

# Planning and Design of Rural Housing in Northeast China and Regional Research on Towns

Huang Wei, Liu Yonggang

Liaoning Communication University, Shenyang, 110136, China

**Keywords:** rural housing; planning and design; urban rural integration

**Abstract:** Under the premise of urban construction and urbanization, the design of urban living environment should be people-oriented, preserve its own history and personality, or have rich public and communication spaces, which has become increasingly important. On the contrary, the existing living space in traditional villages reflects a humanized concept and atmosphere that is often lacking in modern urban life. So, the design of new rural housing in the construction of new rural areas should not be a replication of urban residential areas, nor should it be a reconstruction of the original village. Instead, it should fully respect the traditional cultural atmosphere of the village and the living habits of the villagers. On the basis of meeting the physiological and psychological needs of residents, attention should be paid to their emotional needs, and modern design techniques should be used to create living spaces that are harmonious with the overall atmosphere and suitable for modern life.

## 1. Introduction

In recent years, with the widespread development of new rural construction, the goal of building a socialist new countryside with clean village appearance, complete facilities, beautiful environment, and civilized harmony has been achieved through the systematic construction of new buildings and new environments. The construction of new rural housing should meet the requirements of a "resource-saving society". It is necessary to strengthen management under the premise of unified planning, build residential buildings with distinct regional characteristics according to local conditions, widely use ecological technology to comprehensively utilize resources and energy, and reflect the characteristics of saving land, materials, and energy. Improving the production and living conditions of farmers, as well as the rural ecological environment, has significant practical significance in narrowing the urban-rural gap, solving the "three rural" issues, promoting sustainable development of society, and accelerating the process of building a moderately prosperous society in rural areas.

## 2. Modern ecological architecture concept

Architectural ecology emphasizes the use of ecological principles and methods, with the goal of coordinated development among humans, architecture, nature, and society. It aims to use and transform nature in a restrained manner, seeking the most suitable ecological building environment for human survival and development[1]. The consideration of environmental factors helps in the rational design of buildings, such as solving problems such as building orientation, natural ventilation, natural lighting, sunlight utilization, and thermal insulation, making the form of buildings reasonable and well founded. At the same time, it requires the joint participation of relevant disciplines such as aesthetics, environmental psychology, economics, sociology, etc, to make the architectural expression conform to the geographical environment and space

### 2.1 Technical aspects of construction

In construction, efficient construction techniques are used to meet the same functional requirements by using much fewer materials than traditional methods.

## **2.2 Northeast Environmental Analysis**

The construction of ecological housing in the new rural areas of Northeast China requires coordination with the surrounding natural environment. During the housing construction process, it is necessary to protect the landscape elements such as plants and water around the base according to local conditions, and minimize damage to nature as much as possible; To reduce the consumption of various non renewable energy sources and achieve sustainable development of ecological balance.

## **3. The construction concept of new rural housing**

The concept of using ecological technology to construct residential buildings has gradually been recognized and accepted by rural residents through long-term promotion of compliance with energy conservation and environmental protection regulations and policies. The Department of Housing and Urban Rural Development of Liaoning Province, combined with the actual situation of the province, issued local regulations such as the "Energy Conservation Regulations for Civil Buildings in Liaoning Province" and the "Urban and Rural Planning Regulations in Liaoning Province" after 2008, laying the foundation for coordinating the spatial layout of urban and rural areas, improving the living environment, and promoting the construction of a resource-saving and environmentally friendly society.

### **3.1 Emphasize the rationality of planning and architectural design**

The design of rural ecological housing is to use the achievements of architectural aesthetics, ecology and other disciplines in a specific artificial environment to create a comfortable, environmentally friendly, healthy, and beautiful ecological space for residents. This "ecological" space emphasizes the high degree of unity of the natural harmonious system. In the process of ecological housing construction, it is necessary to consider the rationality of residential design, advocate the use of environmentally friendly and energy-saving new and renewable energy, and create a green and ecological residential area in new rural areas[2]. Planning and design should make reasonable use of building land, protect precious land resources, and maximize the utilization rate of land. For the site selection of villages, it is necessary to utilize their terrain, landforms, and natural resources, especially considering the utilization of unique water resources in the region; For the layout and orientation of buildings, design should be based on fully utilizing the regional climate characteristics; For the design of the layout structure, it is based on the grasp of the economic situation and overall population structure of the village, with a compact graphic design that meets the requirements of land conservation

### **3.2 Environmental Geographic Analysis**

It is necessary to reasonably determine the density and plot ratio of buildings, occupy less arable land, increase green area, and reasonably determine the position, shape, orientation, height, and spacing of buildings, so as to provide good sunlight and lighting for residential buildings, which is beneficial for the winter sunshine of the building complex and avoids the dominant winter wind direction. In summer, it is beneficial for natural ventilation

### **3.3 Functional layout inside the house**

The design of rural residential buildings emphasizes the rational layout of indoor functions to fully utilize natural lighting and reduce lighting energy consumption. By using building methods such as courtyards and windows, natural wind is utilized for indoor ventilation to reduce reliance on air conditioning in summer. At the same time, window sunshades and roof insulation layers are installed to regulate indoor temperature in summer[3].

## **4. Adopting advanced construction methods**

Promote the use of scientific building systems in rural housing construction to improve the effective usable area and service life of buildings; Encourage the use of renewable and recyclable

environmentally friendly materials during the construction process, promote the use of local natural building materials and products, and save non renewable resources. If high-performance concrete and silica calcium wall materials are selected, or the construction method of raw earth walls and wooden structures is adopted, hollow bricks and solid bricks fired from clay will be gradually phased out; Timely reuse or harmless treatment of construction waste to reduce pollutant emissions. The outdoor ground of the building should be paved with permeable bricks to maintain the ecological balance of groundwater resources. Insulation materials should be used on the roof, and green plants should be planted on the roof to make it a roof garden.

#### **4.1 Ecological architecture should continue the regional context**

The construction of new rural housing is not only to create a livable environment that meets functional needs, but also to preserve rich historical and cultural heritage. By comprehensively grasping the relationship between modern ecological housing and traditional dwellings, modern ecological architecture can continue the charm and connotation of traditional dwellings, and create an atmosphere where modern ecological architecture coordinates with surrounding traditional buildings and harmonizes with the surrounding natural environment. The design of new rural residential buildings should explore regional characteristics. Regional characteristics are the natural and cultural characteristics of a specific region's land, and are the source of architectural design and creation. Seeking design language from regional characteristics allows buildings to have unique forms while continuing local characteristics[4]. The region retains a large number of Ming and Qing Dynasty residences, which have formed its own unique regional style due to factors such as regional climate, cultural customs, and aesthetic concepts, and have high humanistic and historical value. The construction of new rural residential buildings in the region must be based on the combination of modern design theory and traditional technology[5]. On the one hand, it is necessary to inherit the architectural culture of the local style and characteristics, and on the other hand, it is necessary to improve the awareness of farmers about excellent traditional architecture, preserve the style and traditional architectural technology of local architecture, and integrate it into modern residential design, so that the architectural culture has the dual characteristics of natural ecology and regional traditional culture.

#### **4.2 Utilizing environmentally friendly renewable resources**

The design, construction, use (residential, renovation), demolition, treatment, and reuse stages of housing must use the above-mentioned technologies in order to effectively play the overall function. Utilize renewable resources such as solar energy, biogas, rainwater, and plants to maximize energy utilization, reduce the consumption of conventional energy in buildings, and achieve the concept of sustainable development in buildings[6].

#### **4.3 Case study of ecological housing construction in new rural areas**

With the development of new rural construction, rural residents have put forward new requirements for housing. The Fushun Municipal Government organizes relevant functional departments such as planning, architecture, and land to adopt on-site investigation, detailed analysis, and scientific evaluation methods, while fully respecting traditional customs, lifestyles, and agricultural culture, to excavate distinctive regional historical and cultural features for residential construction. Taking the new rural construction of three natural villages in Shuangxiqiao Town, Fushun City, Liaoning Province as an example, this article explores the ecological construction of new rural housing.

### **5. Case overview**

#### **5.1 Village planning and design stage**

The planning and design concept of Shuangxiqiao Town in Fushun City takes rich mountain and water resources as the starting point, puts the protection of the ecological environment in the first place, and constructs a "mountain and water countryside" living environment with buildings and

original ecological mountains, forests, and water systems as carriers, establishing a multi form and multi-level green ecological space. The plan adopts a systematic layout of buildings and green spaces, and new residential buildings should make use of the original foundation of old houses as much as possible.

## **5.2 Ecological region analysis**

In ecologically sensitive areas such as Dongzhou District and original ecological forests, construction should be avoided or reduced as much as possible, while maintaining the landscape characteristics and continuity of highlands, valleys, and waterfront lines. The green space rate next to residential buildings should reach over 36%, reflecting the environmental quality of green villages. The flow design of transportation roads emphasizes the principle of safety and speed. Based on the characteristics of different land plots, separation of people and vehicles, and separation of movement and stillness are achieved to ensure the safety of residents' travel. A fast transportation system and a multi-level and multifunctional transportation network are formed externally. Internally, fast commuting roads, labor roads, and leisure and fitness corridors are set up in conjunction with the living needs of farmers, and public service facilities are set up along the main and secondary roads.

## **5.3 Analysis of building environment and lighting**

In the combination design of newly-built residential buildings, the shapes of each building correspond to each other; Each external space is both unified and interconnected, forming a complete system; The internal space and external space are intertwined and interwoven, harmoniously coexisting in one. The residential buildings in Sanqiao Village and Zhengliang Village are arranged in a concentrated and contiguous manner, taking into account the living conditions such as sunlight, orientation, lighting, and ventilation that meet the group combination. The layout of the buildings is based on the principles of low cost and land conservation, with a row layout as the main layout form. In terms of the overall spatial layout of the regional architecture, a complete residential complex is composed mainly of 2-3 story row style residential buildings, centered around a threshing and sun drying field, cultural square, and water area. Internally, it ensures the tranquility and elegance of residents' lives, and externally showcases the simple quality of the new rural residential area, presenting a variety of layout changes. The design of individual buildings in the plan adheres to the principles of ecological priority and economic applicability, with a focus on environmental protection concepts such as water conservation, land conservation, energy conservation, and material conservation. The appearance of the building should be integrated with the surrounding environment as much as possible, and attention should be paid to the inheritance of local traditional culture and innovation of the times. In the village planning and design that combines new and old buildings, partially preserving and partially renovating old houses is another way of constructing rural houses.

## **5.4 Single building design stage**

The design of the new residential unit in Cunwan, Shuangxiqiao Town, Fushun City starts from the actual situation of the new countryside, based on ecological requirements, implements the construction policy of "land conservation, material conservation, and energy conservation", considers spatial environmental factors as a whole, focuses on the combination of spatial layout, functional distribution, architectural design, etc., and deepens the design, highlighting the regional traditional cultural characteristics to meet the various living needs of farmers. In the architectural design of the village bay in Shuangxiqiao Town, the residential layout is compact and the functions are reasonable. Living spaces such as the living room and bedroom are located to the south, which is conducive to ventilation in summer, heating in winter, and wind protection.

## **6. Conclusion**

With the increasing attention paid to the field of rural residential construction, it is necessary to

strengthen targeted preliminary research on rural construction and make scientific, reasonable, and environmentally friendly overall planning and design. In the process of architectural design, innovation should be made in aspects such as architectural form, application of building materials, and construction techniques, while inheriting local characteristics. Efforts should be made to abandon building methods that cause serious waste of environmental resources in rural residential construction. The use of ecological housing construction models to reduce building energy consumption and improve the production and living environment of rural residents has significant economic and social benefits.

### **Acknowledgement**

This study is the research result of the basic scientific research project of higher education institutions in Liaoning Province in 2022, "Research on Residential Art Form Design Based on Emotional Identity of Various Ethnic Groups in the Construction of Villages and Towns". The project approval number is LCW202208.

### **References**

- [1] Jiang Li; Li Chunju; Sun Xiaolu. Research on the Planning and Construction of New Rural Housing [J]. Sichuan Architecture Science Research, March, pp. 10-29, 2009.
- [2] Yan Youxi; Xu Fang. Construction and Application of Land Saving Planning Technology for Rural Housing in Mountainous Areas of Zhejiang Province [J]. Small Town Construction, April, pp. 32-36, 2011.
- [3] Xie Xiaolin. Exploration of Management Policies for Rural Housing Planning and Construction in the New Era [J]. Small Town Construction, pp. 20-54, 2009.
- [4] Huang Jian. Rural Housing Planning, Design and Construction Standards Research Project Initiated [J]. Urban Planning Communication, pp. 31-34, 2007.21.
- [5] Cao Zhifu. Exploration of Rural Residential Planning and Construction [J]. Technology and Market, pp. 23-54, 2012, 07.
- [6] Wang Yue; Ge Jian; Tian Yiwei; Xu Ying. Research on Energy Conservation and Emission Reduction Technology Application in New Rural Residential Buildings in Hangzhou [J]. Modern City, pp. 11-21, March 2010.