoods; Area 4: Organizing the architectural space of ethnic minority villages to support community tourism; Area 5: Introducing the space and architectural forms of traditional houses of ethnic minorities, as well as showcasing the culture, and tangible and intangible heritage of Thanh Hoa Province.

After reviewing the research situation, it becomes evident that there is a research gap in model building and spatial development orientation associated with sustainable livelihoods for ethnic minorities in Vietnam, especially in Thanh Hoa Province.

4. Current situation of residential space organization

Thanh Hoa ethnic minority groups are primarily concentrated in mountainous areas. As a result, the village structures are often organized in clusters, groups, lines, or a combination of clusters and routes following the hillsides or riversides. Each village typically consists of housing spaces, communal living areas combined with cultural houses, and farming production spaces. The number of houses in each village can range from around 30 to several hundred in larger villages. The arrangement of houses varies among ethnic groups, but they generally face rivers, creeks, and low valleys or are positioned against cliffs. For example, H'mong houses face south to capture the cool breeze, with their backs leaning against the mountains and facing north. The road structure within ethnic villages is flexible, following the natural contours of hillsides, mountains, or meandering rivers. It typically consists of a main road with smaller alleys branching off to reach individual houses, forming a comb-like pattern (see Figures 1-4).

Thanh Hoa ethnic minorities mainly live by agriculture such as planting wet rice, cultivating maize and cassava, raising cattle, and planting forests. There are also handicraft productions such as brocade weaving, knitting, embroidery, forging, and carpentry. A few are still hunting wild animals and picking mushrooms and bamboo shoots, but now due to the management and afforestation work assigned to individual households, these forest products have been reduced. The production spaces are arranged in houses, house precincts, and areas around villages and hamlets.

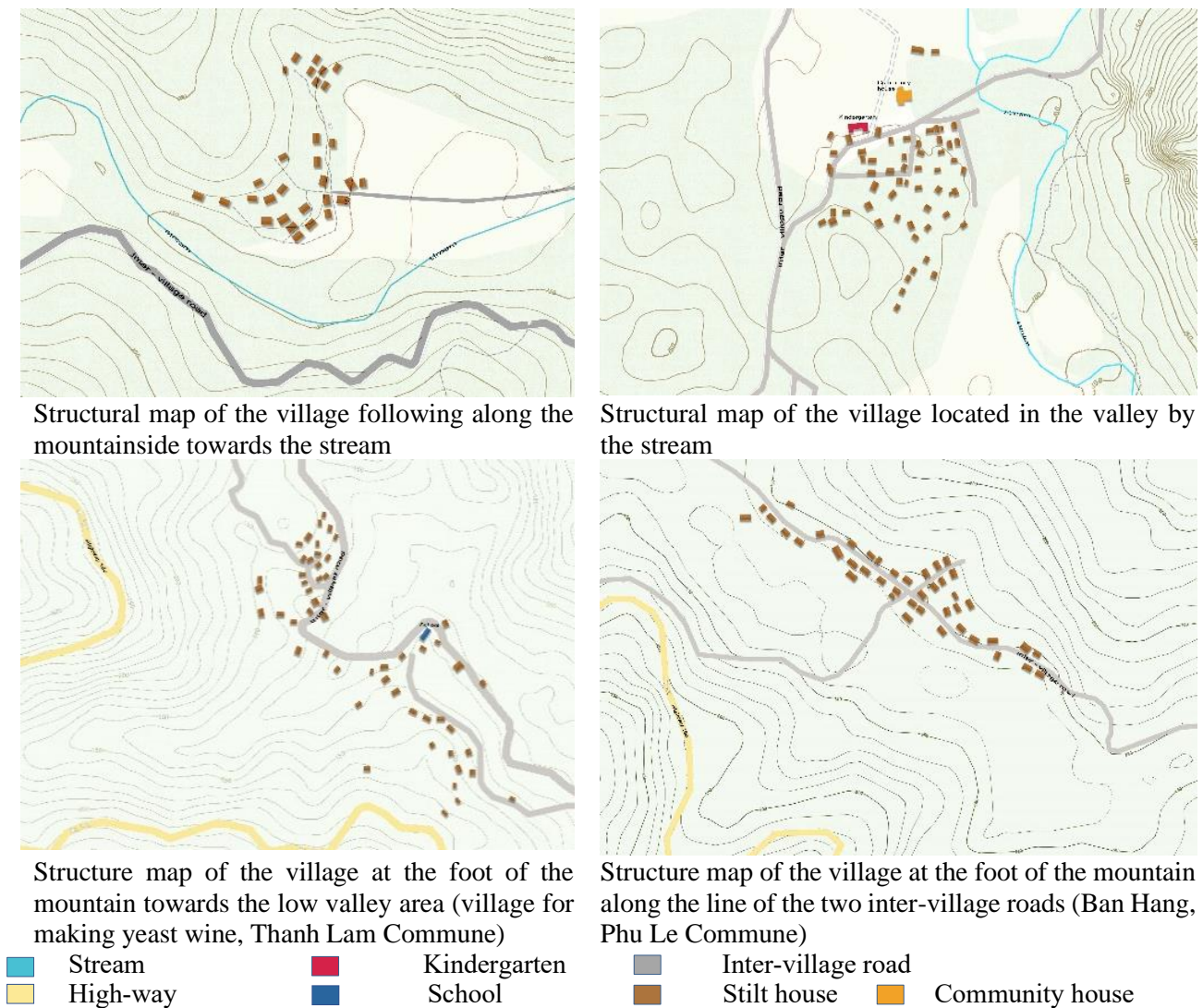


Figure 1. Traffic structure diagram in the villages (Source: author)



Figure 2. Cluster-based structure of the Muong people's villa
(Source:<http://www.baohoabinh.com.vn/40/109136/>)



Figure 3. Cluster-linear spatial structure of the Thai people's village
(Source:<http://www.asiamastertours.com/destinations/pu-luong/>)



Figure 4. Cluster-based structure of the Mong people's village (Source: <https://www.chudu24.com/>)

Each house in an ethnic minority group is usually spacious, with an area of thousands of square meters. The house is arranged in the middle of the highest land and close to the entrance gate, surrounded by yards, orchards, trees for timber, firewood storage, toilets, and livestock barns for cattle (in the past, people used to raise cattle under the floor of the house).

Muong people's houses are wooden stilt structures with three to five compartments, two wings, and two primary and secondary stairs. The house is divided into three spatial structures: the lowest space is under the floor, where firewood, storage, and agricultural tools are stored; the middle is the living space for the whole family; the highest is the attic, where rice and precious items are stored. The middle of the house is a space for ancestral worship and hosting male guests. The last room inside is a kitchen and living space for the women in the house, a space to do crafts such as knitting, weaving, and embroidery. The side stairs of the house are arranged in this area. There are currently three types of Thai houses in the Thanh Hoa mountains, including stilt houses, land houses, and half-stilt half-land houses. The land houses are mainly temporary, whereas traditional Thai houses

were previously on stilts. The house has a wooden makeup with a structure of three or five compartments and two wings, with two main and secondary stairs. The main staircase leading up to the living room is the area for the male host to receive guests and for ancestral worship; the last compartment is the area for women with a kitchen layout, adjacent to the drying floor space outside the house. This space is also appropriate for the family to do their side jobs, such as weaving, knitting, and embroidery. Agricultural products are stored on the attic floor above the family's stove. The H'mong people's houses are on land with a low roof and thick rammed earth walls. The house has a wooden constitution with three traditional compartments and two wings. The house has two doors: a main door to the middle of the house and a side door to the front of the house. The space of the house is divided into three areas according to the different functions. The first compartment is arranged for the kitchen and the owner's sleeping place, the middle space for ancestral worship, reception, and dining, and the last one for the fireplace and guest sleeping area. Rice and rare items are stored in the attic above the kitchen.

5. Some factors affecting residential spaces associated with sustainable livelihoods

5.1. Topographical and climatic conditions

Because of the complex mountainous terrain and fragmentation with the mountainous terrain having an average altitude of 600-700m, the slope above 25% gradually lowering towards the midlands which has an average altitude of 150-200m, and low hills mostly containing slopes of 12-20%. The Thanh Hoa mountainous region has a natural topographical structure with nearly 28 types of land that are very suitable for agricultural livelihoods, such as planting forest trees or forest products; agriculture such as afforestation, growing of bamboo, sugar cane, beans, tea, peanuts, and medicinal plants, and growing wet rice in low-lying places, terraced fields around villages and hamlets. The Thanh Hoa mountainous region has a tropical monsoon climate with four distinct seasons, with a climate characterized by high rainfall, high temperature, and abundant light, which are favorable conditions for the development of agricultural and forestry production.

5.2. Conditions for socio-economic development

Thanh Hoa's government has accelerated the development of technical infrastructure in mountainous areas and ethnic minority areas such as building roads and electricity grids to help people have better living conditions and to reduce poverty and backwardness. According to statistics, 100% of mountainous communes have schools and kindergartens. The rate of school-age children reaches 90% - 95% and public health has made strong progress. 100% of the villages have cultural houses or cultural post offices, and community houses. That shows how the economic life and morale of the people have been continuously improved.

5.3. Cultural elements of traditional labor and production

The culture of traditional labor and production based on experience is deeply ingrained in the lifestyle, farming, and production habits of ethnic minorities and influenced people's livelihood process. Due to experience-based production being completely dependent on the weather as well as unsuitable organization of production space, agricultural production has not been promoted properly. Some villages have implemented eco-tourism and community-based tourism services into livelihood activities but have not been successful due to the lack of knowledge and support from organizations and businesses. The production output of some afforestation and planting precious medicinal plants is also limited due to the lack of experience, investment, and processing enterprises. Therefore, it is necessary to change the way of life and thinking in order to shift the production structure to better suit the local economic, cultural, and social development.

5.4. The process of restructuring agricultural production

Today, with the support of science and technology in the production and processing of agricultural and forestry products as well as the need to develop global economic competition, the structure of agricultural production has shifted from small and fragmented to concentrated, high-tech agricultural production. Diversifying and raising the value of export agricultural products of high quality to international standards, transforming the crop structure towards improving quality and efficiency, and shifting the proportion of agriculture to increase the

proportion of forestry, combined with agroforestry product processing introduces local agricultural products to the international market.

5.5. The needs for family economic development

The demands for household economic development according to survey data in Hieu Village, Ba Thuoc District, and Lap Thang Village, Ngoc Lac District, Thanh Hoa Province, showed the following results. In Ban Hieu, Co Lung Commune, there are 43 households with 170 people, of which up to 36 households are willing to participate in tourism and other economic activities to improve family livelihoods. In Lap Thang Village, Thach Lap Commune, there are 141 households, 556 people, of which through the survey of 35/141 households, there are 30 households/35 surveyed households that are willing to participate in activities to improve family livelihood conditions. Thus, the reality shows that in Ban Hieu, 83.7% and in Lap Thang Village, 85.7% of surveyed households all want to improve their livelihoods, raise their family income, and are willing to participate in economic activities such as afforestation, growing medicinal plants for medicinal purposes, hi-tech agricultural production, concentrated animal husbandry, and community tourism activities. Therefore, it can be seen clearly that people always want to improve their family's economic conditions and have sustainable livelihood activities.

6. Proposing models and orientations for the development of residential spaces associated with sustainable livelihoods

The study proposes four models of residential space associated with sustainable livelihoods, including 1) Model of residential space associated with agricultural activities; 2) Models associated with handicrafts and traditional occupations; 3) Models associated with tourism activities; 4) Mixed model.

6.1. Model associated with agricultural production activities

It is a model of organizing production space around the village to ensure sustainable livelihoods. Specifically, exploitation planning prioritizes high-productivity wet rice land and terraced rice fields with ecological landscapes and natural shapes with attractive beauty for tourism promotion. Upland areas need planning for planting fruit trees, growing precious medicinal plants with medicinal value and high-tech crops of good quality to meet export requirements. Prioritizing conversion of areas with bad swidden land, difficult for plants to grow, located at the end of the wind direction compared to villages, to concentrated animal husbandry. The land areas for planting natural forests, for planting watershed protection forests and for greening bare hills which shall be managed, cared for and exploited strictly according to regulations. Because the topography and climate create beautiful vegetation as well as a beautiful natural ecological landscape of the mountainous area in Thanh Hoa Province, it is necessary to exploit the value of the landscape in combination with other types of agricultural and forestry production in order to promote sustainable agricultural tourism. In this model, when developing residential space, it is essential to pay attention to preserving traditional cultural heritage values, traditional architectural values. Additional service spaces include concentrated wholesale markets, transportation of agricultural and forest products, and processing and introduction of agricultural products of the village. For villages that are small and adjacent to each other, it is advisable to arrange agricultural support service spaces in groups of villages and village clusters to make effective use of the spaces mentioned above (Figure 5).

The model associated with agricultural production is a livelihood model that is considered the most sustainable because this livelihood activity has been established for a long time since the formation of the mountainous ethnic groups in Thanh Hoa and it has been closely associated with agricultural activities. The implementation of this model requires the involvement of the government along with enterprises, cooperatives, and residents. During this process, the government assists individuals with agricultural land use planning, crop planning, and the planning of areas for rare medicinal plants. Businesses and agricultural cooperatives supply plant varieties and engage in the procurement, processing, and commercialization of agricultural products made locally by farmers. Local residents engage in agricultural production activities.



Figure 5. Model associated with agricultural activities (Source: author)

6.2. Model associated with handicrafts and traditional occupations

It is a model of residential space combined with traditional handicraft livelihood activities. This model is for those villages that have a traditional occupation or can benefit from crafting. Household craft production space needs to be expanded to the village level, combined with community cultural activities space to support community tourism, to offer supplement spaces for introducing and selling handmade craft products; to establish organizations and businesses for promoting local and export craft village products (Figure 6).

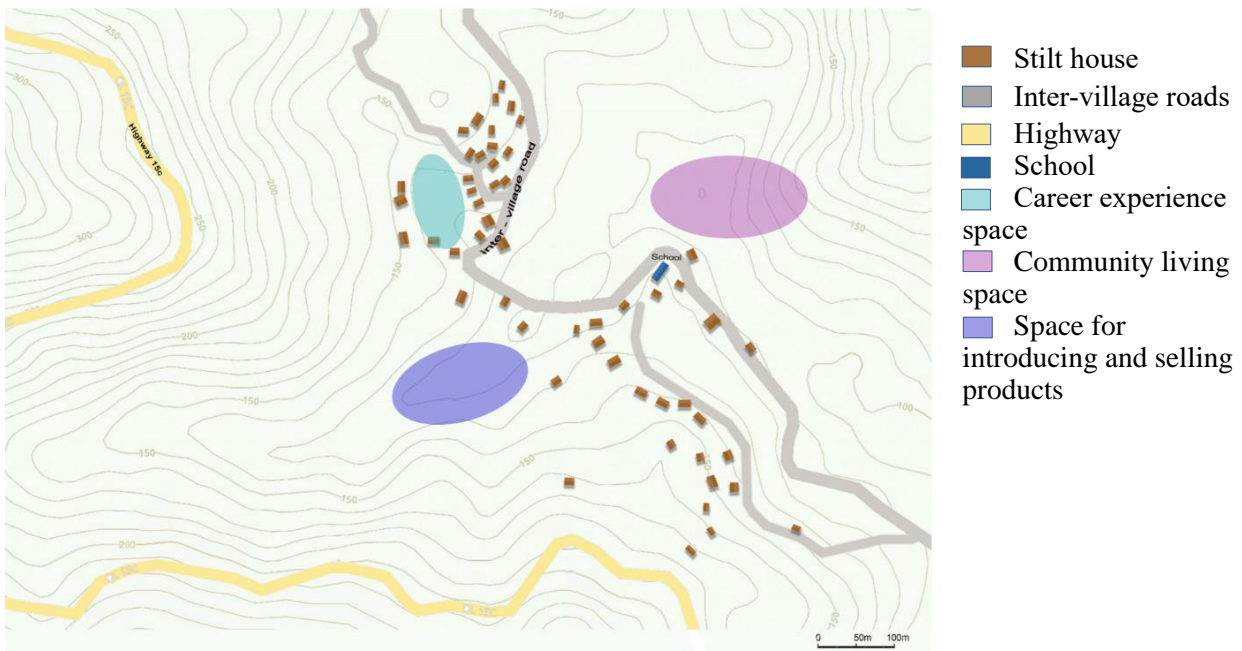


Figure 6. Model associated with handicrafts and traditional occupations (Source: author)

The model associated with the production of handicrafts and traditional occupations in the mountainous ethnic villages of Thanh Hoa is a livelihood activity formed by the needs of social development. This includes handcrafting tools for agricultural production and hunting, and sewing, embroidery, and weaving to provide clothing for personal use. In the past, individuals primarily engaged in crafts, producing handmade products

sold to fellow villagers and within the region. Nowadays, to implement this model effectively, it is necessary to involve additional enterprises and cooperatives for product marketing and promotion, as well as to introduce commercial activities and tourism services.

6.3. Model associated with tourism activities

It is a model of residential space in combination with serving community-based tourism and eco-tourism. In order to associate tourism with livelihood activities, it is necessary to add some functional spaces to the village space. Those spaces are car parking, tourist welcome space combined with selling souvenirs and local products, community living spaces combined with markets, and cultural houses. The cultural space will supplement different functions such as recreating traditional festivals, cultural exchanges, and commercial activities to introduce culture, customs, cuisine, and local products to tourists. Adding other spaces for eating, drinking, selling souvenirs, accommodation, demonstration of traditional craft production to the premises of the house and adding homestay space to serve tourists. Additional space for eco-tourism and agri-tourism will be included in production spaces. For farming and afforestation villages, it is suggested to organize production spaces for cultivation on shifting cultivation and afforestation for tourists to experience agricultural production experience. The space to experience agricultural activities should be arranged vertically from the village to the attractions and sightseeing spots. For traditional craft villages such as knitting and embroidery, production spaces are arranged directly within traditional houses, in the courtyard or under the raised floor of the house, or within the cultural space of the village to facilitate tourists' visits and experiences of traditional culture (Figure 7).



Figure 7. Model associated with tourism activities (Source: author)

The model associated with tourism activities is a livelihood activity formed in response to the demand for community tourism, experiential tourism in agricultural production, and ecotourism. The implementation of this model requires collaboration among three entities: local authorities, businesses, and residents. As a result, the government must properly maintain the village's scenic areas and landscape spaces, and offer vocational training and activities to support tourism. Business organizations involved in tourism operations need to promote tourism services. Residents are responsible for delivering quality services to tourists. To ensure the sustainability and effectiveness of the tourism-related model, it is important to integrate agricultural activities with community, experiential, and ecotourism. In addition to incorporating agricultural and forestry production spaces such as paddy fields, orchards, and medicinal plant cultivation areas into agricultural tourism and experiential tourism, it is necessary to utilize agricultural and forestry products to create tourism products to support livelihoods in tourism activities.

6.4. Mixed livelihood model

A residential space model in a village or a group of villages combines livelihood activities between agriculture, forestry, and handicrafts with community-based tourism, eco-tourism, and agricultural tourism. That is, the spatial model of the village responds to a variety of livelihood activities, or the model of a cluster of villages close to each other can cooperate in terms of traditional cultural heritage values, and the value of handicraft products, local agricultural and forest products to establish a series of sightseeing tours, agri-tourism as well as to provide support in purchasing, processing and packaging, introducing and promoting to increase the value of local livelihood products.

This model is a very sustainable source of income. It can support agricultural practices that were previously thought to be ineffective and cause people to struggle in life, but when properly integrated with the creation of handicrafts and tourism, it will undoubtedly lead to a prosperous and happy life for the local community. The implementation of this model also requires the collaboration of local authorities, businesses, and residents. This is a new paradigm for rural development, and the government should have policies to encourage people to switch from agricultural production to afforestation and the cultivation of rare medicinal plants to create valuable commodities that will support the development of the tourism industry.

7. Orientation to develop residential spaces to be associated with sustainable livelihoods

7.1. Developing residential space based on promoting the value of traditional housing architectural heritage

Based on analyzing the survey results of traditional housing architecture of ethnic minorities in nine districts in Thanh Hoa Province (Muong Lat, Quan Hoa, Quan Son, Ba Thuoc, Lang Chanh, Thuong Xuan, Ngoc Lac, Cam Thuy, Thach Thanh) with 13 villages (Poom Khuong Village, Suoi Phai Village, Sai Khao Village, But Village, Ngam Village, Son Village, Hieu Village, Nang Cat Village, Van Village, Lap Thang Village, Luong Ngoc Village, Thuong Village) the research team found that the cultural heritage value of traditional housing architecture has the following values: 1) The value of originality in traditional village structures; 2) Value of the house's precincts; 3) Value of traditional residential architectural space; 4) Value of architectural form; 5) Value of structure and construction materials; 6) Value of landscape and ecological environment.

In order to promote the value of traditional village structures, care should be taken to preserve, utilize, and promote the traditional spaces that have contributed to the creation of architectural and cultural heritage. These spaces include the typical traffic structure, community living areas, spiritual spaces, entertainment spaces, and spaces used for farming, forestry, and craft production. The agricultural production livelihood model, which serves community tourism, eco-tourism, agricultural experience tourism, and mixed models, will be utilized and developed based on the cultural heritage values of traditional village structures.

To increase the value of the house's precincts, it is important to conserve and utilize the house's precincts. Particular attention should be paid to the areas beneath traditional stilt houses as well as the yard and gardens areas which can be used for creating crafts, drying agricultural products, and serving community tourism. The house's precincts have cultural heritage value that can be harnessed and applied to develop a community service and craft production model.

Regarding the value of traditional housing architectural space, in order to preserve the cultural heritage of traditional housing architecture of ethnic minorities, it is necessary to preserve traditional housing spaces for accommodation, living activities, and serving community tourism. The cultural heritage value of traditional housing architectural space can be used to create livelihood models that support experiential tourism and community tourism.

To uphold the aesthetic and form of houses belonging to ethnic minorities, preservation of their beauty is imperative. Traditional residential architectural forms have a cultural heritage value that is utilized and applied to create livelihood models that support mixed livelihood models, experiential tourism, and community tourism.

In order to raise awareness of the importance of structures and construction materials, it is imperative that ethnic homes be built using locally accessible materials and that the architectural heritage of truss houses be preserved. It is necessary to capitalize on and develop the cultural heritage value of constructions and construction materials for livelihood models that support tourist experiences and community tourism.

Preserving the area's natural landscapes and ecological spaces is essential to highlighting the importance of landscapes and ecological environments. These are places where people can make a living, particularly by taking advantage of their natural surroundings to support the development of tourism. In order to maximize and create livelihood models that support community tourism, experiential tourism, agricultural production models, forestry, and mixed livelihood models, it is necessary to focus on the cultural heritage values of the landscape and ecological environment.

The government and the local people must prioritize protecting traditional cultural and architectural heritage in order to support sustainable livelihood models. This includes protecting the local space and the transportation system's structural integrity, as well as the spaces used for festivals, community living, agriculture, and the production of crafts. House precincts and areas beneath traditional stilt houses, as well as traditional housing spaces, architectural forms, truss structures, and the use of local materials in home construction, must also be preserved.

7.2. Developing spatial areas based on improving mechanisms and policies

Based on the above-proposed models of residential spaces associated with sustainable livelihoods, it is necessary to have an orientation for improving mechanisms and policies. Accordingly, local authorities need to pay attention to refining and improving mechanisms and policies such as:

- 1) Organizing the residential space model to adapt to the restructuring of agricultural production: This is an important strategic orientation. It will fundamentally shift the previously backward agricultural production culture of the ethnic minority groups towards more sustainable livelihood activities, catering to modern agricultural production and large commodity production. It is also important to combine agricultural production with afforestation production, growing valuable medicinal plants, industrial crops, fruit trees, concentrated animal husbandry, processing, export introduction, and service tourism. In addition to the policy of the local government, professionals, organizations, businesses, and people must work together to renovate and embellish residential spaces to help adapt to the above-mentioned livelihood activities.
- 2) Supplementing and perfecting mechanisms and policies: The government also needs to supplement and perfect mechanisms and policies to help organizations, businesses, and people have legal corridors to implement their sustainable livelihood activities. Policies must closely follow the development practice of topographical characteristics, climate, soil, ecological landscape environment, and intrinsic strengths available in the economic activities of mountainous localities in Thanh Hoa Province.
- 3) Associate with organizations and enterprises supporting production: Local authorities need to have policies to attract businesses to invest in eco-tourism areas, agricultural production, animal husbandry, and high-tech processing. Especially, businesses need to pay attention to eco-tourism, community-based tourism, and sustainable agricultural tourism based on renovating and embellishing the space in existing villages or villages or organizing people's new rural settlements to serve the livelihood activities of tourism development. Organizations and enterprises not only invest in production but also need to pay attention to preserving and protecting the landscape, ecological environment, forest vegetation, and local traditional culture, because this is the endogenous value that has been created by nature as well as the people of this land for thousands of years.
- 4) Allocation of preference capital sources: The local government also needs to pay attention to investment in preference capital sources and tax-free loans in the first stage when businesses and people need to get some loans to invest in agricultural production, afforestation, and growing medicinal plants,

industrial plants, fruit trees, concentrated animal husbandry, processing, export introduction, and tourism organization.

- 5) Investment in rural infrastructure: The local government and people need to work together to deploy investment in the construction of rural infrastructure synchronously, helping to bring the road system to remote villages and villages for better transportation of commodity trading, local agricultural and forestry products as well as bringing tourists to villages. Other projects could be building cultural houses, post offices, schools, kindergartens, and medical clinics in villages and hamlets. Lastly, setting up a network of electricity and clean water to the villages and organizing the collection and treatment of solid waste and wastewater to avoid affecting the natural ecological environment.
- 6) Participation of the local community in the management of sustainable livelihood activities: Activities that require the participation of the local community are forestry production activities such as forests, forest conservation, and exploitation management, planting medicinal plants, central cooperative farming activities, tourism service activities, construction of new rural residential areas, and development of residential spaces.
- 7) Protection of traditional cultural heritage and natural landscape ecological environment: For cultural heritage tourism activities, community tourism will have an impact on the residential spaces because it is necessary to add new spaces in the natural landscape in village space, campus space, and housing premises. As a result, it will affect and disrupt the spatial structure of traditional cultural heritage, such as the structure of village space, space and architectural form of housing, and community living space. Therefore, when developing residential spaces, it is necessary not only to ensure adaptation to livelihood activities but also to protect, preserve, and promote traditional cultural heritage values. For ecotourism and agricultural tourism, agricultural and forestry production activities will affect the natural landscape space, vegetation, and natural environment ecosystems. Therefore, maintaining the area's watershed protection forest ecosystem sustainably, refraining from altering the topography or terrain, and safeguarding the natural landscape ecosystem are all important.

8. Case study in Hieu Village

With its still-pristine natural landscape, simple stilt houses perched on gentle hillsides, and charming terraced fields, Ban Hieu is situated in Co Lung Commune, Ba Thuoc District, Thanh Hoa Province. Pu Luong, in general, and Hieu Village in particular, have been drawing a lot of domestic and international tourists who come to stay, visit, and experience local life. The majority of Black Thais reside in Ban Hieu, where they are working hard to develop community tourism. The dirt road that leads to the village is narrow and muddy after rain, and the only lights on in the village at night are electric lights from individual homes rather than streetlights. The community house in the village has been neglected for a long time and is in poor condition. The village chief's home serves as the gathering place for all community events, and outdoor cultural and artistic events have been discontinued. The Doan Street Market, located 8 kilometers from the village's furthest point, is frequently visited by residents of Hieu Village. The first homestays were just plain old stilt houses with basic interiors and facilities, but because Hieu Village was in such high demand for visitors, the locals modified the traditional house spaces to facilitate serving tourists. Changing the space in the traditional house to facilitate serving tourists has led to the spaces being considered the soul, and the core value of the traditional lifestyle has changed. Both the village's overall architectural style and the house's design (Figure 8) have been destroyed as a result of the spaces being altered to better serve tourists. Hieu Village's primary source of income these days is farming, along with tourism-related services. 17 of the village's 36 households engage in community tourism. There is a growing number of households engaging in tourism. The remaining families mainly work in agriculture due to the family's limited physical facilities and there is no one to do tourism because their children work far away, leaving only elderly parents and young children behind.

The livelihood model applied in Hieu Village is a model associated with specific tourism activities, which is residential space combined with community tourism service. For the Black Thai people in Hieu Village to meet

the needs of community tourism development, the Black Thai community in Hieu Village must first embellish the village's spatial structure by adding some missing functions such as markets and health centers. Streetlights should be installed, parking should be renovated, and the outdoor community living space should be restored. More water wharves should be added to increase the number of check-in spots where visitors can take pictures. A homestay that provides both dining and sleeping accommodations on the house's campus must relocate the stove to a more suitable spot, build an outdoor kitchen, designate a drying area for the barns at the back of the house, and install a footbath trough directly beside the base of the stairs. Since the homestay campus only offers lodging, more bungalows and stilt houses are needed to accommodate the growing number of tourists as well as some privacy-seeking individual guests. An outdoor barbeque must also be set up, and the nameplate and entrance gate must be easily recognizable. Regarding the architectural organization of the houses, for both types of homestays serving accommodation and dining, it is necessary to reintegrate the guest kitchen into the main elevated house space, restore the image of the roof's "khu cut" feature, and replace the roofing materials with local materials such as leaves, or cool metal roofing combined with leaves. Concrete pillars should be painted to resemble wood, and steel mesh floors should be replaced with beaten bamboo. In order to revive the people's lost traditional culture, weaving spaces should also be restored (Figure 9).

After applying the livelihood model associated with tourism activities, Hieu Village will overall have full infrastructure and facilities to accommodate visitors and tourists alike, allowing them to fully experience and appreciate the natural landscapes and unique culture of Ban Hieu.

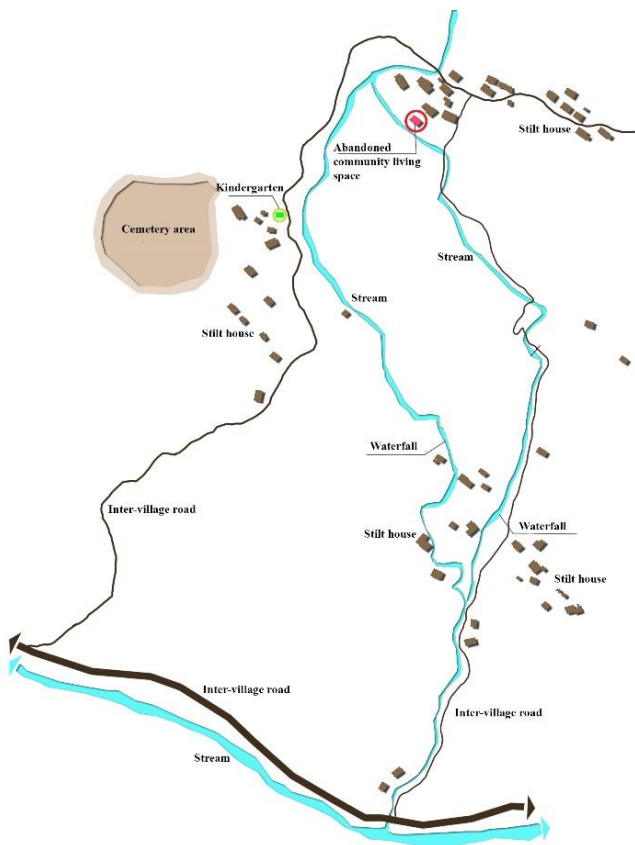


Figure 8. Current situation of space in Ban Hieu

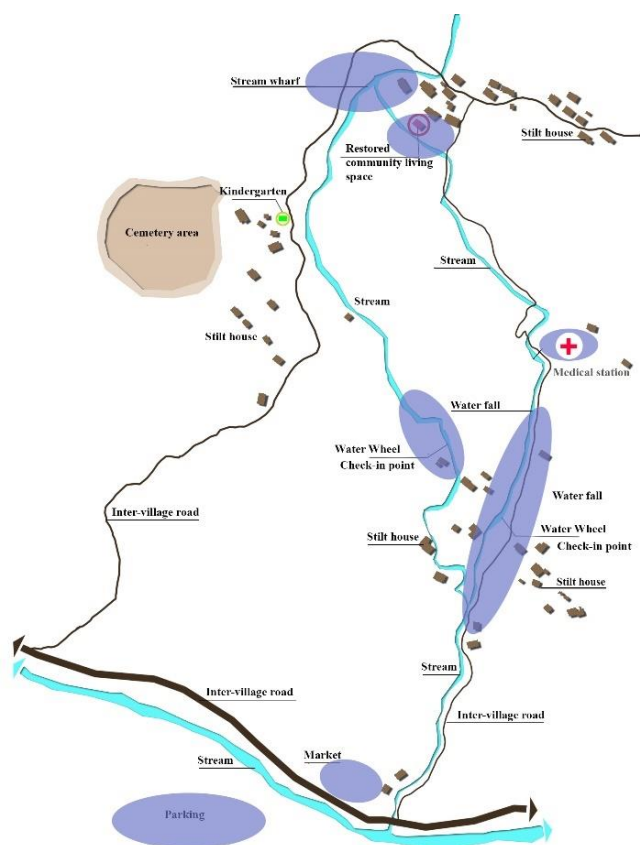


Figure 9. Reforming the structure of the space in Ban Hieu

8. Discussion

The study has proposed a residential space model associated with agricultural production activities to help ensure sustainable livelihoods. This is an important model to ensure high-tech agricultural, forestry, and livestock production combined with tourism activities while ensuring food security. For the model to work

effectively, the study also proposed adding supporting service spaces to cater to agricultural livelihood activities associated with residential spaces.

This model is applied favorably to villages with a lot of swidden cultivation, a lot of afforestation and agricultural land, and grazing land. For the model of residential space associated with handicrafts and traditional livelihoods, research has shown that handicraft production activities are needed at three spatial levels: at the village and village space level, campus-level space, and production space in the residential house. This model applies to villages with long-standing traditional crafts and occupations and is very convenient for tourism development. For the model of residential space associated with tourism activities, it is necessary to add spaces for community tourism, eco-tourism, and agriculture. This model is favorable for developing villages that retain many cultural values and traditional architecture and have a beautiful natural landscape for tourism development. The model of residential space associated with mixed livelihoods is the most suitable model for all villages and mountainous villages in Thanh Hoa. This model promotes one livelihood activity's strengths or combines multiple livelihood activities to help grow the local economy and families toward a green and sustainable economy.

To be able to apply the above model effectively in people's lives, it is necessary to give some guiding orientations for specific solutions. For example, organizing the residential space model to adapt to the structural transformation of agricultural production, supplementing and perfecting mechanisms and policies, and having organizations and enterprises supporting production to participate in livelihood activities with the local people. The government needs to arrange capital sources for preference loans and investment in infrastructure for rural areas, bring the community to participate in the chain of sustainable livelihood activities, based on protecting traditional cultural heritage and natural landscape ecological environment in the process of livelihood activities.

The research results, in addition to the ability to effectively apply the construction and development of residential spaces in association with sustainable livelihoods in mountainous Thanh Hoa, can also be applied to different ethnic minority groups that have similar living conditions in the mountainous regions of Vietnam. The results also serve as a reference document for departments and agencies in the management and development of new rural areas, and in the management and development of sustainable livelihood in the mountainous areas of Thanh Hoa.

The current research results only focus on proposing adaptation models and orientations for developing residential spaces associated with sustainable livelihood activities. Therefore, additional research is needed on the sustainable conservation of traditional cultural and architectural heritage adapted to livelihoods. It is also necessary to research and propose a system of mechanisms and policies to help people develop living spaces associated with sustainable livelihoods. However, it also demonstrates some difficulties and challenges when applying livelihood models. The structure of village space, cultural space, community event spaces, and residential campus spaces may be disrupted due to the need for housing development, household division, and modifications to the layout of living areas resulting from the requirement for more modern interiors which will adversely affect the livelihood model of community tourism activities.

9. Conclusion

The mountainous area of Thanh Hoa Province is a land with a potential for strong development in the forest economy and tourism economy, with a lot of advantages in livelihood activities associated with the development of residential spaces. However, due to the low level of production labor and the infrastructural system, which has not been developed to keep pace with the demand, the ethnic minorities' economy still faces many difficulties, and the per capita income is still at its lowest. Regarding the overview of research projects proposed for the development of livelihood activities in mountainous areas of Thanh Hoa, there is no research on model building and orientation of residential development associated with sustainable livelihoods for ethnic minority groups in Vietnam in general and in Thanh Hoa Province in particular. Therefore, it is evident that the research must propose spatial models based on exploiting traditional architectural values associated with preserving and

promoting traditional cultural heritage values, conserving landscapes and the environment, and contributing to poverty reduction for local people.

This study analyzed five main factors affecting living space associated with sustainable livelihoods: topographical and climatic conditions, conditions for economic and social development, cultural elements of traditional production and labor, the process of restructuring agricultural production, and the needs for family economic development. These factors determine the creation of a spatial model to adapt to sustainable livelihood activities while ensuring the promotion of traditional cultural heritage values, preserving the landscape, and protecting the natural environment.

The study has proposed four models of residential space associated with sustainable livelihoods, which are: 1) Residential space model associated with agricultural activities; 2) Models associated with handicrafts and traditional occupations; 3) Models associated with tourism activities; 4) Mixed model.

In order to effectively apply the above-mentioned models of residential spaces associated with sustainable livelihoods in the construction of a new rural area in the mountainous area of Thanh Hoa, the study has also presented six orientations to develop residential spaces to ensure the promotion of traditional cultural heritage value. These orientations are: 1) Organization of a residential space model in adaptation to agricultural production restructuring; 2) Supplementing and perfecting mechanisms and policies; 3) Bringing organizations and enterprises supporting production to participate in livelihood activities with people; 4) The government needs to arrange capital sources for preference loans and infrastructure investment for rural areas; 5) Involving the local community in the chain of sustainable livelihood activities; 6) Protecting traditional cultural heritage and natural landscape ecological environment in the process of livelihood activities.

In short, livelihood activities are not only considered ordinary material-producing and productive activities but also the organic connection between residential space and production space in rural family houses. Independent economic activity units are necessary because they are a socio-ecological structure, closely related, co-exist, and develop together. On the other hand, if livelihood activities are developed without paying enough attention to the protection and preservation of indigenous traditional cultural heritage values, and the landscape ecosystem, then those livelihood activities are not considered sustainable.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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Author contribution

The contribution to the paper is as follows: Thi, Hien: study conception and design; Hien: data collection, field trip, draft preparation; Thi: analysis and interpretation of results. The authors approved the final version of the manuscript.

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