



Investigation and Adaptability Analysis of Traditional Jiarong Tibetan Dwellings in Aba—A Case Study of Zhibo Village

Fang Xu

School of Architecture, Southwest Minzu University, Chengdu, China

Email: 2076347632@qq.com

How to cite this paper: Xu, F. (2022) Investigation and Adaptability Analysis of Traditional Jiarong Tibetan Dwellings in Aba—A Case Study of Zhibo Village. *Open Access Library Journal*, 9: e9144. <https://doi.org/10.4236/oalib.1109144>

Received: July 27, 2022

Accepted: August 16, 2022

Published: August 19, 2022

Copyright © 2022 by author(s) and Open Access Library Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Traditional dwellings constitute the material space for people to survive, which needs to be updated and changed constantly according to people's life needs, so the adaptability is also constantly improved. Through field research, This paper takes Maerkang Zhibo Village as an example to analyze its village site selection, layout and housing characteristics. It also tries to analyze and study the adaptability of the traditional dwellings in Zhibo Village from the three aspects of natural environment, social environment and “concept” existing in the spiritual world of Tibetan people, and puts forward constructive suggestions for the protection, construction and sustainable development of the traditional dwellings of Jiarong Tibetan people.

Subject Areas

Architecture

Keywords

Jiarong Tibetans, Traditional Dwellings, Adaptation

1. Introduction

Zhibo Village is located in Maerkang City, the birthplace of modern Jiarong. It was founded in the Yuan Dynasty and belongs to the fourth group of traditional villages. It is an extremely complex mountain and plateau landform with a geographical space of 102°06'E and 31°55'N. Maerkang City is located in Aba Prefecture [1] which is the cultural heart of Jiarong Tibetan, with a unique national culture. Under the influence of nature, economy and social culture, people's living style, indoor space layout and functional structure of residential houses are

gradually changing to adapt to the progress of the times. However, under the background of globalization and urbanization, the traditional dwellings of Jiarong Tibetan people have absorbed many modern elements, ideas, culture, materials and artisans' skills, and are already faced with the loss of the culture contained in the architecture itself, the loss of construction skills, and the loss of traditional features and other problems. In the process of accelerating globalization, the cultural foundation of Jiarong Tibetan is shaking, so it is very urgent to find a way to inherit and develop ethnic cultural diversity. This paper takes Zhibo Village, a traditional village in Maerkang, as an example to investigate and study it, analyze the location and layout of the settlement and the characteristics of the residential buildings, and summarize the adaptive experience of the local traditional residential buildings accumulated over the years, so that their construction wisdom can be better carried forward and inherited in modern residential buildings.

2. Location and Layout of Zhibo Village

2.1. Location of Village

The residential settlements in Zhibo Village are close to the river, and the river forms a zigzag to bypass an arched terrace. The residential settlements are located at the inner bend of the river (convex bank), which is zigzag (**Figure 1**). This location is conducive to safety and has the effect of storing wind and gathering gas. Because the bend of the river will be affected by centrifugal effect, the convex bank will continuously accumulate large amounts of sediment. The land here is fertile and safe, and is not easy to be eroded by water, so it is suitable for building houses (**Figure 2**). While the concave bank is constantly washed by the river, and the sediment will be eroded, which will easily lead to flood disasters. The site selection of its settlements follows the principle of “behind the

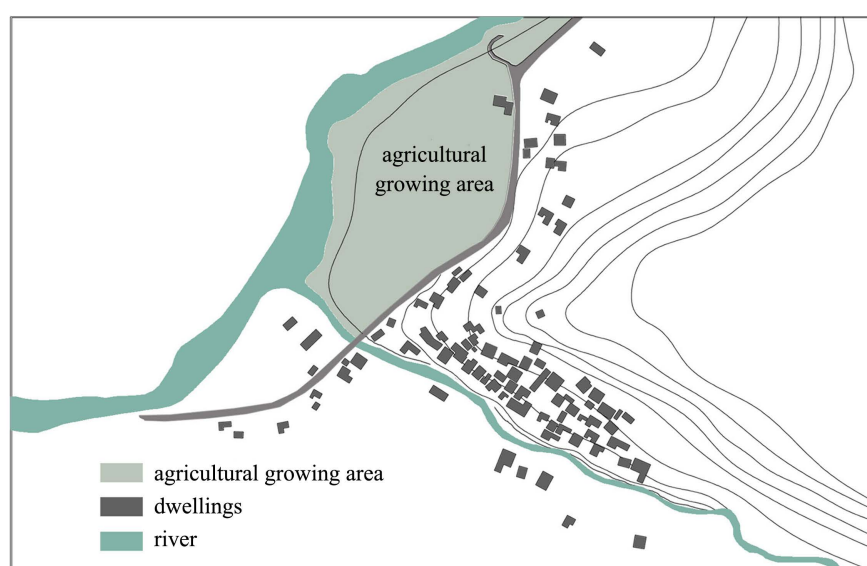


Figure 1. General plan of Zhibo Village (source of the picture: owner-drawing).

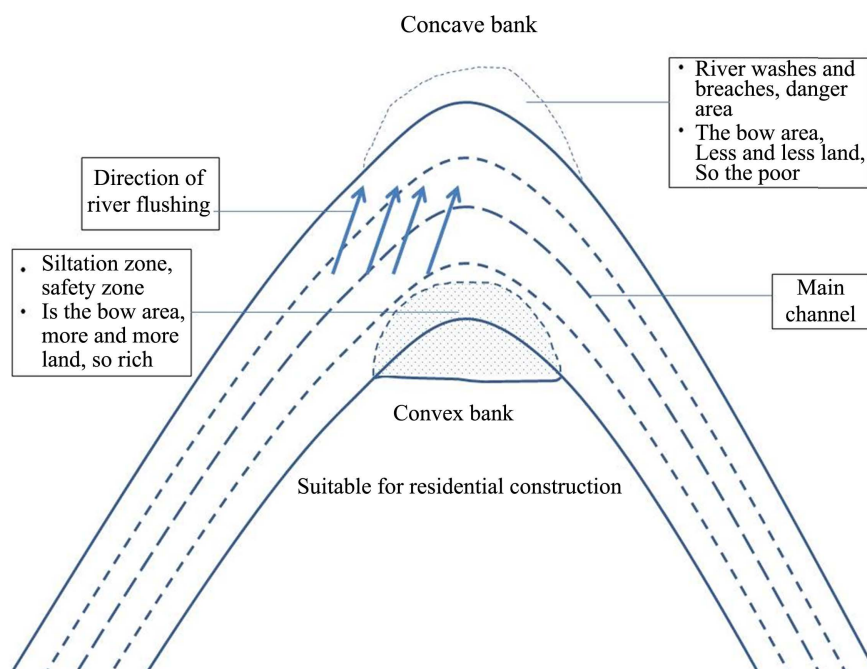


Figure 2. Schematic diagram of river scouring (source of the picture: modified in Yi Studies and Built Environment Studies).

mountains and facing the water”, respects nature and gets along with it in harmony, reflecting the idea of “harmony between nature and man”.

2.2. Village Layout

Due to the limitations of natural geographical conditions, different villages have different spatial layouts, but there are certain “regularity” and “similarity” in these differences. Almost every Tibetan village has a temple, and the dwellings in the village are either built around the temple as the core to form a centripetal settlement, or the temple is placed on the top of the whole village, which is enough to show people’s reverence for god.

Through field investigation found that Zhibo Tibetan village due to the limitation of natural conditions, land area is relatively short, settlement between into group growth pattern, in order to save more arable land, form relatively concentrated, building density is larger, stockade with “cohesion centripetal” group characteristics, internal structure is relatively complex, showing a close layout.

3. Characteristics of Residential Dwellings

3.1. The Characteristics of Spatial Layout

Different floors are divided into different functions according to local people’s living needs, living habits and religious principles of “god, human and animal”.

The ground floor for livestock pens and utility rooms, people in order to guard against theft, its external walls do not open Windows, only a small air hole (**Figure 3**). With the change of the times, the livestock pens have been separated

from people's living, and they are arranged independently in the independent house next to them, so that the indoor environment is cleaner and quieter.

The middle floor is used for the kitchen and bedroom. The kitchen, located on the second floor (Figure 4), is the core activity space. There used to be a fire in the kitchen, but now the fire has been replaced by a stove, also using the heat of the stove to increase the temperature of the room.

The top floor for the scripture hall, Lama housing, dam, and so on. Dam is an indispensable part of local dwellings. In Maerkang area, there are many mountains and little flat land, so the dwellings are built to retire, and the dam is set aside for drying crops, which not only saves land but also solves the drying problem.

In unmodified old buildings, the connections between rooms on each floor are often serial. In order to adapt to life, convenient use, people will comb the relationship of each space, the function is improved, so that each room has a separate streamline, and is no longer a series of access.



Figure 3. The ventilation hole in the ground floor (source of the picture: the author shot).

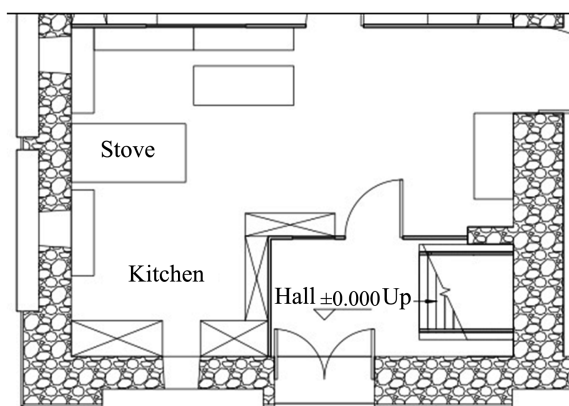


Figure 4. The main room (source of the picture: drawing by the research team).

The stairs inside traditional residential buildings have no counterpoint relationship, and the arrangement is chaotic and arbitrary. This kind of deliberate dislocation of the stairs between the upper and lower parts should be in safety consideration, which can effectively limit the scope of activities that are not familiar with the interior of the building and increase privacy [2]. Most modern buildings have been transformed into modern forms of stairs in order to facilitate the use of their internal stairs.

3.2. The Wall Feature

The traditional residential walls in Zhibo Village are characterized by vertical inner walls and reduced thickness of outer walls, which greatly enhances the stability and seismic performance of the building structure [3].

The external wall is made of local stones and mud, and the wall is made of large stones and small stone pieces to fill the seam. The vertical dislocation is connected to avoid forming a seam. The walls of residential houses are thick, and the bottom wall is 800 mm thick. The four corners of the exterior wall shall be reduced in thickness, and the degree of reduction shall be controlled by local experienced masters according to the terrain and slope. If the terrain is flat, about 20 - 30 cm should be reduced, and if the terrain is slope, at least 50 cm should be reduced. The wall with a large slope should be reduced less, which can enhance the stability of the building and prevent it from collapsing. Each layer is built from both sides to the middle, which not only needs to keep the thickness of the outer wall reduced vertically, but also needs to maintain a certain decreasing relationship in the horizontal direction until it meets the middle (Figure 5). The purpose of this cohesive masonry method is to improve the stability of the external envelope inward [4].



Figure 5. Wall elevation radian (source of the picture: the author shot).

The thick stone walls reflect the unique facade texture of the local dwellings, and also make the stone walls thermal stable, which has good heat storage and insulation performance. The form of gradually decreasing thickness of external walls and the method of building walls stacked with stones are summed up by local craftsmen based on the construction experience on the spot and the construction wisdom handed down by artisans for many years.

4. Adaptability Analysis of Residential Buildings

4.1. Natural Adaptation

Zhibo Village with mountain ravines, steep terrain [4], within the territory of east-west high low, relatively backward in technology and material deprivation s, Tibetan people living here in the face of such complex harsh natural conditions, both in terms of climate, topography and building materials have accumulated a set of unique construction experience, adaptability to the natural environment plays an important role. It reflects people's ability to adapt to the natural environment.

1) Adaptability of Dwellings to Climate

"Meteorological determinism alone cannot explain why houses have so many forms, but weather is undoubtedly an important force in determining form. In the absence of advanced technology or limited ability to control his environment, man has no way of mastering the nature around him but to adapt to his environment." [5]. Rapoport argues that climate can act as a corrective to housing patterns.

Zhibo Village has abundant sunshine and abundant solar energy resources. In the process of adapting to the environment and living in harmony with nature, the local residents have taken corresponding measures to fully adapt to the "natural" climate conditions in order to create a suitable living environment [6]. The first is the use of solar energy. Local residents can use solar water heaters for daily washing and livestock feeding, change the traditional way of obtaining hot water by burning wood, and install solar lamps on roofs or courtyards to light people at night, reducing the consumption of electricity. By making full use of solar energy, the ecological nature of energy utilization is well reflected.

2) Adaptability of Residential Buildings to Landform

The Tibetan people respect or Revere the natural environment very much and have a simple ecological view of nature. Rather than transforming nature, they are more willing to adapt to nature and the environment and make full use of the natural terrain when building.

Due to the terrain, the Jiarong Tibetan architecture has to be built according to the mountain, which has become a major feature of Jiarong Tibetan architecture. How to adapt to the mountain and make use of the terrain is the primary problem it faces.

There are generally two ways to build houses. One is to carve out enough flat land along the contour line and build houses on the flat land. The buildings are

arranged meandering along the contour line to form meandering neighborhoods and roads. Another method is to build houses perpendicular to the contour line. According to the terrain and slope, a number of terraces are leveled out on the slope to build houses on the platform [7].

3) Adaptability of Folk Dwellings to Building Materials

In the era of low technology level, local natural resources constitute the important regional characteristics of local dwellings. In the development and inheritance from generation to generation, local dwellings have formed the construction method and concept of rational use of local materials and full use of the characteristics of local materials.

In the construction of the house, local materials, a lot of use of local natural soil, wood, stone and other resources, all the construction materials used are natural and pollution-free. In addition to being widely sourced and easy to use, these building materials can be reused twice or more and can be returned to nature; When building a new house, no matter whether it is wood or stone material can be torn down from the old house similarly.

a) Wood

Wood is generally used as beams or columns, doors, windows, stairs and other components in the local traditional residential houses. The beams and columns are selected from the local mountains with a specific black fir. The beams and columns are generally round sections with a diameter of 200 mm, and the column diameter varies with the span. Generally, the beam diameter of 6 meters span is 40 centimeters, and the beam diameter of more than 3 meters span is 30 centimeters.

b) Soil

As the main material in local residential buildings, loess has good adhesion and high strength, and acts as mortar to bond and level. As the most primitive building materials, soil is easy to tamp into shape, and has the characteristics of low cost, simple construction, cold insulation, and so on. It is often used for building exterior walls, paving floors and roofs, and its advantage is to make the building sound insulation and heat preservation effect better [8].

c) Stone

Stone material is a kind of natural heat storage material, its heat transfer coefficient is small, and thermal resistance is large. It can improve the insulation, heat insulation and sound insulation performance of the wall, so the heat is not easy to pass into the room in summer. In winter, because the stone has thermal delay, heat is not easy to come out, the stone wall absorbs sunlight heat during the day, and radiates heat inward at night, which can supplement winter heating. It makes good use of the thermal inertia of the stone to adapt to the local climate characteristics, warm in winter and cool in summer [9].

d) Animal and Plant Fibre

In order to increase the viscosity of the loess, so that the soil on the wall is not easy to fall off, in the loess inside will add pig hair, straw, wheat grass and other animal and plant fibers play a role in pulling. Straw and tiny sticks are also used

as flooring materials, which have tiny gaps between them to provide ventilation and insulation and prevent dirt from falling through the purlins. Due to the natural material itself has a good temperature strain capacity, coupled with the tiny gap of plant fiber to act as the air layer, effectively reduce the heat loss, play a good role in heat preservation and storage [10].

4.2. Adaptability to Society

With the progress of society, the growth of economy and the continuous integration of culture, the construction materials have been innovated, and the concept of human settlements and residential buildings have changed. Such changes are also gradually adapting to people's new production and life. The more developed and convenient the traffic is, the greater the change will be. For the reason, the closer the traffic is to the urban area, the more convenient the materials selection and transportation of buildings are, and the greater the influence of foreign culture will be.

The roof and window of Zhibo Village dwellings have great changes. The roof adopts various styles of colored steel tiles, the window area is increased, and the material is changed from the original wooden material to aluminum alloy and glass. The top terrace is part of the dwellings added into the sun room. The distribution of many interior Spaces and the arrangement of kitchen utensils have also changed, the former fire pond has been replaced by a stove, the kitchen and living room have been separated. However, the main functional Spaces are still reserved. For example, the top floor is used as the sutras, and the kitchen is usually on the second floor, and it uses modern kitchen utensils, electricity or gas as fuel.

4.3. Adaptability of Belief

People in Tibetan areas are religious believers. Most Tibetan villages have temples or Tusi's manor, which are generally located in dangerous terrain, the center of stockades or the best location. They are the most important public places in the whole village. While ordinary houses were either clustered together or built around temples, temples and manor were in the dominant position. The North Watchtower and Labrang Monastery of Zhibo are located at the highest point of the whole village, which reflect the obvious relationship of subordination, attachment and enclosure between people's houses, temples and manor [4].

In terms of architectural scale, temples and Tusi's manor are much larger, and the manor basically has watchtower symbolizing power. In terms of the type of construction system, some temples have unique saddle roof, and some manors have sloping roofs. These practices could not be adopted in the ordinary residential buildings of the old society.

5. Conclusion

Through the study and analysis of Zhibo Tibetan village, it can be concluded

that the location and layout of the village well reflect the characteristics of adapting to nature, adapting to the environment and living in harmony with nature, and the exquisite construction skills of the Tibetan ancestors are displayed from the residential features. The adaptability of residential buildings in terms of nature, society and concept not only fully reflects the influence of the environment on people and the adaptation of buildings to the environment, but also reflects the construction wisdom of local craftsmen. Generally speaking, the construction mode and adaptive characteristics of Zhibo dwellings reflect the experience of Jiarong Tibetan people through continuous accumulation and summary for thousands of years. Under the background of multi-culture convergence, these regional original ecological architecture concepts are worth to be recognized and learned.

Acknowledgements

Thanks to all the students who participated in the research and all the warm-hearted people who helped in the process.

Conflicts of Interest

The author declares no conflicts of interest.

References

- [1] Wang, Y. and Liao, Z.X. (2021) Study on the Form of Traditional Tibetan Villages in Jiarong Based on Landscape Security Pattern: A Case Study of Zhibo Village, Malkang City. *Acta Ecologica Sinica*, **41**, 1209-1220.
<https://doi.org/10.5846/stxb202002190291>
- [2] Su, Y.J. and Jiao, Z.R. (2019) Discussion on the Space and Behavior of Tibetan Dwellings in Jiabarong, Aba, Sichuan. *Building Materials and Decoration*, No. 9, 63-64.
- [3] Zhou, F.Y. and Hu, G.H. (2017) Conservation and Development Strategies of Traditional Villages from the Perspective of Genes: A Case Study of Daiji Village, Malkang City, Sichuan Province. *Rational Planning for Sustainable Development—Proceedings of 2017 China Annual Conference on Urban Planning (18 Rural Planning)*, 46-60.
- [4] Zhu, R.Z. (2012) Research on the Architecture of Tibetan Dwellings in Maerkang Zhibo. Master's Thesis, Xi'an University of Architecture and Technology, Xi'an.
- [5] Rapoport and Zhang, M.M. (1979) Housing Form and Culture. Taipei Jing and Xiang Press, Taiwan, 101.
- [6] Yang, Z.P. and Liu, M.Y. (2014) Analysis on Types and Influencing Factors of Traditional Human Settlements in Guangxi. *Coastal Enterprises and Technology*, No. 6, 32-35. (In Chinese)
- [7] Huang, J.J. (2009) Research on the Adaptability of Tibetan Architecture in Gannan Tibetan Area. Master's Thesis, Xi'an University of Architecture and Technology, Xi'an.
- [8] Shi, X.N., Hu, D. and Chen, J. (2014) Ecological Adaptability Analysis of Tibetan Dwellings in Western Sichuan Plateau. *Sichuan Architectural Science Research*, **40**, 314-318.
- [9] Xia, J. and Zhou, H.M. (2018) Investigation and Analysis of Ecological Adaptability

of Traditional Residential Buildings in Southern Hubei: A Case Study of “The First Ancient Residential Community of Chutian” in Baoshi Village. *Hubei Social Sciences*, No. 5, 192-198.

- [10] An, Y.Y. (2008) Climate Adaptation of Tibetan Rural Settlements in Gannan. *Gansu Science & Technology Review*, No. 2, 52.