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*Design to Thrive*

## **Building environment assessment methods and social studies of rural villages in Yunnan and urban development in Chongqing City, Southwest China**

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### **Abstract:**

Recent urbanization processes and corresponding government policies in China have highlighted the need for much greater understanding of sustainable development and the requirements for sustainability in settings that are very different in rural and urban regions. This paper examines practice and knowledge linked to typical vernacular houses constructed since 1950 in Yunnan Province and regional buildings in Chongqing City in Southwest China. Both areas have played crucial roles in contributing to regional architectural design since the beginning of the 20th Century because of the diversity arising from numerous ethnic groups and various climate types and topography features in the region. The study explores how academic and end-user knowledge accumulated and developed, and how this has revealed social, cultural and political influences on how designers and consumers were motivated towards sustainable design over the same time period. It is argued that locally shared knowledge bases should be considered important for informing governmental policies, planning strategy and consumers' preferences, as well as influencing actions and social acceptance in relation to sustainable development. Furthermore, sustainable design should not be regarded as a contemporary new idea, but one that has its roots in the historical changes in built environment design and practice.

**Keywords:** Rural and urban development, regional architecture, local knowledge, sustainable development

### **Introduction**

The concept of sustainable building design has been widely used in different countries and regions, and much research has been done to examine the suitability of international and national sustainable building assessment criteria for use in particular regions and societies. McCool and Stankey (2004) stress that the concept of sustainability is socially and culturally related, however, many studies point out that local cultural and social dimensions of sustainability have often been excluded in the assessment (Brand and Karvonen, 2007; Huetting & Reijnders, 2004; Liao, He, 2015). Zhang (2015) finds that the existing studies mainly focus on the environmental aspect of green building while other dimensions of sustainability, especially social sustainability, is largely overlooked. Zhao et al. (2015) analyzes the social problems of green buildings from the humanistic needs to social acceptance and argues that social processes with consumer engagement and participation needs to be considered in design, construction and operation processes to improve users' happiness and productivity. However the consumers are not always readily motivated or may even prefer expensive technological "gadgets" for reducing energy use. To really reflect preference and influenced actions, social acceptance should be analyzed to fully gauge interest and perspective of the people.

This investigation seeks to determine various attempts being made to engage in sustainable design and construction in Southwest China. It is argued that the knowledge accumulated and developed over historical periods have revealed social, cultural and political information on how designers and consumers were motivated for sustainable design in the past. Scoones suggests that the importance of knowledge bases of sustainable design and construction need to be considered as asset distinctive from the other five aspects of 'capital': physical, financial, human, social and natural. Shared local knowledge capital can dynamically and continually evolve within communities and support the livelihood and wellbeing of people (Scoones 1998). This study investigates locally shared knowledge that developed in both rural areas and urban cities in China. Although reflected in different ways, they have had significant impacts on decisions for building regulations and planning strategies, and have informed user and consumer preferences for sustainable ways of life. There has been a continuity of thought and action in architecture of what is termed "sustainable design" today, both in rural and in urban development in China since the 1950s. In particular, this paper examines changes that have occurred since the 1950s in practice and knowledge linked to typical vernacular houses in Yunnan Province and in regional buildings in Chongqing City, Southwest China.

The analysis of regional buildings commenced with anthropological studies of ethnic group houses in Yunnan and cultural studies related to indigenous buildings in Chongqing which have occurred since the beginning of the 20th Century. The regional architectural 'knowledge' had developed and been re-interpreted from architectural theories derived from Russia in the 1950s and 1960s and which were then influenced by theories from the West from the 1980s, including the latest concept and theories of "sustainable architecture". The project entails both analytical and interpretive methods of textual research and is also based on materials collected in field studies in Yunnan province and Chongqing city.

The study seeks to explore how the rich and diverse construction traditions in Yunnan and Chongqing reveal their historical roots that are radically different from how the concepts of sustainability and environmental design developed elsewhere. In particular it considers how the concept of the sustainable built environment, particular in its cultural and political dimensions, has been associated with the heritage of vernacular buildings in rural and regional buildings in urban areas. It also considers how local shared knowledge and knowledge from academic study have been considered as an asset directing local government policies and planning strategies. On the other hand, these studies also suggest that new market developments have brought new knowledge to professionals and users. Incentive policies and mandatory regulations are needed to achieve overall sustainable development in the context of China's combined central planning and modernised market economy. To apply the different theories and sustainable assessment methods successfully in the local context, this paper argues that the appropriate sustainable methods and assessment indicators to be used, should take account of local knowledge bases that have accumulated in the past.

### **Rural development in Yunnan**

Yunnan is a diverse part of China with representation in the population of 25 out of the 55 officially recognised ethnic groups in China. Villagers' traditional knowledge of designing and building their own houses in the context of special natural environments formed local shared knowledge capital. The earliest systematic studies of vernacular houses of villages and rural

settlements inhabited by these groups were carried out in the 1950s and 1960s. From 1950 to 1963, in order to understand and carry out the classification of the ethnic groups in Yunnan, two stages of identification and investigation of ethnic villages were carried out. More than 1,700 anthropologists, ethnologists, sociologists, architects and artists visited villages to investigate and provide 'scientific' reports about the ethnic group life (Ma, 1999). This was the first time that rural settlements were studied with scientific objectivity; a process that had not been evidenced in previous examinations. The survey focused on the use of traditional materials, construction techniques and characteristics of different houses of ethnic groups, as well as how the vernacular houses had evolved to suit the natural environment, the economic conditions and ethnic group habits. The 'aesthetic' aspects of vernacular houses and habitat settlements, represented by a large number of artistic works, were also introduced to the general public in the country. This partly contributed to creation of Yunnan as a thriving tourist attraction after the 1990s.

Following field studies carried out by researchers in the 1950s, four classifications of houses with different materials and technologies were identified in Yunnan. These were initially considered as representations for different stages of housing development over an extended period of history; in chronological order: Ganlan houses (stilt houses raised from ground), Tuzhang houses with adobe or earthen walls, Jingga houses with overlapping logs serving both as walls and load bearing structure, and Courtyard houses (Figures 1 and 2).



Figure 1. Stilt house and courtyard house. Photos by Yun Gao



Figure 2. Tuzhang and Jingga houses. Photos by Yun Gao and Adrian Pitts.

The study of vernacular houses in the place where they were found was called “studying in a live museum” with examples showing “primitive” houses and more developed ones co-existing at the same time. The purpose of surveying ethnic groups’ houses was to understand better the cultural heritage of vernacular houses and their use in contemporary design in order to inherit and develop the tradition in contemporary architectural design (EGYVH, 1986). The studies also defined the classification of ethnic groups and their villages and houses by

their links with the ethnic group history, religions, and habits. This academic knowledge about ethnic groups and their built environment directed the planning strategies afterwards.

Following the economic growth in the 1980s, unlike villages in coastal areas that developed small industries, the majority of villages in Yunnan had their primary income from agriculture. China’s fiscal systems were a combination of subsidies and taxes. Financial support from the local government and the planning of tourist villages were crucial issues to support development. Local policies and plans inherited the classification methods developed from anthropological studies in the 1950s and 1960s, but with a shift of understanding. Rather than emphasising different forms of houses as representatives of different historical stages, new planning considers all traditional forms of houses having equal cultural values that needed to be protected (Gao, Pitts, Gao, 2014). Surveys of villages for planning strategies after the 1990s used four survey categories for reference as follows:

Table 1: Categories of Village Houses

Categories	Criteria	Policy guidance
First category	Well-preserved traditional houses that have embodied historical and cultural values	Protect
Second category	Traditional houses that are in a derelict state and require renovation	Protect, renovate
Third category	Those using a mixture of traditional and contemporary styles; many of which may have employed contemporary technology and materials but try to imitate the traditional styles at the same time	Recommend to modify
Fourth category	Houses that have used contemporary/modern materials and technologies and had no consideration for traditional forms	Recommend to rebuild

Villages generally have more houses in the third and fourth categories than the first two, because they were influenced by widespread development of urbanization processes, and there was a disproportionate rate of replacement of vernacular style houses by new concrete and brick houses. The majority of villagers adapted to market liberalisation and improved transportation infrastructure by giving up the wooden houses and built with new materials such as bricks and concrete. The traditional knowledge of timber houses was considered less useful, however, farmers in the studied villages still help each other to build and increasingly improve their knowledge of new materials and technologies. The cooperation in housing construction maintained the value of culture and a villager’s sense of belonging over long term development. At the same time, due to the amateur nature of the local construction teams, new houses have common problems of insufficient anti-seismic or thermal performance (Pitts, 2016). Action plans therefore needed to balance between those involving self-reliance and knowledge bases from villagers, and knowledge support from professionals available from outside the village.

When international sustainability assessment methods were first introduced, the concept of ‘sustainability’ was perceived as a new western idea that could be adapted in the Chinese context. Whilst the concept of ‘sustainable design’ as a newly translated phrase from English can contribute to inspire Chinese thinking and help to introduce systematic methods for sustainable design and construction; the knowledge of ‘sustainability’ should not be considered as a totally new imported idea, but one that has its roots and knowledge base in historical change evident in various places (Pitts, Gao, 2014). Lessons can be learnt from previous experience. In cities, the knowledge bases in the past had rather different impacts on development. Chongqing city as a case study will be discussed in the following section.

## **Urban development in cities**

The early central planning system in China had little influence from market forces and as a result the city's social space characteristics were homogeneous and balanced during the 1950s and 1960s. During this period, learning from the architectural approaches favoured in Russia to develop 'socialist content and national styles', the main representatives of important public buildings in different regions were large pitched roofs with monumental scale. With limited materials and funding, however, only small scale constructions were built for general public buildings and the design and construction largely relied on the locally available materials. Building design initially took account of the local climate and topography though during the Cultural Revolution period from the 1970s to the 1980s, there was very limited construction activity. Despite this, architects in different regions had tried to understand and incorporate regional traditions within the given economic conditions. In the context of scarcity of resources, the buildings for those periods were characterized by simple economical design. Pragmatic methods were adopted for regional architectural design and the methods which were known from experience to function adequately in traditional designs were favoured.

One design element here does have better environmental design outcomes, for example, internal courtyards were used in public buildings, learning from traditional houses, to create forms that were not only consistent with tradition but also improved natural lighting and ventilation, and created fluid spaces. Over these periods, in an endeavour to produce regional, national, and indigenous buildings, architects designed with common characters to suit local topography, geomorphology and climate. In this they would make use of local materials, low energy and simple construction methods; in so doing, they also inherited traditional forms and styles, and employed technical, cultural and intellectual methods that were able to provide inexpensive buildings. Similar to the rural areas where shared knowledge bases of farmers in a village have evolved in relation to new materials and technologies, in cities, one of the traditions has been followed is the way to distribute knowledge of good practice. Very often good design prototypes and requirements were promoted as examples for others to follow in the region. This was done by organising design competitions to identify premier design solutions and these were followed by local government policies and planning strategies for enforcement. The mass production methods proved to be efficient to create change, however, rapid developments also led to problems. Limited numbers of rather simplified working models were applied to a whole region, and many of the models lacked consideration of the diversity of the local conditions and were not linked to the preference and local knowledge of the user groups. The rapid urbanization since the 1990s in China has encouraged numerous examples of large-scale construction development in cities, and this has resulted in more varied and sometimes less satisfying quality of buildings and urban spaces.

## ***Urban changes in Chongqing***

Taking Chongqing as an example; the city is surrounded by mountains and defined by the confluence of two rivers: the Yangtze and Jialing Rivers pass through the city, and this forms four terrains inside the city. Due to the limits of the land capacity, buildings built along the hillsides have created the strong visual characteristics of the city (Figure 3). During the period of rapid urban development, many small lanes and steps which used to run up and down the hills have been erased, together with the small houses built on either sides of the steps.



Instead, high rise buildings, large shopping centres, and offices buildings have been constructed along wide new roads that are only suited for car transport.



Figure 3. Buildings along the sloping land in Chongqing, photo by Guo Chen.

Scholars argue that the original small and irregular layout of the public space and vernacular houses reflected the beneficial diversity of urban social life (Yang, 2017). For example, historically houses situated by the river banks and built for working class people were constructed with floors supported by stilts from the lower lying land. Those houses were called Diaojiao Lou (stilt houses) and have been promoted as the representation of local regional buildings. The earliest Diaojiao Lou can be traced back to the Eastern Han Dynasty. Most existing Diaojiao Lou were built in the 1940s and 1950s, however the majority of Diaojiao Lou have now disappeared. As timber structures, those houses could not last long without maintenance and renovation. In 2005, a new commercial street was built to learn from the traditional elevated street form (Liu, 2002), despite building from concrete, its visual forms are similar to the Diaojiao Lou's elevated floors, for visitors to experience the sensation of a pedestrian in the air (Figure 4). A contradiction exists however as those new buildings function as contemporary commercial streets that do not involve the traditional social networks.



Figure 4. Hongya Dong shopping center in Chongqing, photo by Guo Chen.

The phased programmes found in modern design and building schedules also led to separate knowledge bases between designers, manufactures and builders. In the field study in Chongqing, it was found that within a relatively short period of post occupancy period, a relatively large percentage of renewable facilities or materials failed or were changed. For example, plants died on green walls due to the failure of the watering system. It may be easier to design to incorporate new innovative ideas and technologies to meet sustainable requirements, but it takes a much longer period for the construction and manufacturing sectors to gain sufficient knowledge and experience to design and built for the local realities.

Consumers also based decisions on their knowledge and experience to choose and maintain energy saving products.

Different provinces have their own green building assessment criteria for supporting and developing green buildings based on local realities. The “Evaluation Standards of Green Buildings in Chongqing” was published in 2009, to be implemented from 2010. It required that all new public buildings invested in by government must comply with the Green building standard from 2014. However, despite the significant increase of new green buildings, they still account for a small percentage compare to the overall increase of the building sector in Chongqing. To help explain further the situation it should be understood that when the concept and theories of sustainable design were first introduced to China from the West, they were perceived as a new design movement. The general public associated ‘sustainable buildings’ with higher cost because of the better living standards they provided. It is often perceived that higher cost of sustainable buildings may be paid by developers whereas the long-term benefits are considered to go to occupants. Therefore incentive and mandatory regulations are needed to encourage stakeholders. However, this does not mean that previous knowledge from regional design needs to be sacrificed for financial reasons. Traditional regional buildings respected the site condition, took care of daily lives, habits and rituals; various design and plan strategies were also employed to reflect, respect and represent the diversity in the social life of inhabitants. Rather than create a ubiquitous form of large scale skyscrapers and public space, designers and developers can benefit from the past experience. Appropriate use of small neighbourhood divisions and varying building types could be used to enhance the characteristics of the site and community memory, and reflect prevalent diversified society.

## **Conclusion**

This paper has examined some of understandings derived from cultural and social studies of rural settlements of Yunnan and also identified the urban heritage in Chongqing City, which highlighted the importance of knowledge bases that communities and individual had regarding what is called “sustainable development” today.

In rural areas of Yunnan Province where agriculture still provides the primary income for villagers and traditional social networks in villages are relatively intact, the classification of houses derived from the studies of the ethnic groups in the 1950s and 1960s provides knowledge bases for local government policy and planning strategies. Shared local knowledge within the rural communities could be described as a cohesive form of local knowledge capital.

In Chongqing city, before the 1980s, the planning economy system in China and the scarcity of the resources led to economical architectural design and construction methods that suited the local conditions. However, after the 1990s, a large number of building designs in urban areas focused more on the visual and size impacts than on sustainable design methods. At the same time, the concept and theories of sustainable design were perceived as a new design movement introduced from the West, and as a result were often associated with higher costs and luxury living.

This study examined the knowledge distinguishing between designers and builders and between designers and users. Field studies in both villages and cities in China demonstrate that it may be easier to design to incorporate innovative ideas and technologies to meet sustainable criteria requirements, but it takes a much longer period for the construction and manufacturing sectors to gain sufficient knowledge and experience to design and built for the



local realities. Consumers also have preferences and influence actions to accept lifestyles impacting on energy use following knowledge gathered in the past. The combined planned economy and the market economy systems in China therefore requires integrating with the knowledge capital, along with other aspects of environmental and technological awareness in order to gain understanding provided from historic cultural and social studies of regional buildings. Therefore it is argued that the social and cultural aspects of ‘sustainability’ should not be considered as a new initiative, but one that has had its roots in the historical changes of build environments which have occurred in specific places. The social and cultural indicators for sustainable assessment methods can therefore be identified and constructed from studies of the historical transformation of the place.

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