OPTIMIZATION DESIGN STRATEGY OF LIVABLE ENVIRONMENT FOR MIAO MOUNTAINOUS BUILDINGS IN GUANGXI

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ABSTRACT

The purpose of this study is to explore the optimal design strategy for the livable environment of Miao mountain buildings in Guangxi that adapts to the characteristics of Miao culture and the natural environment in Guangxi. The study adopts the literature analysis method, qualitative research method, systematic scientific method, ecological environment evaluation method, and livable space optimization method, and takes Peixiu Village in Guangxi as the main research object to analyze the current situation and problems of Miao mountain architecture. This study puts forward an optimal design strategy for the livable environment of Miao mountain buildings in Guangxi, and provides a scientific basis and reference for improving the livability of mountain buildings.

Keywords: Mountain architecture, Livable environment, Design strategy, Miao nationality in Guangxi

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INTRODUCTION

The Guangxi Miao are one of the 11 ethnic minorities in Guangxi, China. They are mainly distributed in the northern and northwest regions of Guangxi. The largest settlement is in Rongshui Miao Autonomous County, Liuzhou City, Guangxi. The Miao population in Guangxi is more than 430,000. Miao villages are characterized by large scattered settlements and small settlements. They are very representative mountain villages in China. Miao mountain architecture is a traditional architectural form formed by the Miao people living in the mountainous environment for a long time. It has unique national cultural characteristics and regional adaptability. Miao mountain architecture is the main form of residence for the Miao people and has a long history and unique cultural heritage. With the development of modern social economy and changes in lifestyle, the livable environment problems faced by Miao mountain architecture have become increasingly prominent. For example, increased building density, village expansion, and inconvenient transportation have all had a certain impact on the livable environment of Miao mountain buildings. With the advancement of modernization and the increase in population density, Miao mountain architecture faces problems such as poor living environment and low quality of life. Therefore, the optimized design of the livable environment of Miao mountain buildings in Guangxi is of great significance for protecting and inheriting Miao culture, promoting local economic development, and improving the quality of life of residents.

This research aims to study the status quo and problems of the livable environment of Miao nationality mountain buildings in Guangxi, propose an optimal design scheme, and to explore the optimal design strategy for the livable environment of Miao nationality mountain buildings in Guangxi that adapt to the characteristics of Guangxi Miao culture and natural environment.

1. Features of Miao Mountain Architecture

As a special architectural form, Miao mountain architecture has unique characteristics. 1) The mountain architecture of the Miao nationality is rooted in the traditional culture of the Miao nationality, pays attention to the harmonious coexistence with the natural environment, fully integrates natural elements, and highlights the integration of the mountain environment and the Miao lifestyle; 2) The mountain architecture of the Miao nationality has various forms, and the building materials include wood Structure, soil and stone, etc. The building adopts a multi-layer and multi-stage layout, and the building flexibly adapts to the mountainous terrain (Table 1); 3) Miao mountain architecture shows the awe of the Miao people for the natural environment. Surfaces often use natural materials and colors to harmonize with the surrounding environment. Due to the unique charm and strong natural adaptability of Miao mountain architecture, more and more people began to pay attention to and learn from its design concepts and methods.

Table 1 Characteristics of Miao Mountain Architecture

Type	Diaojiaolou	Pitched roof	Wearing bucket structure	Chair-back balustrade
Illustration				
Feature description	Buildings are divided into plane stilted buildings and slope stilted buildings	The slope roof adopts the gable or suspended gable roof	The traditional dry-column dwellings of the Miao nationality are Wearing bucket structure	The chair back rail in the fire pit hallway is called a beauty's back and has a simple finish

Source: Data collected and curated by author

2. Current status of built environment in Miao mountainous areas

The mountain architecture of the Miao nationality is formed on the basis of the unique geographical environment of the mountain, and there are some current situations and problems in the livable environment of the mountain architecture. 1) Miao mountain architecture usually adopts wooden structure, which has good air permeability and thermal insulation, and can provide a comfortable living environment in different seasons. Miao mountain architecture also pays attention to the use of natural light and natural ventilation to reduce energy consumption. Consumption; 2) With the development of the economy and the advancement of modernization, the Miao mountain architecture is gradually replaced by modern architectural forms. These modern buildings often ignore the characteristics and advantages of the Miao mountain architecture, resulting in the lack of cultural characteristics and livability of mountain architecture The decline of the environment; 3) The large population influx and construction activities brought about by the urbanization process have destroyed the ecological environment of the mountains, leading to problems such as water source reduction and land degradation, which have brought some adverse effects on the livable environment of Miao mountain buildings , affecting the livable environment of Miao mountain buildings; 4) Traditional Miao mountain buildings have certain limitations in structure and material selection, which cannot meet the diverse needs of buildings in today's urbanization process. The role in social development is also gradually weakening, facing some problems related to the livable environment.

The Miao mountain architecture has unique characteristics and advantages in terms of livable environment, and the design strategy research focusing on ecology and sustainable development can provide an effective optimization plan for the livable environment of Miao mountain architecture in Guangxi. This study will explore the optimal design strategy for the livable environment of Miao mountain buildings in Guangxi. By combining traditional culture and environmental protection, the ecological and sustainable development of buildings will be realized, and the comfort of indoor and outdoor environments and the quality of life of residents will be improved.

LITERATURE REVIEWS

1. Research on the characteristics and culture of mountainous buildings in Guangxi

Scholar Lu Jiwei (2001) proposed in his work "What is mountain architecture?" and pointed out that mountain architecture is based on landform characteristics and is laid out according to differences in slopes. The architectural forms are patchwork; some scholars use schema theory to analyze the traditional settlements in the mountains of northern Guangxi. The landscape was deconstructed and analyzed, and the schemata in terms of "ecological landscape, external spatial form, internal spatial organization and residential architecture" were explored. Wei Yuqi (2018) believes that mountain architecture has strong regional cultural and artistic connotations. Folk residences in northern Guangxi absorb the essence of local culture and technology, adapt to the local mountain environment, and meet different folk living habits; scholar Nasir (2021) believes that "vernacular architecture "It is mainly famous for the use of local materials, labor and culture in construction; scholars analyzed the morphological characteristics of mountain architecture from three aspects: "reduction of grounding, indefinite base, and integration of mountain houses." Weng Ji (2013) analyzed the grounding form that adapts to the terrain based on the basic characteristics and layout principles of mountain architecture, and discussed the spatial layout characteristics and grounding form of mountain architecture. Zhang Yuchen (2022) believes that traditional mountainous areas have complex and changeable environments and lack of available resources. It is necessary to strengthen dialogue with the natural environment to find effective construction strategies. Through research on the architectural characteristics and culture of Guangxi's mountainous areas, the architectural heritage of Guangxi's mountainous areas can be better understood and protected, and the inheritance and development of Miao culture can be promoted.

2. Research on the status quo and problems of the livable environment of mountainous buildings

Common problems in the mountainous built environment include "land use, travel roads, use of old houses, public facilities", etc. (Wei,2012); some scholars have proposed that the roof form of mountainous buildings should also be coordinated with the environment, believing that architecture cannot be separated from the environment. , architecture must exist dependent on the environment. Yin Xuhong (2019) believes that the decline of traditional villages is related to infrastructure problems, so improving infrastructure can improve the village environment and enhance livability; Song Guodong (2021) found that some villages have old and dilapidated houses, and uneven roads in rural streets , the problem of relatively narrow roads; Wu Xiaolan (2016) believes that the construction of a livable environment for the elderly has problems such as "imperfect public policy support systems, unbalanced regional development of livable environment construction for the elderly, and the livability level of the community for the elderly needs to be improved urgently". In his research, Cao Ke (2016) found that there are four phenomena in the practical process of mountainous town construction: "scale growth, goal utilitarianism, technological progress and cultural diversity"; some scholars believe that the study of architectural culture belongs to the category of material culture research and is related to Regional ecology is closely related and is now in a new equilibrium stage in the process of destruction. Through research on the current status and problems of the livable environment of mountain buildings, we can understand the problems of poor environmental quality and unreasonable resource utilization of mountain buildings, provide scientific basis and solutions for the improvement of livable environment and sustainable development, and provide scientific basis and solutions for mountain buildings. Provide guidance and reference for design and planning.

3. Research on the optimization and design of the livable environment of mountainous buildings

Wang Luying (2022) researched and found that the key points of mountain building design are three aspects: "mountain building site selection, mountain building layout, and road transportation system"; apply the concept of "lucid waters and lush mountains are valuable assets" to choose the most appropriate construction system and building materials, which can effectively improve the optimization and design of livable environment for mountain buildings (Long, 2022). Some scholars mentioned in the article that the design of mountain architecture relies on the mountain terrain, does not conflict with the natural landscape, and is in line with the aesthetic tendency of our culture. In the design of mountain architecture, we can make full use of terrain and other conditions to create regional and unique architectural styles. . Lin Yu (2022) believes that the importance of mountain architectural design lies in solving the vertical traffic design problem of mountain buildings; Deng Chengfu et al. (2022) proposed the impact of the ecological environment on mountain architectural design. It is necessary to avoid damaging the mountain ecological environment and balance, and to realize the relationship between people and Harmonious coexistence with nature; Wen Yan et al. (2022) believe that mountain architecture has complexity and adaptability. By studying the optimization and design of the livable environment of mountain buildings, the livability, adaptability and sustainability of mountain buildings can be improved; for The optimization design of the environmental performance of green public buildings was studied and the optimization strategies for the environmental performance of climate-adaptive green public buildings were analyzed. By studying the optimization and design of the livable environment of mountain buildings, the livability, adaptability and adaptability of mountain buildings can be improved. Sustainability, providing a good living environment and living experience for mountain residents.

RESEARCH METHODOLOGY

The research methods used in this study include literature analysis, qualitative research, systematic science, ecological environment evaluation and livable space optimization. The human factors, natural factors and economic factors of Miao mountain buildings are analyzed through field investigations and interviews. Research. The research population and sample scope are Peixiu Village, Guangxi, and the research population groups include local villagers, operators, tourists, design experts, government personnel, etc. in Peixiu Village, Guangxi.

This study takes Peixiu Village in Guangxi as the main research object, and collects field information and data on the natural ecological environment, residential buildings, historical culture, and human landscape of Peixiu Village through field surveys, interviews, and participatory observations. Combined with the questionnaire and the data in the interview questionnaire, analyze the existing problems of the mountain buildings in Peixiu Village, propose an optimal design plan, and explore the optimal design strategy for the livable environment of the Miao people in Guangxi.

RESEARCH RESULTS

This study found that the Miao mountain architecture in Guangxi is the main living form of the Miao people, and there is a certain difference between the Miao mountain architecture and the traditional architecture in terms of the livable environment. Study the status quo and problems of the livable environment of Miao nationality mountain buildings in Guangxi, propose an optimal design scheme, and explore the optimal design strategy for the livable environment of Miao nationality mountain buildings in Guangxi that adapt to the characteristics of Guangxi Miao culture and natural environment. According to the research objectives and the feasibility of the technology, the researchers put forward the research results as follows:

1. Ecological Environment of Peixiu Village, Guangxi

Peixiu Village, Rongshui Miao Autonomous County, Liuzhou City, Guangxi is located in the "Yuanbaoshan" National Forest Park. The village is surrounded by mountains, with long streams, ancient trees, fresh air, simple folk customs and rich ethnic customs. Peixiu Village is the most distinctive and representative original ecological Miao village in Guangxi. The most representative village is the "Lovers Pine" by the river at the bottom of the village. The ecological environment of the village is beautiful and beautiful (as shown in Figure 1). Peixiu Village in Guangxi is one of the first "Top Ten Most Beautiful Villages" in Liuzhou City. In 2021, it was selected into the list of key towns and villages for rural tourism in Guangxi.

Figure 1 Ecological Environment of Peixiu Village, Guangxi
Source: Photographed by author

2. The architectural features of Peixiu Village in Guangxi

The morphological characteristics of the buildings in Peixiu Village, Guangxi include the characteristics of the building's "shape, volume, layout and form", with distinct national style and regional characteristics. 1) The building has various and characteristic shapes, and the main feature of the building is the sloping roof. The slope and curvature of the roof have certain standards and specifications; 2) The volume of the building is different in size. Due to the

complexity of the mountainous terrain, The volume of the building will change due to the terrain undulations and architectural needs (as shown in Figure 1); 3) The layout of the building is rich and varied, and the layout of the Miao mountain buildings is mainly divided into "layered layout" and "concentrated layout". Two forms; 4) The form of the building is very diverse, and the form of the building draws on the shape of the natural landscape and mountain topography. The building imitates the form of mountains, the shapes of animals and plants, and the shapes of snakes, fish and birds. The use of these forms is not only the worship of nature, but also can be integrated with the surrounding environment to create a unique mountain architectural landscape.

Figure 2 Architectural Features of Peixiu Village, Guangxi
Source: Photographed by author

3. Design strategies for livable environment of mountainous buildings

This study aims at the livable environment of Miao nationality mountain buildings in Guangxi, combined with the morphological characteristics of buildings in Peixiu Village, Guangxi, and analyzes the influence of these factors on the livable environment. Corresponding optimization design strategies are put forward to improve the livability of mountain buildings and enhance their environmental adaptability and sustainability. Based on the understanding and problem analysis of the Miao mountain architecture, the optimal design strategies and methods are proposed, including the optimization of architectural forms, the selection and utilization of materials, and the coordination between architecture and the environment. At the same time, combined with modern scientific and technological means, consider the requirements of sustainable development such as environmental adaptability, energy saving and emission reduction. 1) People-oriented design, the building follows the special living habits and cultural beliefs of the local residents, and provides residents with a comfortable living environment in line with their cultural habits; 2) The rational layout design of the building, the building layout should be in harmony with the surrounding natural landscape, enhance Awareness of protecting natural resources and ecological environment; 3) Daylighting and ventilation design, considering factors such as mountainous terrain and orientation, rationally configuring windows and ventilation facilities to improve natural lighting and ventilation effects; 4) Building thermal insulation design, selecting appropriate insulation Materials and technologies, improve the thermal insulation performance of buildings, and reduce energy waste; 5) Human settlements design, design comfortable interior spaces, consider factors such as furniture placement and layout, and provide convenient public facilities and community services.

4. Application cases of optimization design strategy

The combination of traditional culture and environmental protection is an important direction in the optimal design strategy of the livable environment of Miao mountain buildings in Guangxi. Traditional culture is of high value to the Miao people, and it reflects their respect and love for the landscape and environment. By analyzing the characteristics of the Miao mountain architecture in Guangxi and the current situation and problems of the livable environment, the researchers put forward an optimal design strategy and applied it to Peixiu Village in Guangxi (as shown in Table 2).

Table 2 Environmental optimization design concept of Peixiu Village

Illustration			
Existing problems	Unoccupied and neglected due to disrepair or abandoned buildings.	The architectural style is not uniform, and there is no unified standard planning as required.	Due to the influence of the city, the villagers' spontaneously built houses are not in harmony with the surrounding areas.
Optimization Strategy	Repair problematic buildings, integrate them into industrialization, and revitalize them into buildings with operating functions (homestays, farmhouses).	Make a unified plan for the entire village building, and use it as a guide for various types of architectural design schemes.	Rectify the appearance of problematic buildings to meet the needs of residential life and reflect the cultural characteristics of Miao architecture.
Illustration			
Existing problems	The new building does not blend with the rural environment and lacks the local ethnic architectural features.	The division of functional areas in the village is vague, and there is a lack of public venues and infrastructure.	The ecological environment is destroyed, and the traditional cultural characteristics and cultural landscape of the village are missing.
Optimization Strategy	Reasonably plan and layout buildings, standardize the use of building materials, follow local architectural construction techniques, and highlight architectural features.	Rationally plan village functional divisions, increase infrastructure, beautify village environment, and reshape village cultural landscape.	Follow the laws of nature, protect the original ecological environment of the village, excavate the local culture, and reshape the regional cultural characteristics.

Source: Data collected and curated by author

Through the case study of the application of optimization design strategy, it is found that the optimization strategy of the livable environment of Miao nationality mountain buildings in Guangxi is important in improving the living environment and improving the quality of life of residents. While protecting the traditional culture of the Miao people, it actively uses environmentally friendly materials, construction techniques and methods to improve the ecological adaptability and sustainability of the building, thereby optimizing the livable environment of the village. In addition to the design strategy of combining traditional culture and environmental protection, ecology and sustainable development are also important directions for the optimization of the livable environment of Miao mountain buildings. In the

process of transforming traditional Miao villages, future designers can combine traditional culture and modern architectural technology to create a livable living environment for Miao mountain buildings and fully demonstrate the charm of Miao culture.

5. Evaluation of the effect of the optimization design strategy

By evaluating and summarizing the application cases that have implemented the optimization design strategy, we can better understand its actual effect, and continuously improve and optimize it in practice. 1) Investigate the specific effects of various design strategies in practical application, including retaining and inheriting the architectural culture of the Miao people, improving the effect of the indoor and outdoor environment of the building, and improving the comfort and health of the living environment; 2) Investigating the practical application of the design strategies Feasibility and practicability in operation, including improving the livability of the building without destroying the traditional architectural form and style, and without increasing excessive costs. Design strategies proven in practice can be widely applied and provide feasible solutions for the livable environment of Miao mountain buildings.

DISCUSSION & CONCLUSION

In the process of this research, the researchers took Peixiu Village in Guangxi as an example, after field investigation and in-depth investigation, referred to the research viewpoints and related research results of the literature, demonstrated the application practice of the optimal design of the livable environment of the Miao Mountain in Guangxi, and explored the Miao Mountain in Guangxi. Optimization design strategy of building livable environment. By studying the characteristics of Miao mountain architecture and the optimization design strategy of livable environment, we can provide a more comfortable, healthy and sustainable housing environment for Miao people. This study will provide theoretical and practical guidance for the optimal design of the livable environment of the Miao mountain buildings, and is of great significance for promoting the development of the livable environment of the Miao mountain buildings in Guangxi. Future research can further explore the sustainability of Miao mountain architecture and the coordinated development of urban and rural areas, and provide more instructive suggestions for architectural design and planning in the Miao area of Guangxi.

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