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The Landscape Change of Qiang's Settlements in the Upper Reaches of Minjiang River after Wenchuan Earthquake

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ABSTRACT

Qiang ethnic group is one of the oldest ethnic groups in China, mainly living in upper reaches of Minjiang River in southwest of China. Qiang's traditional settlements are valuable cultural heritages. Unfortunately, most of Qiang's settlements were damaged during Wenchuan earthquake in 2008 in different degree. After the earthquake, settlements were reconstructed in different ways. The landscape of Qiang's settlements had been changed greatly by dual influences, the destruction of earthquake and reconstruction after earthquake. Researching the changing process of Qiang's settlements landscape has great significance to the protection of cultural heritage and the inheritance of culture, especially in the period after earthquake. At first, Qiang's settlements are classified into five types with typology method after field research, according to the different degree of destruction and the different model of reconstruction. The five types are settlements restored to original forms in original location, settlements rebuilt to traditional forms in original location, settlements transformed to traditional forms in original location, settlements rebuilt in new location according to unified planning and settlements rebuilt in new location by villagers themselves. Secondly, the five types of settlements are compared with traditional settlements from several aspects including geographical environment, location of settlements, forms of settlements, space structure, building materials and construction technology, in order to research for the change of the landscape characteristics. Finally, the changing processes of each type of settlements landscape are analyzed. The change of villagers' demands for settlements space are analyzed with the changes of their production model, life style, traditional customs, cultural communication, national religion and spiritual pursuit. Based on this analysis, the main factors influencing the changes of Qiang's settlements landscape are summarized.

1. Introduction

Qiang ethnic group is an ancient group with a large population in China, which played an important role in the history of Chinese nation. And it is regarded as an important part of Chinese nation. The ancient Qiang people lived a nomadic life originally in the north of Qinghai-Tibet Plateau centered around Qinghai Lake. With the replacement of various dynasties, Qiang people moved to different places in China. Some tribes were powerful, others were weak. Some subsisted mainly on agriculture ,others lived on livestock breeding. Some were assimilated by the Han nationality, others combined with aboriginal inhabitants. Finally, only one group of Qiang people who live in the upper reaches of the Minjiang River keep the basic characteristics of Qiang nationality. According to the fifth national population census of China in 2001,the population of Qiang nationality is about 306,100. More than 80% of them live in the upper reaches of Minjiang River area, which is located in the Southwest of China, including a few administrative districts ,such as: Wenchuan , Maoxian, Songpan, Beichuan and so on, with an area of about 12,181 square kilometers (Lu Li,2010) Refer to Figure 1.

As we know, Wenchuan earthquake occurred in 2008, its epicenter was not a point but a line started from YingXiu of Wenchuan County to Beichuan county, which covered almost entire area of Qiang nationality (Figure 2). The earthquake killed about 30,000 Qiang people, accounting for 10% of the total population of Qiang nationality . Affected by the earthquake, most of Qiang's settlements and their natural environments were damaged in different degree. Before the earthquake, there were many Characteristic Qiang's settlements which were located in the high mountains and valleys of the upper reaches of the Minjiang River. The ancient Qiang people used the local materials and traditional craft to build them. Most of them had a long history over hundreds or thousands of years, for example, according to the survey, the Buwa village in Wenchuan has a long history over 2500 years (Expert group of post-disaster scientific reconstruction Wenchuan County,2010). Since 2008, the repair and

Figure 1 *Minjiang River and the main location of Qiang*

reconstruction of the settlements have been kept doing. The modern design technique, construction technology and the new materials have been used to reconstruct the settlements. In the process of reconstruction, the traditional culture of Qiang ethnic group has encountered the foreign culture. Because of it, landscape changes have taken place in Qiang's settlements during the process. It is significant to study on the landscape changes in Qiang's settlement for the dynamic protection and cultural heritage of Qiang's traditional settlements.

2. Selection of Case Study and Research Approach

2.1 Case Study

The research is aimed at the changing progress of Qiang's settlements landscape. After preliminary investigating the settlements in upper reaches of Minjiang River, five couples of settlements are chose to in-depth investigation according to the classification of settlements rebuilt. They are Buwa Village, Luobo Village, Xiuxi village, Taoping Village and Aer Village (Figure 3). These settlements are located in different alpine valleys in upper reaches of Minjiang River. They all had complete features as Qiang's traditional settlements, and they represent five different models of reconstruction after Wenchuan earthquake. Except for Buwa Village, the other four villages are all composed with two parts, an old one and a new one, which can be compared with each other.

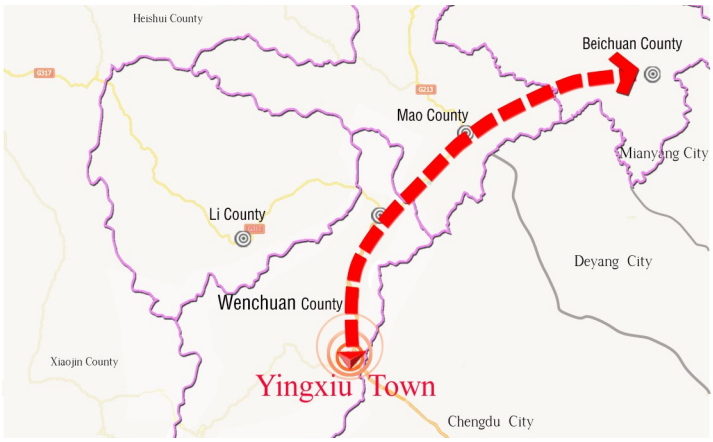

Figure 2 *Center of Wenchuan earthquake*

2.2 Research Approaches

The specific approaches include the following five steps: analyzing the constituent elements of Qiang's traditional settlements landscape from documents; doing fieldwork research to Qiang's settlements and classifying Qiang's settlements according to the different degree of destruction and the different model of reconstruction by method of typology; classifying and comparing different types of settlements landscapes by comparative analytic approach, analyzing the main characteristics of change according to the constituent elements. analyzing the generation procedure of every type of settlement landscape after reconstruction from four aspects: destruction by Wenchuan earthquake, effect of reconstruction, multicultural communication and residents' demands; summarizing the influencing factors to the change of settlements landscape.

3. Landscape Elements of Traditional Qiang's Settlement

3.1 Geographical environments

In the upper reaches of the Minjiang River, Minjiang River and its branches cut the edge of the Tibetan Plateau, causing many high mountains and deep valleys, which are called "valley" by local Qiang people, such as, Longxi valley, Puxi valley, Heihu valley and so on. Qiang's settlements mainly are located on the high mountains and riversides of each valley. The environments of each valleys usually have three remarkable characteristics. Firstly, their locations are remote, and they have difficult terrain, because of them it was very easy to defend in ancient times. Secondly, there are farmland, forests, grassland and other production resources in each valley, so it is very easy for Qiang people to form many self-sufficient units by using those resources. Thirdly, there are many high mountains between the valleys, so the transportation is difficult. It makes the villagers of each valley to be relatively independent groups, because of that it is easy to preserve the respective national characteristics (Mingkewang, 2008).

3.2 Site selection of settlements

The reasons why Qiang ethnic group migrated to the upper reaches of the Minjiang River area were complex, the war was one of the main reasons, so the defense was the main factor for Qiang ethnic group to choose location of settlements. The source of the production , living material , complex geographical environments and the social structure were also important questions, which the ancient Qiang people must face to. In addition, the wizard who has the leading position in Qiang's religion could affect site selection. Most of Qiang's settlements were located in river valley facing the east, named sunshine mountain of Qiang ethnic group. This site is very beneficial to growth of crops because of enough sunshine, also it is conducive to help Qiang people to keep physical and mental health, so later villages are located mostly in such kind of place. Therefore, site selection of settlements was

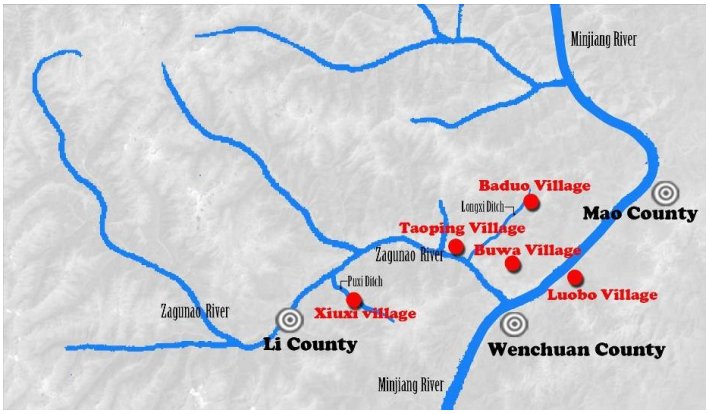

Figure 3 *The locations of settlements chose to case study*

determined by five factors, including: water source, arable land, defense, climate and beliefs. Usually Qiang's settlements are located in the river valleys, hillsides, high mountains, thus forming different layout. The existing site selection of settlements includes five features: water security and stability, adequate land for agricultural and animal husbandry, good defense situation, nice climate, spiritual needs of Qiang people (Lu Li,2008).

3.3 Settlement patterns

When a settlement began, it included only one family and small number of residential house. With the increase of family members, it gradually expanded, the whole settlement was usually constituted by one or several large family with close relationship. Therefore, buildings in each settlement were concentrated layout and connected one another, the neighbors shared the gable, so the roofs of the same settlement were connected, reflecting strong integrity and cohesion of Qiang's settlement. In addition, because it was not very safe in ancient times, Qiang people had strong defensive consciousness, self-discipline, a strong cohesive force, so settlements appeared characteristics of defense, cohesion and integrity. Usually, each settlement had some high towers, which were the symbols of the settlement, they could be used to defense the enemy. The buildings in the settlement were built along the contour and connected by the irregular alleys, so it looked disordered, just like the labyrinth. If out-comers went to the settlement ,it was very easy to get lost.

3.4 Settlement Spaces

The settlement spaces refer to the external spaces of the settlement, including four elements: boundary, ally, sign and building. Boundary refers to the division line between the settlement and the environment, and can be divided into the material boundary and the psychological boundary. Material boundary can be defined boundary line between the settlement and the surrounding natural environment or other settlement, its representations includes the building wall, the gate of the settlement, the towers in the settlement, temples near the settlement, clear ownership forest land and so on. Psychological boundary refers to the psychological scope and limits of the settlement, usually including the valleys and the nearby mountains of the settlement. Most of Qiang's settlements had no clear boundaries, but villagers usually psychologically had a clear scope of the settlement. For example, when Qiang people talked about people of Puxi valley, they called them Puxi valley's people. The alleys are not only the internal paths to connect each family, but also very important outdoor space of the settlement. Villagers in the settlement can visit each other through the alleys. In addition, they are also an important communication space of villagers. The settlements in the upper reaches of the Minjiang River have plenty of sunshine, so the villagers like to bask in the sun sine, do some sewing and chat with each other on the alleys in front of their house. The sign refers to the building, structure or ancient tree that can represent the settlement in the process of settlement cognition. In ancient times, it was very important for Qiang's settlements to defend, usually towers were built in the open place or port, they became the hallmark of the settlement with strong identifiability. In addition, Qiang nationality worship the god and the nature, white stones usually are consecrated at the roofs of the settlement, also another monumental structure is built at the roofs, it can also be regarded as a typical mark of Qiang's settlements. Almost every settlement has a tree called "hamadryad", which is located on the hill behind the settlement, or at the entrance to the settlement, the villagers will regularly worship. Buildings include tower and house. Architectural elements which can affect outer space of the settlement include architectural form, scale, material, the relationship between adjacent buildings and the relationship between buildings and alleys. Towers are the tallest buildings in the settlement. They commonly have the structure with large lower part and small upper part, some are 7 floors, some are 8 floors, the highest one has 12 floors, and they play a leader role in the whole settlement because of their height. Qiang people live in the houses, the tallest one is up to five floors, most of the houses are 3 floors. They are built on the hills, so their bases are not at the same height, but their roofs have the same contour. The first floor is used to raise animals and pile up woods. The second floor includes several bed rooms. The third floor is the sunshine deck. There is a small room to store at the side of hill on the deck. The walls from the bottom to the top have different width, the lower part is wider than the upper one, the building looks like a trapezoid, when people see it, they will feel stable.

3.5 Building Materials and Technology

The villagers used raw materials from the near mountains to build the settlement, for example, rubbles, clays, woods etc. Some mountains were rich in rubbles, villagers could use them as the main material to build walls and roofs, supplemented by poles, woods and grasses, such as Taoping Qiang village in Lixian, their houses which were built by rubbles were still well preserved after the earthquake. Some mountains were lack of stones and rich in yellow muds, the main structures of both houses and towering towers were built by yellow muds, such as Buwa village in Wenchuan, the whole settlement used yellow muds as the main building materials. The settlements were built by the traditional building technology, no drawing, no hanging, no column support, only by artisans superb technology and experience, but after the completion the buildings were very stable.

4. Human Geography of Qiang Settlement

After Wenchuan earthquake, most Qiang's settlements suffered different degrees of damage. Some of them were destroyed, some suffered damages partly, others were only slightly affected. According to the different degrees of damage to the settlements, the central government asked some provinces to help local villagers to repair and reconstruct their settlements. Based on some factors, including: location, rebuilding the main structure, landscape pattern, landscape features, the reconstructions of Qiang's settlements are divided into the following five types (Xiaofei Wen, 2012):

4.1 Restoration of Settlements

In the earthquake, some settlements suffered damages partly, but they were not destroyed totally, their base environments and basic patterns didn't change obviously. So such kind of settlements can be reinforced and repaired bases on the original building foundation and materials (Mingying La,2009).

4.2 Settlements rebuilt to traditional forms

Some settlements damaged seriously or collapsed totally in the earthquake, but the original base can be available, they can be reconstruct at the original place. Suck kind of reconstruction for Qiang settlements aims to develop the national culture tourism.

4.3 Transformation of Settlements

Nontraditional mode of Qiang settlements were built before the earthquake, using modern materials and modern technology, most of them were 1 to 3 layers of rural residential houses which were brick-concrete structure. Unfortunately, they suffered different degree of destruction in the earthquake. after the earthquake, villagers repaired the houses or reconstructed at the same place by the government subsidies. After the reconstruction new business model appeared for Qiang's village tourism, which was organized by government, company and farmers together. By using this model, settlements were planned uniformly to transform the landscape and improve infrastructures in order to develop special tourism of Qiang's village.

4.4 Rebuilding of Settlements According to Unified Planning

The settlements must be reconstruct at different places if they suffered such three different situations. Firstly, the settlements were completely destroyed in the earthquake. After the earthquake the original settlement needed longer time to repair. In addition, damage of the original settlements was not serious, and it has high value of culture and protection. Finally, the base of settlement was destroyed, and it was not suitable to reconstruct at the original place. For the first two cases, the new settlements were planned uniformly to reconstruct near the original ones, during the process of reconstruction, villagers could exchange their lands to construct their new houses. For the third case, because the land which can be used to reconstruct is very limited in the upper reaches of the Minjiang River area, if there was no enough land near the original villages for reconstruction, settlements must be reconstructed at other different counties, the village villagers must migrate totally.

4.5 Settlements rebuilt in new location by villagers themselves

Before the earthquake, some settlements were located at higher mountains, their living condition was very difficult, such as: bad traffic, water shortage and so on. After the earthquake, facing the opportunity of reconstruction, the villagers chose a new location to reconstruct the settlements in the permission of funds and land, usually near the highway.

5. Case Study of Qiang's Settlements After Earthquake and Analysis of Landscape Change

Figure 4 *The tower, alley and "wood-god" in Buwa Village after reconstruction*

Five settlements were selected for the case study based on different condition as discussed earlier. The characteristics and regularities of settlements landscape change are found by field research and comparative analytic approach. In order, the five settlements are: Buwa Village, Luobo Village, Xiuxi village, Taoping Village and Aer Village.

5.1 Buwa Village

Buwa Village is a typical settlement restored to original forms in original location. Compared with the old village before earthquake, new Buwa Village was changed little on the architectural style and landscape pattern. It remains for traditional Qiang settlement. Buwa Village located in a high mountainside near the center town of Wenchuan County, which altitude is 2200 meters. The buildings in Buwa Village were damaged seriously in the earthquake, which were all built of yellow mud in the mountain. The top of towers collapsed in the earthquake while some houses were damaged partly. The three towers were restored to original form after earthquake. Some villagers whose houses were destructed seriously moved out to a new location, while the other villagers restored their houses to original style. Road system in Buwa village remains for the old one, but the alleys was broadened and upgraded. Besides of the towers, there is another important landmark landscape in the village- an old big tree, which is respected as "wood-god" guarding their home. Under the ole tree, the whole of the center town can be overlooked (Figure 4).

5.2 Luobo Village

Luobo Village is a typical settlement rebuilt to traditional forms in original location. Some houses and spaces were restored partly after original settlement was researched in depth. According to different historical periods and different degree of damage, 10 houses were selected to be models. Unified approaches of restoration and

Figure 5 *The Old Luobo Village (left) .* ***Figure 6*** *Museum in Luobo Village (right)*

reconstruction were put forward after research, providing reference for the others. According to the different value and damage degree, there are six kinds of solution to rebuild residences: overall restoration, reconstruction to original forms, style coordination, ruins exhibition, partial maintenance, and complete demolition (Yang Bao, 2009). In order to accommodate the development of tourism and the demand of modern life, the settlement reconstructed has been changed largely in layout, space form and function, compared with the original settlement. However, the settlement reconstructed is harmonious and unified to the original one in architecture style, landscape environment basically. It is still the type of traditional Qiang's settlement.

5.2.1 Geographical environments

Luobo Village is located in a plateau on a high mountainside in Wenchuan County, which altitude is more than 1900 meters (Figure 5 and 6). It is dry and sunny throughout the year there.

5.2.2 Settlement location

The new village is rebuilt on the land of the original one. Some important or typical buildings are reconstructed on the original sites as the old ones.

5.2.3 Settlement patterns

The form of new village is similar roughly as the original one, but it has hardly defensive faction, while it represents lower cohesion and integrity than the original one. New Luobo Village constructed for tourism is composed of three parts: inns, national culture Museum (Figure 6), earthquake ruins. Some houses destroyed in the earthquake are retained as a memorial landscape, some houses are built as national culture displaying space, and most of the rest houses are reconstructed as folk inns for tourism.

5.2.4 Settlement spaces

The four elements of settlement space have been changed slightly. Before the earthquake, there are two kinds of alleys in the village, one located between two columns of architecture, another goes from beneath of the houses. There are full of variety in the alleys with alternation of light spaces and dark spaces. However, only one kind of alleys is remained in settlement after reconstruction, so the spaces become simpler than the original ones. Houses are no longer linked together as the original houses, while the roofs are separated from each other. In order to adapt to the demand of tourism, each building is independent to a certain extent, and most of them have a closed courtyard. For the needs of modern life, the distance between two houses is increased .There are very small windows in the original exterior walls for defense needs, while the scale of windows is increased in new houses for better lighting and ventilation (Figure 7).

5.2.5 Materials and technology

The original houses were built with local yellow soil (clayey soil) and wood as the main raw materials. Using the traditional technology, walls were constructed by solid masonry made up of yellow soil with the help of boards. The new houses were reconstructed with astigmatic design，using modern technology and materials such as steel reinforcing wall. Nonetheless, the landscape style of new village is similar to the original one, because local yellow earth was still used on outside surface of walls (Figure 8).

Figure 7 *The alley and houses in new Luobo Village*

Figure 8 *Applied technology and materials in new Luobo Village*

5.3 Xiuxi Village

Xiuxi Village is a typical settlement that is transformed to traditional forms, which is the original form.

The old village had almost been abandoned before the earthquake, while a new village has been built at another location near the old one. The new village which was partly damaged by the earthquake has been reconstructed for several years after the earthquake. Basic principle followed for the earthquake reconstruction that is the layout of the village are remained as it before earthquake. The villagers mainly built their houses themselves with assistance from government, so the new village shows some traditional characteristics in several aspects, such as architectural layout, materials and technology, architectural form, detail structure and decoration, etc. The settlement landscape has traditional style.

5.3.1 Geographical environment

Xiuxi Village is located in a high mid-level in Pu Stream valley which is a tributary of Minjiang River in Li County. There is a typical mountain valley at an altitude of 2500 meters.

5.3.2 Settlement location

The new village is about two hundred meters near the old village and stands on a higher slope. The location of the new village is near the cultivated land and close to their "wood-god" on the mountain behind the village.

5.3.3 Settlement pattern

The layout of new village is less compact than the old one. The new village covers an area over two times of old village. The houses connected with each other closely in old village all conform to contour line and array as steps (Figure 9). The houses in new village also lay out on the slope adapting to the terrain, but the layout of the new houses are looser than old houses. Most new houses have separate courtyard, while some houses share common gable wall (Figure 10).

5.3.4 Settlement spaces

The old village has not clear boundaries and the villager's cultivated land is around the houses. On the contrary, there is a gate built as a clear symbol in front of the new village. The villagers all have strong territorial consciousness to their villages, forest and cultivated land. The narrow alleys in old village are composed of two groups, one parallels the contour and another is vertical to the contour (Figure 11). The roads in new village are wider. A four meters wide road was constructed through the village, while several alleys lead to every house. There is not any open space for public activities in old village. However, there is a square in the center of the new village and a parking lot on the edge (Figure 12). The houses built with sheet stones in old village were all connected with each other. Most of the houses in new village are independent and have gap between each other.

Figure 9 *The pattern of old Xiuxi Village*

Figure 10 *The houses in new Xiuxi Village*

Figure 11 *Alleys in old Xiuxi Village*

Figure 12 *Square in new Xiuxi Village*

Figure 13 *Settlement Pattern of old Taoping Village*

5.3.5 Materials and technology

Sheet stones and yellow earth in the mountain were used to built

Figure 14 Settlement Pattern of new Taoping Village

houses in the old village. Most of the houses in new village are constructed by traditional technology with Sheet stones and cement mortar, while some of the new houses were built with bricks.

5.4 Taoping Village

Taoping Village has two parts, the old village and the new one. The new village is a typical rebuilt in new location according to unified planning, which was built by government without local residents' involvement. Due to the influence of many factors, The settlement after reconstruction has been changed in architectural style, a compound style composed of traditional and modern elements. Comparative analysis is done to the old village and the new one.

5.4.1 Geographical environment

Taoping village is located in the valley of Zagunao River which is a tributary of Minjiang River in Li County. It is 1440 meters above sea level. Because the valley wind influences crop growth, arable land surrounding is very limited.

5.4.2 Settlement location

The old Taoping Village is located in one side of a main road along Zagunao River. The land is gentle slope topography more than 10 meters above the road. The new village near the old one and adjacent to highway, The land is flat and lower than the old village. The buildings parallel to the road.

5.4.3 Settlement pattern

The old Taoping Village center is on the three high towers. The house lay-out compactly embodies a strong integrity and cohesion. According to the historical data, defense was considered to the most important faction at the beginning of construction. The villagers took measures adapted to terrain conditions when they built their houses, so the old village shows irregular form but integrated so closely with the slope as an organic whole (Figure 13). The new village located in the open ground near the old village was constructed with unified planning after the earthquake, so the new houses arranged in parallel are orderly and regular (Figure 14).

Figure 15 *Spaces in old Taoping Village*

Figure 16 *Spaces in new Taoping Village*

5.4.4 Settlement spaces

Without any artificial boundary, the old village has natural boundaries such as roads and steep mountain. According to fieldwork, settlement has had a tendency to expand within the scope of the natural boundaries before the earthquake. The new village has clear boundary composed of gate, square, road, stone steps and mountain together. It is limited so clearly that there is hardly any room for expansion outside. The old village has special and prominent sign of the three towers, while the new village is identified mainly by the gate with village name on it. The alleys constructed along water system connect 8 radial exports and constitute a network. Alleys and water channels can contact every house. The alleys lay out so intricately with light change, elevation change and small scale that the old village is a maze for outsiders (Figure 15). Imitating the old village and trying to create similar spaces, people set water flow in the middle of the road and build bridge gallery in the new village. However the spaces in the new village are totally different from the old ones. For example, the spatial scale is much larger, the houses are much more regular, and the space form is much simpler and more repetitive. For the development of tourism, entrance plaza and activity square are respectively arranged on both ends of the new village, which scale is very large (Figure 16). In contrast to the compact houses in old village, the houses separated with each other in new village have larger area and enough gap between. According the field research in the peak period of tourism, the big space and construction scale of new village actually can just meet the requirements for tourism.

5.4.5 Materials and technology

Villagers adopted traditional technology with sheet stone and yellow earth to build the old village.. Almost all the buildings in the old village connected as a whole, so the structure is very stable and largely intact after the earthquake. The new village was constructed by government with unified planning. Villagers did not participate in the construction process. Modern technology and modern materials were used in the new houses., and parts of the houses are decorated with some traditional symbols, such as white stones, sheep skulls, etc.

Figure 17 *The old Aer Village*

Figure 18 *The new Aer Village*

Figure 19 *Houses at the new Aer Village*

5.5 Aer Village

New Aer Village is a typical settlements rebuilt in new location by villagers themselves. Due to a lack of unified planning and control, the villagers did not attach importance to building exterior form but pay more attention to the using function and adapting the restriction of geography when they self-built their houses. The houses mostly were built along the road without obvious landscape features, so the village has a free form. Part of the village was transformed to a unified style after reconstruction by sticking traditional adornment materials on the outer wall.

5.5.1 Geographical environment

Aer Village is located in a high mid-level in Dragon Gulley which is a tributary of Minjiang River in Wenchuan County. It is 2200 meters above sea level (Siqiang He, Bin Jiang, 2004) .

5.5.2 Settlement location

The old village was located in higher mid-level near cultivated land, but the traffic is inconvenience. After the earthquake, the road was built leading to another village lower than old Aer Village from the foot of the mountain. Villagers moved down from the old village, and constructed their houses spontaneously on both sides of road. The locations of new houses were mainly determined by two conditions: land and traffic.

5.5.3 Settlement pattern

The original village has strong integrity (Figure 17). One the contrary, the new village along the road presents a form of belt extending to a larger concentrated village (Figure 18).

5.5.4 Settlement spaces

There is only an outside space of belt shape in the new village, because all of the houses are arranged along a road. The structure of the village is single and loose. Buildings are independent relatively and lack of link to each other. There is not any clear identification (Figure 19).

5.5.5 Materials and technology

All houses in new village were built with modern materials and technology which can help shortening the building time greatly compared with the traditional method.

6. Analysis of Factors Effecting The Landscape Change of Qiang's Settlement

6.1 Destruction of Wenchuan earthquake

The earthquake not only destroyed part of the traditional Qiang's settlements, but also destroyed the geological environments and their ecological environments. Although it can be repaired or rebuilt, it cannot be restored, especially for the environments. The settlement is culture heritage which is not renewable, and the landscape change of the settlement is irreversible because of the influence by the earthquake .

6.2 Impact of disaster reconstruction

6.2.1 Special background of reconstruction

The Wenchuan earthquake affected extensive areas and a great number of people, brought about great destruction, big losses. After the earthquake, it was very urgent to accommodate the victims. Based on the urgent demand for reconstruction after the earthquake, Chinese central government asked every province with relatively advanced economy to help one county, for example, Guangdong province was responsible for helping Wenchuan county. Their main tasks aim to build new infrastructures, improve facility constructions of schools and hospitals, help the villagers to rebuild houses.

6.2.2 The impact of reconstruction on Landscape

The reconstruction process was quite different from the building process of traditional Qiang's settlements. The purpose of reconstruction is entirely different. Therefore, it is inevitable to affect and change the landscape of Qiang's settlements.

(a) Reconstruction planning and design

Almost all aid projects begin with planning, but unified planning is entirely different from spontaneous growth rule of traditional Qiang's settlements. Unified planning will clearly define the boundaries of settlements, roads, building positioning, scale, apartment, spatial form. The reconstruction of the settlement is lack of flexibility, the creation of space is established, lack of variability and it is not impossible to have rich spatial forms like the traditional settlement. In the traditional settlement, almost every household faced different directions, but in unified planning, every house of the new settlement has the same building orientation. It was very easy to identify every house due to different locations and orientations, differences of topography; unified planning of settlements tend to provide only several kind of house for the villagers to choose, so after the completion, the housing has larger repetition. The landscape of settlement is homogeneous and homogeneous. Due to time constraints, traditional culture of Qiang's ethnic could not be grasped by the builders , only related elements or symbol are added to the epidermis of buildings and some important space of the settlement. Therefore, before the earthquake, we could identify the attribute of nation or regional attribute by the overall landscape of Qiang's settlements, but after the reconstruction, we can only identify them by the symbols.

(b) Infrastructure construction

In infrastructure construction, the ally affects the landscape of the settlement mostly. On the streets of traditional settlements is adjacent buildings by defining a channel, the road of the new settlements are often initially planned, or on the road on the basis of the original construction optimization, build residential. The difference of the road and the building relationship is caused by the difference of the construction sequence. The old settlement is the tunnel in the building, the new settlement is the building attached to the main road. The building community in the old settlement is highly related and integrated, and the building community in the new settlement must be connected with the road and become a whole.

(c) Building technology and materials

Most of the reconstructions use modern building technology and materials, completely different from the traditional way. Modern technology and materials can create a larger scale of indoor space and building volumes, so that the patterns of the settlement could be changed. The traditional houses were built by use of stones in order to stabilize the structure, and the walls of the traditional building from the bottom to the top have different width, the lower part is wider than the upper one, the building looks like a trapezoid; In new settlement, more frame structures are used to reinforce structure, which makes the architectural structure more flexible. Using new technology and new material is the direct factor of the landscape change of the settlement.

6.3 Multicultural exchange

Before the earthquake, due to the remote location of Qiang's settlement, bad transportation, less communication with alien, the pure ethnic characteristics of Qiang ethnic group can be reserved. After the earthquake with the improvement of traffic conditions, Qiang nationality communicates with other nationalities more frequently, especially the culture exchange between local culture and foreign culture during the process of reconstruction. Such kind of exchange results directly in the landscape change of Qiang's settlement. For example, the reconstruction of Shuimo Town in Wenchuan. Reconstruction of Shuimo town includes two parts: one is the reconstruction of the original street; the other is to build a new Tibetan-Qiang style street. The landscape features can be seen in three forms: firstly, some original streets become the traditional street with west Sichuan's characteristic because of the influence by Han nationality; secondly, the new settlement with Tibetan-Qiang traditional elements appears.

6.4 The changes of villagers' demand

The change of residents' demand is the basic reason of the landscape change of settlement, including the change of material need and the change of spiritual demand. Material demand refers to the requirements of material space and material life. Whatever ancient people and modern people, they have some common demands, including: water, farmland, residential demand. The difference is that the defense needs have disappeared, and the demands of modern people focus on traffic conditions, environmental health, energy, economic interests, living comfort and other aspects. The changes of residents' demands can be analyzed from the following aspects: production modes, lifestyle, customs, social networks, national beliefs, spiritual pursuit.

6.4.1 Changes of production modes

The traditional agricultural production mode has changed. Besides traditional agricultural, modern Qiang people rely mainly on three ways to obtain economic benefits: firstly, large-scale cultivation of commercial crop, such as planting fruit, vegetable base; secondly, special handicraft industry based on unique handicraft technology, such as Qiang embroidery workshop; thirdly, characteristic tourism based on Qiang nationality 's traditional culture. The change of production mode can make people to have more flexibility in residential location, instead of depending on the cultivated land only.

6.4.2 Changes of lifestyle

The layout of the traditional houses reflect lifestyle of the Qiang people, almost all the houses are divided into three floors: the first floor is used for the livestock husbandry and toilet, all bed rooms are at the second floor, the roof is the platform, which is used for sunshine deck, playing and rest. The modern settlements, especially the settlements focused on the tourism, reduce or abolish the function of the livestock, the first floor is directly used as living room for reception. Some traditional lifestyles have been reserved in the modern settlement, such as the stove, fireplace, bacon space. Modern lifestyle adds many new elements, such as solar energy, various household appliances. Qiang people used to gather around the stove to warm themselves at night in the traditional house ,but modern Qiang people like to sit in the sofa in front of the TV at night. The stove is replaced by the electric stove. Solar receiver is placed at the roof of every house, it becomes a new landscape element of the settlement.

6.4.3 Changes of customs and habits

The traditional customs of Qiang nationality include festival activities, house construction, weddings and funerals. Festival activities include sacrificial activities and traditional dance. They are held at outside space, such as outside of the temples, near hamadryad. Sacrificial activities are presided by the Shibi, who is a wizard. Housing construction also has a

series of rules and activities, the Shibi will choose the date of groundbreaking and beam raising, such kind of activities usually are held at the constructing house. When the activities happen, all the residents, especially the villagers from the same big family, will help the host, they will gather at the host family and have a dinner together. The activities can be held at large or small space, but in modern lifestyle, besides the former activities, Qiang people need larger place for gathering or tourism reception. At the same time, Qiang people would like to show their dance or sacrificial activities to the visitors. Therefore, almost every modern Qiang's settlement has a large-scale square.

6.4.4 Changes of social network

In ancient times, family was the core of Qiang's social network. The settlements had exclusiveness each other, it embodies in two aspects: space of the settlement and building façade. Space of the settlement has the form of defensive space and cohesive space. On the building facade, the obvious feature is that residential windows are small. Under the development of the transportation and wider range of social contacts, people's social network is no longer fettered by the concept of the traditional family, but with the influence of the geographical relationship, culture, social contact and work, the new social network is formed rapidly, and will be changed and stretched sequentially. It is reflected in the landscape changes of the settlement, that is, people are no longer rigidly adhere to the family, but showing a more open landscape form. The exterior façade has been changed, too. Because of the demand for of daylight and ventilation, the windows become more bigger.

6.4.5 Changes of national belief

Qiang ethnic group would like to worship the God and nature. In traditional settlements, almost every household has their sacrificial space, for example, shrine is located on the wall opposite to the gate, each roof has a special tablet with the white stone facing to the gate. The belief of Qiang people continues, but the form of the sacrificial space is no longer as strict as that of the ancient times, and it can be combined with the furniture and furnishings of the home. The white stone, which is one of the important worshipful natural objects, is also used as an important traditional iconic element of Qiang's settlement in modern settlement.

6.4.6 Changes of the spiritual pursuit

The spiritual pursuit of ancient Qiang people lay in the sense of security, the sense of belonging to the family and the mutual recognition between the residents. In the modern traffic conditions and the new concept of time and space, a sense of belonging is not only for their family or the settlement, but also for expanded region and national cultural identity. At the same time, people gradually have higher level spiritual need, that is, the realization and recognition of social value, which is the absorption and application of others' culture in the reconstruction of the settlement.

7. Conclusion

According to the classification of cultural heritage, settlements belong to sustainable landscape of cultural landscape. The change of the settlement landscape is a dynamic process of continuous change. The disaster like Wenchuan earthquake has changed Qiang's settlements landscape has been changed more greatly by Wenchuan earthquake than by the influence of historical evolution for hundreds of years before. The Research for settlement landscape should be based on the analysis of history, contemporary and future, which present a dynamic sustainable clue, and focus on development, regeneration and evolution.

The research content can be summarized as the following four aspects. Firstly, the elements of Qiang's traditional settlement landscape were Figure d out, including geographical environment, location of settlements, pattern of settlements, space structure, building materials and technology. Secondly, Qiang's settlement after reconstruction were classified into to five types, including settlements restored to original forms in original location, settlements rebuilt to traditional forms in original location, settlements transformed to traditional forms in original location, settlements rebuilt in new location according to unified planning and settlements rebuilt in new location by villagers themselves. Thirdly, the above five types of settlements are compared with traditional settlements, in order to analyze the change of landscape characteristics of settlement landscape. Finally, the evolution of each kind of settlement landscape was analyzed. In conclusion, the changes of Qiang's settlement landscape are determined by four factors: the destruction of Wenchuan earthquake, the impact of post-disaster reconstruction, multi-cultural communication and the change of residents' demand. The change of residents' demand is the fundamental cause of the settlement landscape change. The change of local residents' requirements mainly include six aspects: production mode, life style, customs and habits, social network, national religion, spiritual pursuit. They directly affected the location, spatial pattern and space form of the settlements, therefore, they are the most key factors influencing the change of settlement landscape.

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