

# *The Research on Rural Landscape Design with Bamboo Art Themes in Southern Sichuan—A Case Study of Lifeng Shan Zhuang and Its Ecological Environment Improvement*

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**Abstract:** This paper combines the rural landscape environment in Southern Sichuan with local bamboo culture, and through design improvements, injects new vitality into the countryside. Taking "Lifeng Shan Zhuang" as an example, it studies the application of bamboo elements in its residential environment and landscape, using the Semantic Differential (SD) method to analyze the data. The paper also explores how bamboo culture can be applied to characteristic landscape design in rural construction, aiming to create a high-quality, locally distinctive rural landscape environment with a bamboo art theme.

## **1. Bamboo Resources in Southern Sichuan and Their Current Status in Traditional Rural Landscapes**

### **1.1 The Natural Landscape Substrate of the Countryside**

Bamboo is hailed as "China's Second Forest." Located in southern Sichuan, the region comprises mountainous and hilly terrain and boasts a 2000-year history of bamboo cultivation. It is one of the world's most suitable regions for various bamboo species and one of China's top ten bamboo resource-rich areas. In Yibin, southern Sichuan, dense bamboo forests cover the hilly slopes, with farmlands and ponds developed in the river valleys at the foot of these slopes. Villages are situated on terraces between bamboo forests and farmlands, forming a dispersed and clustered geographical landscape.

### **1.2 Analysis of Rural Habitation Landscape Environment and Issues**

#### **(1) Landscape and Village Environment**

Lifeng Shan Zhuang is located in Yibin, Sichuan Province, about 5 kilometers southwest of Lizhuang Town., it surrounded by lush vegetation and scenic beauty. Although the region's natural setting is rich, with dense vegetation and bamboo forests, current conditions show that areas like bamboo groves, farmlands, and water bodies are overgrown with weeds and lack proper aesthetic appeal. Except for minor bamboo landscapes near certain residences(Figure 1), most areas require landscape rectification and improvement.

The village's central plaza is paved with smooth stone slabs and equipped with shading facilities for rest and social interaction (Figure 2). Surrounding the plaza are agricultural textures, interspersed with disorganized bamboo groves and scattered grass around ponds and rice fields.



Figure 1: Status of bamboo forest    Figure 2: Village Gathering Plaza    Figure 3: Courtyard Layout

## (2) Building and Courtyard Structure

In southern Sichuan, where high temperatures and abundant rainfall prevail, traditional buildings often feature open layouts and courtyards incorporating garden designs.<sup>[1]</sup> This creates a layered and varied spatial layout, enhancing the internal courtyard landscape. Bamboo is widely planted around courtyards(Figure 3), often serving as fences or screens, providing both decorative and protective functions. However, many side areas of courtyards are cluttered with firewood or miscellaneous items(Figure 4), causing disorder and obstructing daily life. While traditional timber and earth structures are still in use(Figure 5), new architectural styles such as concrete flats and buildings have emerged, reflecting the spread of modern construction technology but also compromising the authenticity of traditional rural residences.<sup>[2]</sup>



Figure 4: Current situation    Figure 5: Stone Wall Surface    Figure 6: Bamboo woven mud wall

## (3) Construction Materials

Bamboo is extensively used in southern Sichuan architecture, crafted into beams, columns, stairs, railings, sunshades, fences, and components in traditional houses, as well as bamboo-mud walls in ancient buildings (Figure 6).Its convenience, low cost, resistance to cracking, ventilation, and moisture absorption make it a defining characteristic of traditional southern Sichuan architecture.

## (4) Analysis of Human Activities

As a traditional farming area, the primary production activities of rural villagers in southern Sichuan still revolve around agriculture, including rice, vegetables, and bamboo cultivation. However, with modernization, some young laborers have moved to urban jobs, affecting farmland management and maintenance. (Figure 7) Consequently, rural tourism development has gradually taken place, leveraging rich local natural and cultural resources to attract tourists and boost the rural economy.<sup>[3]</sup>

Research object	Crowd activity characteristics	Space and functional requirements
Local resident	High living environment requirements/high living convenience/perfect public services/recreation, communication needs	Supporting service facilities, quality living space
Foreign tourists	Tourism distribution requirements are high/perfect public services/beautiful landscape conditions/leisure and entertainment needs	Cultural experience, distinctive folklore, art installation, beautiful rural landscape, immersive experience

Figure 7: Analysis of Residential Activity Needs of the Population

## (5) User Spatial Perception Survey and SD Method Analysis

Site visits to Lifeng Shan Zhuang recorded the application of bamboo elements in residential landscapes, observing detailed landscape design and decorations. A user questionnaire gathered

subjective perceptions and evaluations of bamboo elements, including spatial perception, comfort, aesthetics, etc., through interviews to understand users' recognition and expectations of bamboo culture in landscape design.

The initial evaluation factors included:01 Openness and transparency of the space landscape;02 Integration degree of natural elements;03 Freshness and lightness brought by bamboo elements;04 Comfort and relaxation of users;05 Psychological impact of bamboo culture on users;06 Richness and layering of the space landscape;07 Rustic charm and local characteristics created by bamboo elements;08 Users' willingness to stay in the space;09 Warmth and coziness of the space landscape;10 Overall harmony and unity of the space landscape.

Semantic differential (SD) is a psychometric method that uses "words" from semantics as scales to quantitatively describe the psychological responses of architectural users to various environmental atmospheres for evaluating spatial usability. [4]

The evaluation scale in this study was divided into five levels according to the principle of "secondary nature," symmetrically centered on 0(Figure 8). [5]Adjectives were paired with antonyms, using common language for better understanding by respondents.

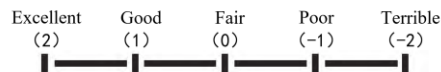


Figure 8: Semantic Differential Evaluation Scale Setting Chart

A total of 86 responses were collected via random interviews, primarily from villagers, merchants, staff, and tourists. The contents of the questionnaire are shown in Figure 9.

The data of the overall landscape perception evaluation matrix of Lifeng Mountain Resort is shown in Figure 10. Through sorting and analysis, the data summary table of the average score of each factor is finally obtained (Figure 11) and the survey and analysis table of SD method (Figure 12).

		Excellent	Good	Fair	Poor	Terrible
<b>Questionnaire: Survey of landscape and landscape environment experience of Lifeng Shan Zhuang</b>						
1. What is your identity? A. Villager Resident B. Staff member C. Merchant D. Visitor E. Other						
2. What is your main type of activity in Lifeng Shan Zhuang? A. Farming and planting B. Tourism and leisure C. retirement vacation D. other						
3. What is your favorite landscape area in Lifeng Shan Zhuang? A. Natural idyllic sceneries B. Holiday homestay courtyards C. Scenic attractions area D. other						
4. How strong is your desire to stay in Lifeng Shan Zhuang? A. Very willing B. Yes C. Generally willing D. Less willing E. Be unwilling to						
5. Your comments on the overall space design of Lifeng Mountain Resort: 01 The openness and permeability of the space 02 the degree of integration of natural elements 03 the freshness and lightness brought by bamboo elements 04 the user's sense of comfort and relaxation 05 The influence of bamboo culture on the user's psychological state 06 The sense of landscape and hierarchy of the space 07 the local atmosphere and local characteristics created by bamboo elements 08 Users' willingness to stay in the space 09 the warmth and warmth of the space 10 the overall harmony and unity of the space						
6. Please share your comments and suggestions on the surrounding landscape or facilities of Lifeng Villa:						
01 Openness and transparency of the space landscape	21 (24.42%)	24 (27.91%)	23 (26.74%)	11 (12.79%)	7 (8.14%)	
02 Integration degree of natural elements	17 (19.77%)	23 (26.74%)	30 (34.88%)	10 (11.63%)	6 (6.98%)	
03 Freshness and lightness brought by bamboo elements	16 (18.6%)	26 (30.23%)	28 (32.56%)	12 (13.95%)	4 (4.65%)	
04 Comfort and relaxation of users	13 (15.12%)	28 (32.56%)	30 (34.88%)	9 (10.47%)	6 (6.98%)	
05 Psychological impact of bamboo culture on users	10 (11.63%)	19 (22.09%)	24 (27.91%)	15 (17.44%)	18 (20.93%)	
06 Richness and layering of the space landscape	7 (8.14%)	15 (17.44%)	19 (22.09%)	15 (17.44%)	30 (34.88%)	
07 Rustic charm and local characteristics created by bamboo elements	16 (18.6%)	19 (22.09%)	32 (37.21%)	13 (15.12%)	6 (6.98%)	
08 Users' willingness to stay in the space	11 (12.79%)	20 (23.26%)	19 (22.09%)	18 (20.93%)	18 (20.93%)	
09 Warmth and coziness of the space landscape	15 (17.44%)	30 (34.88%)	26 (30.23%)	6 (6.98%)	9 (10.47%)	
10 Overall harmony and unity of the space landscape	14 (16.28%)	31 (36.05%)	21 (24.42%)	16 (18.6%)	4 (4.65%)	

Figure 9: Main Contents of the Survey Questionnaire (Left)

Figure 10: Evaluation Matrix Data for Overall Landscape Perception at Lifeng Shan Zhuang (Right)

Influence factor	01 Openness and transparency of the space landscape	02 Integration degree of natural elements	03 Freshness and lightness brought by bamboo elements	04 Comfort and relaxation of users	05 Psychological impact of bamboo culture on users
Average score	0.48	0.40	0.53	0.38	-0.14
Influence factor	06 Richness and layering of the space landscape	07 Rustic charm and local characteristics created by bamboo elements	08 Users' willingness to stay in the space	09 Warmth and coziness of the space landscape	10 Overall harmony and unity of the space landscape
Average score	-0.53	0.30	-0.14	0.41	0.40

Figure 11: Factor Average Score Data Summary Table

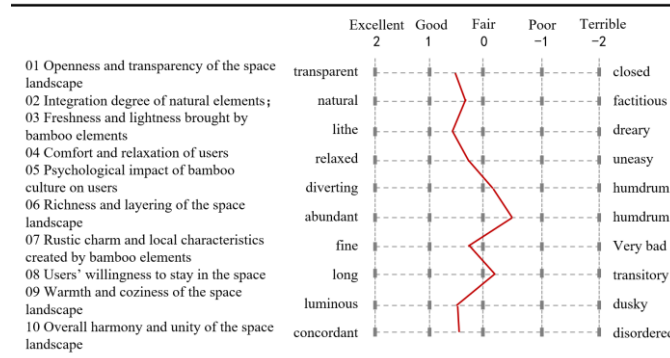


Figure 12: Semantic Differential Survey Analysis Table

Data analyzed revealed that the majority of participants were local villagers (86.05%), followed by tourists (11.63%), with staff and local merchants occupying lower proportions. A negative correlation was found between openness and transparency of rural landscapes and their richness and layering; low integration of natural elements contrasted with the positive effect of bamboo elements' freshness and lightness. User comfort and relaxation were relatively low, while warmth and coziness were higher, indicating a need for improved design to enhance user comfort. Overall harmony and unity scored high but could be further optimized.

### (6) Summary of Current Issues

Despite historical and cultural richness, local cultural elements, and picturesque rural scenery, the region lacks distinctive rural habitation landscapes. The abundant bamboo landscape resources remain underdeveloped, with fragmented pathways, poor touring experiences, single-form public spaces, inadequate landscape facilities, and indistinct regional cultural features.

## 2. Strategies for Enhancing Lifeng Shan Zhuang's Habitation Landscape with Bamboo Art

### 2.1 Overall Planning - Maintaining Bamboo Forest Waterscapes

Based on the current foundation of Lifeng Shan Zhuang, landscape renovation designs are proposed to present the natural aesthetics of southern Sichuan, creating a landscape model integrating ecological protection and bamboo art heritage.

In terms of layout, according to local conditions, a ribbonlike paddy field landscape with ornamental effect is formed according to the topography, as shown in Figure 13, creating a rural pastoral picture of dense forest, bamboo cultivation and Shu style.

According to terrain and village location characteristics(Figure 14), Lifeng Shan Zhuang will be divided into protected building areas, existing residential areas, bamboo landscape areas, mountain stream lotus pond areas, homestay areas, and ecological farmland areas.(Figure 15).The homestay area will primarily consist of villagers' own courtyards, modified to reflect local bamboo art cultural characteristics, creating quality habitation landscapes based on rural features and terrains.



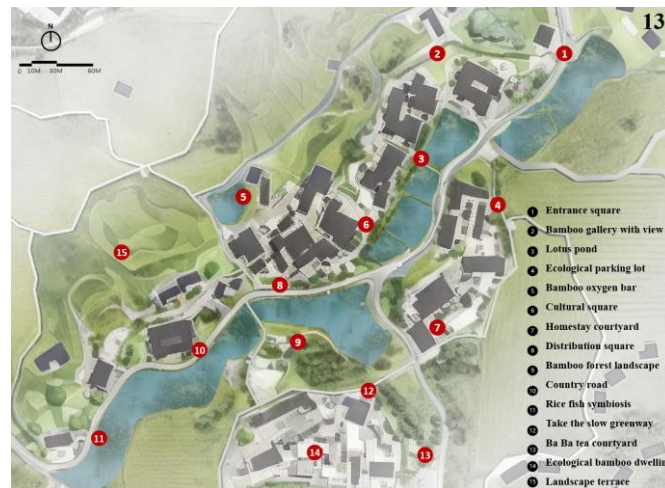


Figure 13: Overall Site Plan of Lifeng Shan Zhuang

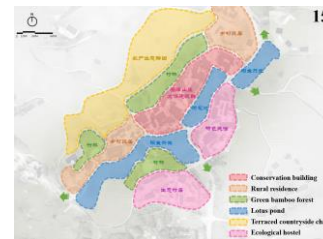
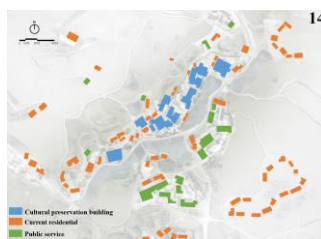


Figure 14: Existing Building Distribution      Figure 15: Planned Functional Zones

## 2.2 Point Layout - Enhancing Farmland and Pond Landscapes

Ecological restoration will be conducted for degraded farmlands and ponds, removing ineffective trees and weeds to restore farmland's ecological functions. Centralizing around farmland ponds, rural characteristic farmland landscapes will be designed, creating rustic pastoral landscapes.

Natural pond shorelines will be restored, expanding interfaces to increase interaction with surrounding areas.<sup>[6]</sup> Adaptive plants will be planted around ponds to enhance environmental aesthetics, with lotus ponds featuring water landscapes like lotus and rice-fish coexisting fields.

## 2.3 Pedestrian Pathways - Creating Forest Trails and Landscape Nodes

Design modifications should protect the original ecological environment, avoiding damage to soil, water sources, flora, and fauna. Forest trails will not only offer natural scenic views but also showcase local cultural elements. Utilizing existing natural or artificial elements, viewing platforms, and rest areas will be developed, creating eco-friendly walking and sightseeing trails. These trails will feature local cultural, historical, and traditional craft displays, such as bamboo art landscape pieces, showcasing the unique charm of rural areas.

## 2.4 Style Restoration - Restoring Traditional Architectural Styles

To protect traditional architectural locality and respect the site's original ecology, historical buildings will be restored, dilapidated homes repaired, and overall spatial quality enhanced, restoring vitality to residences. Using southern Sichuan traditional styles, such as pitched roofs, wooden frames, and cantilever pavilions, traditional elements will be retained in façade designs to give buildings regional and historical senses. Wooden structures with fine woodworking techniques

will adorn doors, windows, relief carvings, and other elements, highlighting local craftsmanship.

### 3. Bamboo Art-Themed Habitation Landscape Design in Lifeng Shan Zhuang

#### 3.1 Creating Bamboo Public Spaces

##### (1) Entrance Plaza

The main entrance will utilize spacious areas for plazas, with the ground paved using stones and bricks, complemented by bamboo landscape decorations. Bamboo tube walls and bamboo-themed landscape equipment will create a distinctive paddy field landscape plaza. Social facilities such as benches, tables, and outdoor fitness equipment will be provided to promote interaction and communication among villagers.

##### (2) Villager Gathering Plaza

The gathering plaza will be centrally located in Lifeng Shan Zhuang, preserving the natural environment with bamboo groves offering sufficient shade. Surrounding rest pavilions and gazebos will be constructed using bamboo, blending into the natural landscape, creating a comfortable space for gathering and socializing.

##### (3) Bamboo Walkway

A bamboo walkway will be added within the lotus pond bamboo forest, flanked by lush bamboo. A winding path along the pond edge will allow visitors to appreciate both the pond scenery and the bamboo forest landscape (Figure 16).



Figure 16: Bamboo Forest Boardwalk

##### (4) Wheat Field Stroll

A bamboo pavilion is planned to be built among the rice fields (Figure 17). The observation deck pavilion provides visitors with a view of the rice field, a bamboo swing, and a comfortable seat and balustrade design, providing an ideal place to enjoy the beauty of the wheat field.



Figure 17: Farmland Promenade

#### 3.2 Bamboo decoration in courtyard and the application of bamboo art in building body

Traditional residential courtyards will use bamboo to construct primitive yet elegant entrance doors, with bamboo frames and door panels. In building structures, bamboo will be used as a roofing element, leveraging bamboo's flexibility and lightness to create arched or curved roof shapes, generating a light and natural visual effect. By integrating these design elements, Laims to blend traditional bamboo art with modern living spaces, enhancing both aesthetic appeal and functional value.

## 4. Durability Issues in Bamboo Construction

Bamboo construction has high artistic value and practicality, but its durability is affected by moisture, insect pests and other factors. In the design, the characteristics of bamboo should be fully utilized to ensure the stability of the structure, and the use of bamboo accessories or combined with other materials can be considered to build a composite structure to ensure long-term stability and durability.

## 5. Conclusion

Southern Sichuan's abundant bamboo resources offer a unique opportunity for exploring bamboo art-themed landscape designs, which can raise awareness about ecological conservation and encourage the sustainable use and protection of bamboo forests, thereby promoting ecological balance. We need to build an example of Lifeng Shan Zhuang, use bamboo art elements to create a living environment landscape in line with local culture, and inject vitality into rural development.

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## References

- [1] Wei, M. (2017). *The study of the continuation of the traditional dwellings style in Luzhou, Sichuan province-A case study of the dwelling house in Ledao ancient village, Luzhou, SiChuang Province (Master's thesis, Southwest Jiaotong University). Master's thesis.*
- [2] Peng, Y.G. (1992). *Analysis of Traditional Village Settlements. Beijing: China Architecture & Building Press.*
- [3] Zhang, X.X. (2021). *Preliminary Discussion on the Function and Strategy of Rural Tourism in Promoting Rural Economic Development. Guangdong Sericulture, (2), 139-141.*
- [4] Wu, F. (2019). *Post-use Subjective Evaluation of Green Residential buildings in Hunan Province (Master's thesis, Hunan University). Master.*
- [5] Zhuang, W.M. (1996). *SD Method and Architectural Space Environment Evaluation. Journal of Tsinghua University (Natural Science Edition), (04), 42-47.*
- [6] Ma, K. (2019). *A Study on Green Space Planning and Design of Sui Han Lou Village in Jin Tang County (Master's thesis, Shandong Agricultural University). Master's thesis.*