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A preliminary study on the climate adaptive design of green rural houses in west China

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Abstract

This paper introduces a preliminary study on the climate adaptive design of green rural houses in the Qinling mountainous region of west China. Based on literature reviews and field investigations on the existing traditional and contemporary rural houses in the researched region, the folk wisdom implied in the traditional rural houses, the perceptions and expectations of local residents, and the inheritance of folk wisdom in contemporary rural houses, are identified and discussed. Suggestions for the climate adaptive design of new rural houses in the researched region are provided, further researches are also recommended.

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Keywords: Climate; adaptive design; green; rural house; China.

1. Background

Along with fast economic development and government promotion of New Village Construction, large amount of new rural houses have been constructed in China during the last 10-15 years. However, many of such houses, especially the self-constructed ones which simply copied the so-called “city styles”, are not adaptable to their local climate conditions and performed poor in terms of their indoor thermal environment and energy efficiency. Therefore, in year 2013, the China Ministry of Housing and Urban-Rural Construction (MHURC) together with the Ministry of Industry and Information Technology (MIIT) jointly issued a document for promotion of green rural houses in the country[1]. With this background, a series of researches have been conducted targeting rural houses in different regions of the country. This paper introduces one of such researches, which is also the preliminary study of

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a national demonstration project conducted in the Qinba mountainous region in west China. A brief conceptual framework of the project is shown in Fig.1. This paper mainly involves part B of the research.

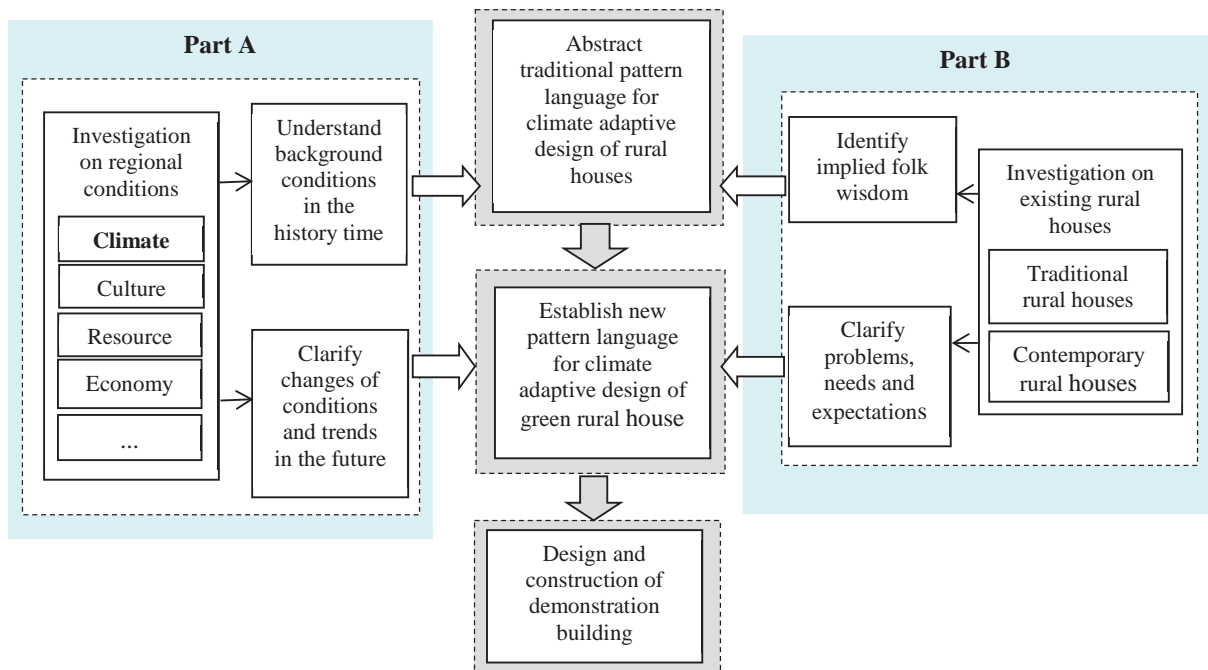


Fig. 1. Brief conceptual framework of the project.

2. Climate conditions of the Qinba mountainous region in west China

The Qinba mountainous region locates at the “cold in winter and warm in summer” climate zone for building thermal design in China. Its precipitation is between 750-1000mm with rainfall mostly concentrated in the summertime. Hu et al.[2] and Feng and Dong [3] observed that, in the recent 40-50 years, while the average annual temperature is increasing, the amount of annual precipitation is decreasing, and the frequency of storms is also increasing, which potentially may course more natural disasters (like hill-creep, mud-rock flow, etc.), especially in the summertime.

3. Investigation of existing rural houses

3.1. Target and method of the investigation

In the long period of self-evolution, traditional rural houses in different regions of China have accumulated abundant of climate adaptive wisdom, which could be good references for the contemporary building design and construction.

With this consideration in mind, a series of field investigations had been conducted to identify and abstract useful folk wisdom implied in the traditional rural houses, and to understand the perceptions and expectations of local residents in the researched region.

3.2. Content and method of the investigation

Content of the investigation included functional layout, material selection, and construction details, indoor and

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