

# *Spatial Conservation and Development of Dong Ethnic Settlements under Environment Behavior Studies*

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**Abstract:** With the goal of carbon peaking and carbon neutrality in China, the trend of researching the ecological development of settlements began to rise. Thus, this paper takes the settlement space as the research object, which is developed by means of field research, questionnaire and interview. From the perspective of Environment Behavior Studies, we explore the preservation and development of the future traditional settlement space in the context of rural revitalization, while exploring its unique cultural connotation and characteristics. This paper selects Yutou Dong ethnic settlement in Hunan Province as a research case, and uses the Public Space and Public Life survey method and Semantic Differential analysis method to evaluate and analyze the settlement space, which can explore the ecological development of the traditional settlement space. The development path adopts "culture-ecology-livability", which can create a regional and memorable settlement space, and at the same time promote the ecological adaptation of traditional settlement space for conservation and development.

## 1. Introduction

The traditional settlements in western Hunan have not only the beautiful scenery depicted by writers and artists, but also the unique folk customs. In addition, the region is also one of the gathering places of ethnic minorities in China, with a rich cultural and natural environment. Therefore, this paper selects the Dong tribes in the western region of Hunan as the object of research, whose internal regional architecture is adapted to the local conditions and it is cleverly and spiritually located in the mountains. The rigorous architectural layout and clever design in the Dong settlements and the eco-friendly environment have prompted the development of tourism. Based on the theoretical viewpoint of Environment-Behavior Studies, the case of Taro Dong Village is studied and analyzed, and it can provide new ideas for the conservation and development of traditional settlements in China in the future.

## 2. Theory Application Analysis

Environment-Behavior Studies is the science between human behavior and the environment of things, and it focuses on the feedback relationship between human and environmental factors

[1].From the Environment-Behavior Studies of "environmental decision theory", "interaction theory" and "interpenetration theory", we can find that the environment and people are closely related and determine the spatial vitality of the settlement [2].As traditional settlement space in the western part of Hunan Province in China has a favorable natural and human environment, but the current environmental problems have restricted the development of the area. Therefore, the conservation and development of traditional settlements are investigated on the basis of environmental behavior, which can analyze the contradictions and problems between environment and development. Therefore, the conservation and development of traditional settlements are investigated on the basis of Environment-Behavior Studies, so that it can analyze the contradictions and problems between environment and development.

### **3. Overview of the research area analysis**

#### **3.1 Yutou Dong Ethnic Settlements in Hunan Province**

Yutou Dong ethnic settlements was built in 1368 during the Hongwu period of the Ming Dynasty, and is located in the middle of the mountains at the junction of Hunan, Guangxi and Guizhou provinces, named after its location, which is shaped like a taro .The architecture of the whole village is typical of the Dong ethnic style, with the drum tower, ancient well, Sasui altar, ancient tomb group, and the green stone post road all well preserved.The layout of buildings along the valley creates a "ridge type" and "valley type" livability model, which fully reflects the harmonious relationship between people and the environment, and it is also a great expression of the spatial development of the settlement into the environment.

#### **3.2 Data Collection**

The research data collection is carried out in the following three ways:(1) The Public Space and Public Life survey method, it makes fixed-point observations of Yutou Dong ethnic settlement, as well as statistics on the number of behaviors over a systematic time period.(2) The web questionnaire method, it analyzed the activity use evaluation of the spatial nodes with excellent human culture and natural environment in this settlement space.(3) Semantic Differential analysis method, which establishes 10 groups of adjectives as evaluation factors, and the scale is set to five levels, which are assigned to each adjective according to its different.In summary, it can provide a basis for ecologically adaptive conservation development based on feedback from villagers, tourists and other groups, as well as the actual needs of spatial development of settlements.

#### **3.3 Data Analysis**

The analysis is carried out by the data collected by Public Space and Public Life survey method, where the selected points were the iconic spatial places such as the Walled Gate, the Drum Tower and the Wind-Rain Bridge within the settlement space, and it can get the evaluation of various kinds of places (Table 1).It can be found that villagers prefer new public spaces, while tourists prefer ethnic and cultural places. (2) Data collection based on the web questionnaire, which includes various aspects such as natural ecology, spatial vitality, cultural environment, activity style, human living environment, and functional evaluation.A total of 120 questionnaires were released, of whom the respondents were mainly local residents (53%) and tourists (47%). There were 98 valid questionnaires, with an effective rate of about 81.67%. In terms of feedback, 75% of the visitors' opinions are mainly about the lack of sufficient open space and public service facilities, while 68% of the local residents are mainly about the lack of rest and recreation facilities, as well as the lack of

comfort and practicality of public space. (3) Based on the data feedback obtained from the SD analysis method, the lack of collective memory, the obvious conflict between ethnic and foreign cultures, and the lack of space for activities within the settlement can be found (Table 2).

Table 1: Settlement space evaluation table

Amount	Settlement space nodes	Evaluation Data
7	Ethnic category:Lusheng drum tower, Yashang drum tower Activity category: Sasui altar Culture category: Ancient Post Road, Red Army Road Traffic category:HuiLong Wind-Rain Bridge New construction category: Dragon Pulse Plaza	<p><i>Ethnic category</i> Local residents: 3.4, Outbound Visitors: 3.5</p>
		<p><i>Culture category</i> Local residents: 2.6, Outbound Visitors: 3.4</p>
		<p><i>Traffic category</i> Local residents: 2.8, Outbound Visitors: 3.2</p>
		<p><i>New construction...</i> Local residents: 3.1, Outbound Visitors: 3.6</p>

Table 2: Scale of spatial semantic differences of settlements

Serial Code	Semantic Adjectives	Evaluation factor radar chart
1	Abundant- Scarcity	<p>1.Cultural Richness 2.Landscape Richness 3.Spatial Scale 4.Location Environment 5.Emotional Attachment 6.Traffic Access 7.Physical shape 8.Service Facility 9.Geographic Location 10.Activity Frequency</p> <p>Local residents (blue line with diamonds), Outbound Visitors (orange line with circles)</p>
2	Abundant- Scarcity	
3	Suitable-Inappropriate	
4	Cosy-uncomfortable	
5	Thick - Light	
6	Accessible-inconvenient	
7	Complete-Insufficient	
8	intact- incomplete	
9	Excellent - Bad	
10	Frequent - Rare	

### 3.4 Current Issues

The economic pillar of Yutou Dong Ethnic settlement is mainly tourism, its lack of ecological adaptation to the development model, which blindly developed is bound to lead to increased pressure on the natural environment. In addition, the continued decrease in ethno-cultural concerns contributes to a decrease in visitor attractiveness, and it leads to a polarized and depressed environmental behavior dynamics within the settlement space.

The current situation of Yutou Dong ethnic settlement is analyzed and its problems are mainly in the following three aspects. (1) Commercialization of national culture; this is reflected in the phenomenon of traditional folk culture being "besieged" by tourism, and the original "intangible cultural heritage" culture being commercialized and marketed, which becomes a "one-of-a-kind" commercial exhibit. (2) Changes in the behavior of villagers; with the proliferation of tourists

brought by tourism development, the lifestyle of the original inhabitants has been interrupted, while the traditional lifestyle customs have been reduced to varying degrees in the "booming" commercial atmosphere. (3) Lack of attention to the preservation and renewal of historic buildings; it is reflected in the transitional development of tourism, and the failure to "restore the old as the old", but the destruction and reconstruction of existing buildings.

#### 4. Conservation Strategy of the Settlement Space

The material "environment" element of the settlement space can be regarded as the initial "memory" attribute, and the natural ecology and cultural environment behind the settlement can be protected at a deeper level by means of environmental optimization and overall continuity. Based on the theoretical view of Environment Behavior Studies, its environment is the decisive factor influencing the spatial development of settlements. Therefore, we should pay attention to the practical connection between human behavior and environmental needs in order to develop a conservation strategy that is more adapted to the Dong ethnic settlement space.

##### 4.1 Conservation of the Spatial Integrity of the Settlement

The preservation of the settlement space is the respect and protection of historical memory, and is also the most precious gift to future generations. In the core protected area of the settlement space, based on the "environmental determinism" of Environment Behavior Studies, it should be based on its spatial functional characteristics and follow the principle of environmental sustainability. Only under the premise of protecting the core area of the settlement, it can ensure a more beautiful and simple landscape for rural tourism. In addition, we should also abandon the thinking of commercial development, and protect the original texture of the environment, in order to achieve a harmonious coexistence between people and the environment. Finally, the protection and development strategy for Yutou Dong ethnic settlement is proposed based on the analysis of environmental wholeness and human behavior (Figure 1).

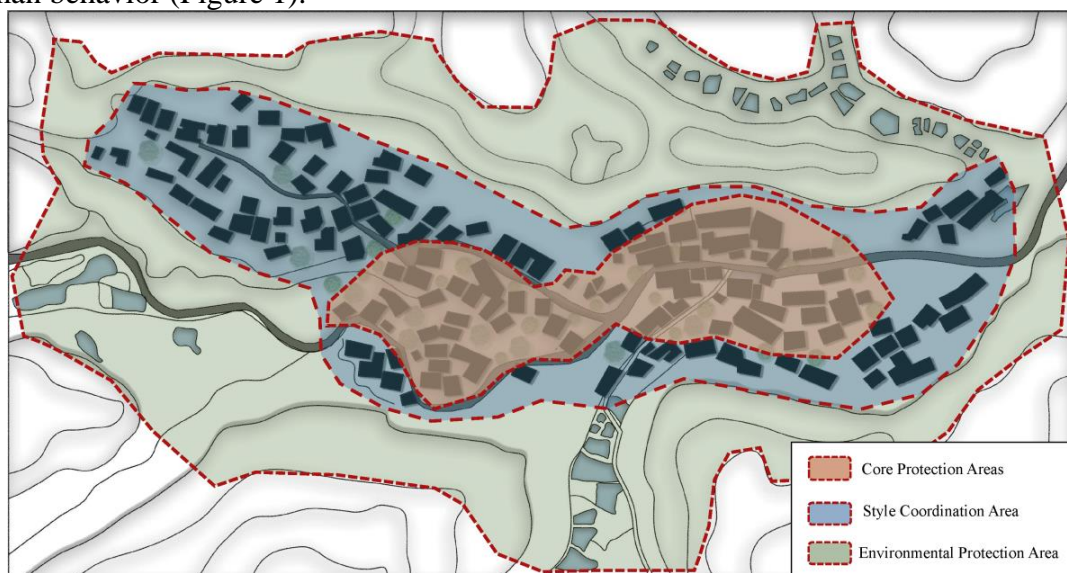


Figure 1: Overall conservation map of the settlement space

##### 4.2 Protection of Dong Regional Buildings

There are many existing traditional dwellings and historical buildings in Yutou Dong ethnic

settlement, which has great architectural and cultural resources. In terms of external factors of the built environment, for example, iconic buildings have a strong connection with the way people behave, while most of the population is willing to attend places like the Drum Tower. Based on this, we should give full consideration to the preservation and reuse of the traditional appearance of the settlement in the process of protecting the settlement space, and develop it with the regional cultural characteristics. Taking a cue from the Italian approach to architectural heritage conservation, the Group for Local Action (GAL) not only works with the local government, but also acts as a representative to provide suggestions and advice for conservation and restoration [3]. Therefore, if we want to preserve the architectural and cultural environment of Dong ethnic settlement, its governmental financial support and professional participation become the key to the preservation of the settlement.

### **4.3 Transmission of Ethnic Culture of the Settlement**

As Yutou Dong ethnic settlement has a hundred-year history of being built, its ethnic culture has been passed down to this day, which all stems from the residents' identification and inheritance of culture. The cultural environment cannot be produced without the architectural space carrier, and the drum tower, as an ethnic and standard architectural place in the settlement space, it carries the villagers' public behavior activities and has a strong cultural cohesion. Therefore, we maintain the space of ethnic places in order to ensure that residents have an external environment to rely on. And from the analysis of Environment Behavior Studies, the cultural characteristics should also be fully explored, so that the folklore activities have more residents and visitors to participate in. Finally, ethnic culture can produce more behavioral interaction with people, which can strengthen the influence of internal and external environment and promote the transmission of ethnic culture in the settlement.

## **5. Development Strategy of Settlement Space**

According to the "interpenetration theory" of Environment Behavior Studies, the internal "environment" can be adjusted to change the external human interaction and redefine the meaning of things. Therefore, the research on the development of the settlement space based on the concept of "green ecology" and "micro-renewal" can be seen as a process of conservation and renewal. Relying on the background of the era of rural revitalization and combining the actual needs of Yutou Dong ethnic settlement, we research the development strategy of its settlement space to achieve the goal of sustainable ecological development.

### **5.1 Comfort Enhancement of Public Environment**

Due to the Environment Behavior Studies of "interaction between environment and human behavior", we focus on the way people behave in their activities. With the help of digital technology, the environmental analysis unfolds for the space inside the settlement, which includes the analysis of light and wind environment, and it can provide the basis for the subsequent optimization of public environmental comfort [4]. In addition, the following points should be considered in the comfort enhancement strategy. (1) Environmental optimization should meet the needs of human behavior and activities in the space of ethnic places, and pay attention to the creation of surrounding natural landscape and memory points. (2) Enhancement of auxiliary functions within the settlement and improvement of the system of supporting public services. (3) Discover "negative" places and develop purposeful environmental enhancement by combining memory and cultural points.

## 5.2 Multi-Composite Functional Space

Based on the perspective of Environment Behavior Studies, it can change the relationship between human self and phenomenal environment through the composite multiple regulation within the settlement space. Multi-composite is a multifunctional space produced by integrating its external (point, line, and surface) public space elements, and environmental creation influences [5]. As a result, the Yutou Dong ethnic settlement is being upgraded in two main ways. (1) Functional enhancement of ethnicity and memory space, it mainly targets the accessibility and iconic optimization and enhancement of Drum Tower and Red Army Road. (2) The integration of "point" node space and "line" street space, it improves the corresponding indicative signage, etc.

## 5.3 Adaptive Planning of Spatial Behavior

Through the spatial behavior analysis of Environment Behavior Studies, we establish the route of tourism development and the core of settlement protection, and promote the appropriate development of environmental resources. The key nodes of the settlement are protected to avoid overly commercialized marketing models. In addition, we should also pay attention to the cultural and ecological factors, and take "historical architecture and humanistic environment" as the tourism card to bring tourists the most authentic "rural experience". Based on this, the focus on the creation of different characteristics nodes to create a good ecological environment, ethnic culture of the development axis, so that the Yutou Dong ethnic settlement to get ecological adaptive development (Figure 2).



Figure 2: Ecological adaptive development planning map

## 6. Conclusions

The century-old Dong ethnic settlement deep in the mountains has a long history and fine environment, but the numerous current problems of the settlement space restrict the ecological adaptive development. Based on the theoretical view of Environment Behavior Studies, which can be evaluated by Public Space and Public Life survey method, Semantic Differential analysis method, and questionnaire, it identifies the common problems of spatial development and conservation of traditional settlements at present. By analyzing the ecological environment, architectural style and

ethnic culture, we can propose strategies for the protection and inheritance of traditional settlement space. By means of multiple compounding and environmental enhancement, it increases the rich diversity of behaviors of villagers and visitors and enhances the development vitality of the settlement space. Ultimately, through spatial planning using elements of natural ecology and ethnic culture, it provides new ideas for ethnic cultural inheritance and environmental protection and development within settlements. Ultimately, by using natural ecology, ethnic culture and other elements for spatial planning, it provides new ideas for ethnic cultural heritage, and environmental protection development within the settlement.

## References

- [1] Li Daozeng. *General Theory of Environment Behavior Studies* [M]. Beijing: Tsinghua University Press, 1999.
- [2] Li B. *Environmental behavior theory of environmental behavior and its expansion*[J]. *Journal of Architecture*, 2008(02):30-33.
- [3] Mu qi, Eboli, Li Chen,. *The conservation and renewal of Italian rural built heritage under the "synergy" model: the case of Piedmont Region*[J]. *Architect*, 2021, 209(1): 34-41.
- [4] Lin Jin, He Chuan, Xiang Xin, etc. *The Research on Protection and Renewal Strategy of Traditional Residential Buildings in Western Hunan based on BIM Technology --Take the ancient town of Pushi as an example*[C]//*Wise Building the Future--Proceedings of the National Symposium on Teaching and Research of Architectural Digital Technology in Architecture Faculties in 2021.* ,2021:496-505.
- [5] Yang Hengyuan. *The Shaping of Rural Complex Public Space* [D]. Tsinghua University,2019.