Ecology Layout Patterns in Mountain Rural Settlements -
A Case Study of Qin Ba Mountain Area

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Abstract — Rural settlements in mountain areas are the weakest and most basic social and economic organization units, and are ripe for development. Problems include: the decline of traditional villages, primitive and backward infrastructure, chaotic building order, and so on. Setting these as our object, we use interdisciplinary comprehensive research and qualitative methods of social investigation to analyse their fragile natural environment. We summarize the mountain village settlement layout pattern of development, then put forward improved layouts and make suggestions for ecological, regional, scientific, harmonious coexistence of rural settlements. For mountain rural settlements and other areas with similar background to rural settlements, we explore the planning and construction of new countryside as important principles with practical significance.

Keywords - Mountain Rural Settlements; Layout Pattern; Ecological Characteristics

I. INTRODUCTION

Qin Ba mountains is the junction of Sichuan, Chongqing, Shanxi, Hubei, Henan five provinces, on the administrative divisions, including today's Han Zhong, An Kang, Shang Luo of Shaanxi, Jing men, Sui zhou, Xiang fan, Shi Yan, Shen Nongjia forest region of Hubei, Da Zhou, Ba Zhong, Chong Qing of Sichuan and Nan yang of He nan and other cities. It is have east-west Qin ling and Da Bashan mountain stand among them, with the Chang Jiang river of Han Shui is the longest tributary flow penetration. Meanwhile, it has a geographical and ecological conditions integrity consistency of natural.

There were many small basin and the mountain valley, fertile land, mild climate, the important grain production areas in southern Shaanxi. And it is important ecological barrier of the upper Chang Jiang River, extremely rich mineral resources. This region is integrating ecology culture and region of the junction of Ba shu culture from the perspective of the history.

II. THE THEORY RESEARCH OF MOUNTAIN RURAL VILLAGE

Before 1949, research about rural village more than the city’. China on rural village systematic research began in the 20th century 30's. In particular by J. Brunhes' "La Geographie Humane" after being translated into Chinese, a few scholars began to pay attention to rural villages. 40's, Mr. Fei Xiaotong published "Peasant Life in China" and "local Chinese" as the study of rural village also made a great contribution. Since 1949, the reform and opening up previously, the relative decline of rural villages, the rise of urban studies. After reform and opening up, major changes have taken place in rural villages, a number of ecological thinking blend into research of rural villages and the emergence of eco-villages, rural village ecosystems, and rural living environment and so on. The "rural garden ecology" of Yun Zhengming, Wang Zhi-Ping and An Ping, the village presented the concept of ecology, the main form of villages, structure, behavior and environment. Subsequently, Chen Yong, Chen Guojie so further propose the concept of rural village ecosystems that the scope of village ecology in addition to village itself, there should be some hinterland, the villages within the population, an important part of ecology is human ecology of rural village. Since then, Liu Shaoquan "rural settlement ecology - theory and practice" use of ecological theory and methods to rural villages as a social, economic, and natural ecosystem, then research on its structural, functional and process of succession. Chen Guojie "Chinese mountain village study" and Shen Maoying "Mountain rural village development theory and practice" also use China Mountain (Chang Jiang River) as the research object, from the ecological environment, ecosystem, ecosystem theory in the mountains of rural village research.

III. FEATURES OF RURAL VILLAGES IN QIN BA MOUNTAINOUS AREA

A. Geographical Environment

Qin Ba border area located in the Qin Ling Mountains, cross the Jialing River and Han River two river systems, Han Zhong in Shaanxi, Long Nan in Gansu and Sichuan Guang Yuan area three blocks composed mainly mountainous terrain. There are many small basins between mountains and have some Ba zi regions distributed in it. It is a special
geographical unit. It has the integrity and natural geographical environment (Fig.1), fertile land (Fig.2). The ecological environment are more vulnerable. Its natural and human features have been relatively backward, economy in a very backward state, not only to bring the local people's lives very difficult, and not conducive to regional planning and development. Climatic conditions in the north to the warm sub-tropical climate zone with the transition. There were many small basin and the mountain valley, fertile land, mild climate, the important grain production areas in southern Shaanxi. And it is important ecological barrier of the upper Chang Jiang River, extremely rich mineral resources. This region is integrating ecology culture and region of the junction of Ba shu culture from the perspective of the history.

B. Ecology Rural Villages Characteristics

Mountain is a special geographic environment and characteristics of complex ecological systems, determine the uniqueness of mountain resources and biological diversity, and thus form the mountainous rural village more scattered layout, the Qin Ba mountain area also formed a particular patterns of mountain ecology rural village. First of all, most village site limited to specific morphological positions, help to carry out agricultural production activities. Mountainous ecology rural village on the mountain environment to adapt not only in elevation, but also on the slope and aspect have a choice. There are significant differences in the sunny and shady. Mountain ecology rural villagers generally choose to sunny as natural construction conditions ideally. Dry and sunny leeward is conducive to the development of ecology rural village. Second, the size of ecology rural village is generally small, loose internal structure. Generally, mountain ecology rural village have scattered village pattern dominated type and village reunion of linear form. Disorder within the domestic distribution of scattered villages, no levels to speak of space, the scattered layout of expression not only messy, but also the performance of its distance between households and large families, cannot form a roadway, convenient link between the villagers (Fig. 3).

C. The Raw Architectural Form of Fural Buildings

Qin Ba mountains raw soil construction for more scattered, plus the disparity between the rich and the poor is
differ, construction scale and form difference is very big. From the point of construction scale, and can be divided into a room, two rooms, three rooms, are three between two PianShou, is between two PianShou, a common architectural form a PianShou, etc. Housing is amidst the many "two slope water", that is, the roof is herringbone water. The partial mansion house to more "a slope of water". A large family of money is not the simple common form, but at least is a courtyard, the building before entering into the "CaoMen", namely the courtyard outside the front door, into the door, there is a courtyard, through the yard and into the room, the room, there is a square "courtyard", patio is surrounded by houses, the house Shared patio lighting.

IV. THE CURRENT PROBLEMS OF MOUNTAIN RURAL SETTLEMENTS

A. The Decline of Traditional Villages

Many traditional architectural styles was often disregarded, because the urbanization impact the Village Construction, the mountain ecology rural villages extend in the process of construction continuously and original house have gone out of use gradually(Fig.4). Space structures of residence extend continuously and separate from the traditional basic function and basic layout of the mountain rural village. Or uniform row of new houses be built and all the building types be same in the rural village, they come from the construction of the new socialist countryside, and spurn the characteristic of mountain ecology rural village. This phenomenon led to the decline of traditional village characteristics, the formation of loose disordered ecology rural villages.

B. The Backward Infrastructure

The Qin Ba mountain areas' ecology rural village junction infrastructure and public service facilities are very backward, because of small settlement, spatial distribution of scattered independent and strong backward economic conditions, roads, telecommunications service and other public service facilities using low, causing duplication of resources (Fig.5). On the other hand as solar energy, technology utilization low levels of suitability, with mountain villagers to used wood, straw as fuel and pollute the environment, waste of resources. Villagers living in the relative spread of infrastructure and energy use caused by low, with the standard of living, increase the demand of villagers comfortable, it will inevitably to increase large energy consumption.

C. The Chaos of Building Ordered

The Basic characteristics of ecology rural villages include scattered sites, layout disorder in the The Qin Ba mountain areas. Following the rapid economic development and the impact of modern lifestyles, many villagers follow the urban residential buildings blindly, this actions wrecked the traditional architectural styles and loss characteristics and advantages of local-style dwelling houses. The current ecology rural villages residential construction is still in disorder, fundamental architecture units is a single home, which to some extent the confusion caused by the housing, and even new buildings do not effect traditional building insulation is good, even in winter spend a lot of firewood for heating, resulting in substantial waste of resources and energy consumption.

D. Damage to The Ecological Environment

Mountain ecology villages have the special geographical environment, including the rich in forest resources, tree species diversity, a variety of diverse biological resources. The regions have the rich ecological resources. It is the ecological security barrier Qin Ba Mountains, but is still a relatively fragile eco-system area. In process of promoting economic development, tremendous environmental damage appear, severe population size over the growing capacity of the natural environment, and the villagers lack of...
perfect and most basic function of the surrounding towns of
possible the construction of village. Consider using the most
using of new energy and maximize energy use as much as
elements of fusion, to create a clear hierarchy of space level,
resources, mountainous rural villages should intertwined
and design. In the case of the full conservation of natural
building in a line through various means such as planning
construction of mountainous rural villages. To settle the
small gathering, large decentralized model for planning and
the region is the main features of mountain. Through the
features, scattered small-scale structure of rural villages in
environmental awareness, free garbage disposal, sewage,
causing sewage, garbage accumulation, not only pollute the
river near the spring , but also caused serious pollution of
groundwater, which caused serious damage to the ecological
environment. Mountainous ecology rural villages have large
land area, idle land be exist in the villages , and many village
residents at random, spontaneous blind transfer, or they
building new houses, causing a large number of houses abandoned, the land have not reclaimed, the action of waste
arable land is a serious phenomenon will solicitation in
scarcity of arable land had become more a shortage of
resources.

V. ECOLOGY LAYOUT PATTERNS OF MOUNTAIN RURAL SETTLEMENTS

A. Planning Level to Control Rule

It should formulate the guidelines of rural renovation
construction planning. At meantime guide and control the
direction of ecology rural villages and including the degree
of planning and construction. Change the disorder state of
the current rural village planning and construction. Finally
determine the development mode of mountainous ecology
rural villages and settlement layout pattern, and the
ecological capacity of the entire village. Avoiding over-
exploitation of natural resources and leading to deterioration
of ecological environment. It should reference to principles
and methods of urban planning, rural reality, the view of
settlements, production, life and ecological. We can plan
regional characteristics of the mountain for ecology rural
villages.

Mountainous ecology rural villages during the process of
planning and design have always been top-down preparation.
The course comprise research field conducted with the
villagers communicate hardly, actually not meet the needs of
villagers. Understanding the local natural resources, effective
use of energy, mountain inappropriate planning of ecology
rural villages will be brought to the village and indirect
economic losses more than constraints development of
mountainous rural villages in the future. Geological hazards
for the entire region will have increased and ecological
possibilities.

B. Ecological Distribution of Villages

In Shaanxi-Gansu-Sichuan border area, the mountain
ecology village should layout conform to the landscape
features, scattered small-scale structure of rural villages in
the region is the main features of mountain. Through the
small gathering, large decentralized model for planning and
construction of mountainous rural villages. To settle the
building in a line through various means such as planning
and design. In the case of the full conservation of natural
resources, mountainous rural villages should intertwined
elements of fusion, to create a clear hierarchy of space level,
using of new energy and maximize energy use as much as
possible the construction of village. Consider using the most
perfect and most basic function of the surrounding towns of
living, production and economic function, ecological
environmental functions.

Characteristics of mountain ecology rural villages under
the new rural construction have not been well inherited and
carried forward. In economic development, attention should
be paid. Protecting traditional layout features, promoting
traditional culture, to become an important part of
geographical features. Meanwhile, the formation of rural
villages is the product of time and space, mountain and
water, green mountain landscape are all natural. A lot of
planning and construction neglect to conform natural,
starting from the natural environment, dealing with the
relationship of the villagers in the mountainous rural
villages, buildings, landscape, ecological and other elements.
Respect for nature, strengthening the role of ecology,
creating regional characteristics in the mountain villages.

C. Appropriate Layout Pattern

Qin Ba mountains area form the inherent law of rural
settlements mountainous rural settlement location and
settlement distribution has obvious geographical adaptability,
adapt to the nature, adjust measures to local conditions, and
the villagers spontaneously in settlement construction in the
process of construction and imitating the improved gathered
as a result, the use of traditional techniques and local
materials, comply with the topography and geomorphology,
built his own house, to resist the threat of climate
conditions, the formation of banded settlement layout
(Fig.6), the group settlement layout (Fig.7), and tree
settlement layout (Fig.8), small assembling type layout
mode.

At the same time in order to meet the need of modern
life, the planning of the original space hierarchy refactoring,
joined in the whole space sequence public space node
(Fig.9), and with the original residents node boot space and
space together to form the linear space of the progressive
sequence. Public space nodes to a public activity center and
small square as the center of gravity, the architecture and
landscape environment space of the communion, whole
space sequence according to the linear progressive, song
according to the natural landscape, the mountain settlement
landscape in natural space fully release and presentation.

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D. Eco-residential Buildings

1) Reflecting the traditional characteristics. In the Qin Ba mountain area ecology rural villages of ecological design process is to maintain regional architectural features. Including traditional culture-related things, such as the layout of villages, construction of the spatial form, decoration and color, through the traditional elements to integrate and restructure. More a reflection on the technical features of the building and external symbol, and even cultural identity is reflected in the hell on. Including traditional local customs, lifestyle, language, religion, etc., which are mountainous ecology rural villages an important manifestation of regional ecological design.

2) Climate suitability. Rural village patterns and climate is close. Layout and construction groups into the streets need to consider a major factor which it is the weather in the region. Meanwhile, climate and soil are the embodiment of architectural regionalism. Architecture adapt to the terrain and natural environment of the ecological architecture of the buildings retain the traditional characteristics of the region have far-reaching significance.

3) Use of new technologies. In order to reflect the regional culture, showing the charm of Qinba mountain building, under the premise of ensuring the seismic safety of using the deposited walls of the wooden structure of the system, and wood - two light steel structure system, wood bamboo fence. The building materials and construction methods of mountainous ecology rural villages should comply with the local style and reflects the local geographical features, local materials, and good thermal insulation, more than low cost, but not damage the environment at cost. The architecture design, should consider building its own energy, integrated energy system generates, so as to achieve the purpose of efficient use of energy. As the mountain is relatively dispersed rural living, considering the use of small villages gather to achieve passive solar technology and rain water collection, solar thermal collection room, fees and other heat recovery systems by intensive building. The use of efficient energy makes it more effective and energy saving ecological and environmental benefits.

VI. Conclusion

Mountainous ecology rural villages include the ecological design of wide-ranging, highly systematic and general. It has some guidance on ecological planning of other regions rural villages. This thesis use ecological planning and design as a starting point, analysis and discussion on mountain eco-village planning and implementation of strategy. Selection and technical aspects in the building, according to local conditions, and actively develop the appropriate use of local technology and local materials, to learn from the local traditional construction technology and ecological experience, the only way China's towns and villages the ecological residential building will have a lasting vitality, so that man and nature harmony. Concerned about the ecology of mountainous rural villages planning and designing study is based on ecological and technical point to seek the development of ecology rural villages planning laws for create a new planning approach.

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REFERENCES


