

Guidelines for Rural Village Planning and House Design

Analysis of Bolitai Village Renewal & Dangdai Village Reconstruction



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1 Shelter Situation Analysis

1.1 Basic General Data

Geography and Administration

Located in Southeast Asia along the coastline of the Pacific Ocean, China is the third largest country in the world. With an area of 9.6 million square kilometres and a coastline of 18,000 kilometres, China is bordered by 14 countries. The eastern half of China is a region of fertile lowlands, foothills and mountains, deserts, steppes, and subtropical areas. The western half of China is a region of sunken basins, rolling plateaus, and towering massifs, including a portion of the highest tableland on earth.

China is composed of 23 provinces, including Taiwan, 5 autonomous regions, 4 municipalities and 2 special administrative regions, including Hong Kong and Macao.

There are 5 level subdivisions: province-level; prefecture-level; county-level; township-level and village-level.

Demography and Health

At the end of 2009, the total number of Chinese population reached 1.329 billion, and an increase of 672 million was over that at the end of 2008. The year 2009 saw 16.15 million births, a crude birth rate of 12.13 per thousand, and 9.43 million death, or a crude death rate of 7.08 per thousand. The natural growth rate was 5.05 per thousand. The sex ratio at birth was 119.45. Now 45.68% of the population live in cities and 54.32% live in the rural areas.

Table 1: Composition of Population in 2009 Unit: 10,000 persons

Items	Population(Year-end figure)	Percentage (%)
National Total	133474	100.0
Of which: Urban	62186	46.6
Rural	71288	53.4
Of which: Male	68652	51.4
Female	64822	48.6
Of which: 0-14 years	24663	18.5
15-59 years	92097	69.0
60 year and above	16714	12.5
Of which: 65 years and above	11309	8.5

By the end of 2009, there are 289,000 health institutions in China, including 60,000 general hospitals and health centers, 26,000 community health service centres, 3013 mental and child health-care institutions, 1,315 specialized health institutions, 3,543 epidemic disease prevention centres (stations) and 2,706 health monitoring institutions. There were 5.22 million health workers in China, including 2.16 million practicing doctors and assistant practicing doctors and 1.74 million registered nurses. General hospitals and health centres in China possessed 3.96 million beds. The number of rural health care centres was 39 thousand, possessing 910,000 beds and employing 898,000 health care workers. In 2009, 3.776 million people were infected by A or B class infectious diseases, with 15,105 reported deaths. The incidence of infectious disease was 28.434 per million, with the death rate standing at 0.114 per million.

The rural cooperative medical care system disintegrated rapidly after the reform from 1978 due to government low investment, lack of health personnel and drug prices rising too fast. It is very difficult for farmers to see a doctor. The health care situation gap between urban and rural areas had been getting wider and wider until the new reform of health system kicked off in 2010. Although in recent years this situation has been improved, but the urban-rural gap is still large.

1. A disparity of medical security level is obvious. According the third National Health Survey, by 2003 there are 55.25% urban residents under the health security, and 30.45% was under the basic medical insurance. In rural area, only 21% farmers under the healthy security. In rural areas if the family whose members got bad illness, it would be easy to get back into poverty.

2. Disavailable to get health care. There are only 61.1% farmers live less than 1 km to the nearest health institution, and in urban area 81.9% families live not more than 1km.

3. Lack of health personnel. In 2003 there are only 2.14 doctors and 3.18 nurses per thousand residents in county level. Because the county is much better than rural areas, the numbers must be much lower in countryside.

4. Poor health equipment. in 2004, the equipment number of ten thousand Yuan above were 1,414,400. And in county-level there were 280,200 units, only accounting for 19.81%, of which most equipment is below 500,000 Yuan.

Economy

In 2009, the gross domestic product (GDP) of the year was 33,535.3 billion Yuan, up by 8.7% over the previous year. The annual per capita net income of rural households was 5153 Yuan, and the annual per capita disposal income of urban households was 17,175 Yuan. The proportion of expenditure on food to the total expenditure of households was 41.0% for rural household and 36.5% for urban households. According to the 2009 rural poverty line with annual per capita net income below 1196 Yuan, the population in poverty in rural areas numbered 35.97 million at the end of 2009.

1.2 Shelter Related Fact and Figures

Access to Shelter

Housing stock

According to Chinese statistical communiqué 2009, at the end of 2008 the urban housing stock reached 12.737 billion sq. meters, up 9.115 billion sq meters over 1997. In 2008, the floor area of newly built of housing in urban areas was 759.69 million sq. meters, and that in rural areas was 834.36 million sq. meters.

Table 2 Housing conditions of rural households

Item	1990	1995	2000	2005	2007	2008
Houses Newly Built This Year						
Per Capita Floor Space of Houses (sq.m/person)	0.82	0.78	0.87	0.83	0.974408	0.99
Value of Houses (yuan/sq.m)	92.32	200.3	260.23	373.31	485.1149	533.66
Structure of Houses (sq.m/person)						
Reinforced Concrete Structure	0.23	0.33	0.47	0.51	0.641068	0.66
Brick and Wood Structure	0.47	0.37	0.36	0.29	0.291254	0.28
Houses at Year-end						
Per Capita Floor Space of Houses (sq.m/person)	17.83	21.01	24.82	29.68	31.63094	32.42
Value of Houses (yuan/sq.m)	44.6	101.64	187.41	267.76	313.591	332.83
Structure of Houses (sq.m/person)						
Reinforced Concrete Structure	1.22	3.1	6.15	11.17	12.54886	13.4
Brick and Wood Structure	9.84	11.91	13.61	14.12	14.78649	14.89

Housing deficit (quantitative and qualitative)

1. Quantitative

At the end of 2009 the urbanization rate was 46.6% according the *Blue Book of the Cities in China*. This book reports that the urbanization rate will be 65% in 2030. At least 6.85 billion sq. meters of house will be built in the following 20 years.

2. Quality

The complete set house ratio was 80.64% in 2005, up 40.6% over 1990, according to the Census of Urban Buildings in China, 2005.

The proportion of reinforced concrete structure of rural house has increased from 32.85% in 1990 to 70.21% in 2008. But the average use period of rural house was only 20-30 years.

Yearly percentage increase in number of dwelling units

There has been no accurate number of dwelling units from the official statistics. From 2006, the government demanded that in the newly built communities there should not be less than 70% small-area units, and the floor area of small unit should not be over 90 sq. meters. The supply of small units in the commodity housing market obviously increased in the last two years.

Occupancy

There was argument about occupancy. In these two years lots of commodity houses had been sold out, but the occupancy was still very low. A survey in Ningbo city showed that the occupancy rate of old communities before 2005 was about 82%-95%, and that of newly built communities after 2006 was about 42%. The survey demonstrated the occupancy of suburban dwelling was much lower than that in downtown.

Housing standard

The housing standard has been improved very rapidly. The complete set house ratio in an index to measure the completeness of house function, which is 80.64% in 2005, up 40.6% over 1990, according to the Census of Urban Buildings in China, 2005.

A survey on rural living environment carried out by the Ministry of Construction shows that 96% of the villages do not have any drainage ditches and sewage treatment; in 40% of the villages it is difficult to travel in rainy days, in sunny days carts are used to pull the people, yet in rainy days people have to pull the carts; 70% of the village livestock sheds and residential mixed in one yard; 90% of the villages using traditional dry toilets; in 90% villages garbages are put everywhere on the streets; 90% of the villages do not have any fire fighting facilities.

So in rural area the quality of houses is much lower than in urban area. Most of the rural house had been set up in the recent 20 or 30 years. A rural house Structural quality survey on 9 villages in Haicang District Xianmen City showed that there were 5 structural types: brick-concrete structure, stone structure, stone brick structure, stone brick and wood structure, of which house made with stone brick and wood has higher damage rate than other types. The overall quality of rural house is in a low level and a estimate of loss in demolition and rebuilding of the house is more than 4.5 billion dollars.

Floor area per person

According to statistical communique 2009, per capita floor space of residential building in urban areas is 28 sq. meters, up 1.9 sq. meters over the 2005. At the end of 2008, per capita floor area of houses in rural areas was 32.42 sq. meters.

Rental (formal and informal)

The rental housing is consisted of private housing, public housing and informal housing. The rental market grows rapidly.

Table 5 sources of rental housing

Source of Rental house	Scope
Private housing	Commodity housing, reformed housing, farmer's own housing
Public housing	State-owned housing, unit-owned dormitory, low rent housing, economical rent housing, government official's dormitory, experts' apartment
Informal housing	the housing of small property right, illegal housing

It was seen a steady development of rental market in 2006 and a strong growth in 2007, and a high volatility in 2008. The new commodity houses, second-hand houses and vacancy houses entered the market massively, and caused rental supply to surge.

A sample survey of the 2006 housing rental market by People's Bank (China Central Bank) showed that the age of lessee were mainly under 30 years old. In 14 cities 54.13% were under 30, less 15% was above 40. The lessees mainly included white-collar, peasant workers and university students. The rental housing mainly includes one-room, two-room and three-room, in which the two-room house was most welcomed by the percentage of 40%-50% and one-room and three-room were 20%-35%.

Ownership (formal and informal)

Before 1998 most of the urban housing was state-owned or belonged to the working unit. Since then the urban households have to purchase private house in the market. At the same time state-owned housing was sold to the employees.

Housing affordability ratio

As the price dramatically rised in 2007 and 2009, it is very difficult for urban households to afford a house in the downtown. Up to now there has not been any official data of housing affordability ratio. Some of the youth begin to change the transitional opinion on purchasing houses to live in, and think that renting will be a better choice.

House price to income ratio

The so-called Price to Income ratio (Housing Price-to-Income Ratio), is the ratio of housing prices to annual household income of urban residents. Take the case of Beijing: in 2009 an ordinary two-room new house in the 4th ring within 80 sq. meters, after crazy rising in prices, the price is 25,000 Yuan/sq meters, the total price is about 2 million; If a middle class family who has worked for five years to purchase the house, supposing husband and wife's monthly salary is 2000 Yuan, the family month income amounts to 4000 Yuan, and the yearly income is 48,000 Yuan. Such house price income ratio is 40, equal to ten times that of US.

Land (formal/informal)

According to the constitution of Chian land is owned by the state and rural collective.

Housing construction

Urban housing is designed by the architect and constructed by the construction company.

Rural housing is usually constructed without design.

Building materials

Urban housing usually uses the following materials: concrete, steel, glass, brick, stone, wood, etc. Most of the new buildings are constructed with reinforced concrete.

Less than half of rural housing is made of reinforced concrete and more than half is made of bricks and wood.

Access to and cost of Basic Services/Infrastructure

The local government provides infrastructure of the cities, such as water, electricity, roads, gas, and telecommunications facilities, etc. The quality and scope of basic service will become better and wider than ever before as the economic grows. Although the governments have enlarged the investment to rural infrastructure, there are still a lot of problems as a result of long term insufficient investment: lack of purified drinking water, road, surrounding, education, sanitary service etc..

Access to and cost of Education

China has already carried out 9 year system compulsory education from elementary school to junior middle school. The student need not pay any fee except the cost of books. But it is still a heavy burden for a lot of urban families who have to spend extra fees for spare time training, choise of shool, etc. hoping the children can get much more perfect education due to the lack and unfair distribution of education resources.

1.3 Housing Policy

China Housing Policy can be distinguished into four periods in China's housing system reform process.

1. Welfare Allocation Period (1949-1978)

Before 1978 China had been carrying a highly centralized planning system in housing investment and supply. This welfare housing policy caused a drain on the State's resources and unequalty in ditribution.

2. Experiment Period (1978-1987)

From 1978 to 1987, the State initiated an experimental reform by raising the rent of "publicly-owned housing" and selling publicly-owned houses to individuals at a subsidized price.

3. Comprehensive Reform period (1988-1998)

From 1988 to 1998, the State took comprehensive measures to advance the progress of housing commercialization.

- Changing the structure of the housing investment .The State encouraged private investment in housing.
- Publicly-owned housing was sold at cost price or standard price and would be allowed to enter the market after five years.
- Developing and perfecting Housing Funds.

4. Fully-Functioning Housing Market Period (1998-present)

In 1998, a new policy was put forward aiming to establish a housing market of which the high income households should buy “commodity house”, low and middle-income households could buy “economical house” at a limited price and low income households could rent low-rent housing provided by the government. In fact, the commodity house market burst in 2007 after 8 years eventual growth, which causes the price rose rapidly. On the other side, the economical house and low-rent house supply was still a small portion before 2010.

1.4 Actors in Shelter Delivery and their Roles

In urban area China has established a system of housing supply.

The Central government:

The central government is in charge of policy-making and supervising the land use of local government. After April 2010 a series of new policy are put into carry out to control the rapid rising of house price.

The local government:

The local government provides lands to the developer and gets the fees for land use. In China the urban land is owned by the Nation and the rural land is owned by the collective. The developer should pay the land transfer fees to get land use right. The land transfer payment is becoming a much more important financial income for the local government.

The real estate developer:

After getting the land use right, the real estate developers can develop housing and sell it to the people. As the rapid growth of house price in large cities in China, the developers have made huge extraordinary profit in the last 4 years.

Architects and design institutes

As the professional architects and design institutes play a very important role in housing development.

Banks

As housing loan is of much lower risk than other kinds of loan, the banks prefer providing more loans to housing purchasers. So housing loan in China develops very rapidly in the last decades. As the rapid growth of housing price, the risk of housing loan becomes bigger than before. In this April a series of new policy came into existence from the central government to control the increase price of commodity housing.

Purchasers

Since 1999 China has ceased to supply welfare housing. People have to buy houses in the market. Since then the commodity house market developed widely and rapidly. Almost every young couple wants to have their own house. Due to the rapid rising of price, it's much harder to afford a house after 2007.

In China, every rural household has the right to obtain a house plot, but they have to build their house by themselves. From 2003, the government paid more attention to rural development. More fund has been used into construction and update the rural facilities and houses.

1.5 Shelter Design

Physical Planning

In China urban planning is very critical in city development. In every city there is a planning bureau or a bureau of land planning. But some of the cities only have the master plan, and there are even no regulatory plans. So each plot of development has to be planned and approved separately, the local government officials have spent much time in listening to the design report.

In rural areas village planning seldom was made. Houses were constructed without any planning or design. Most of the rural houses are rebuilt each 20-30 years because of the lower standard or bad quality.

Land Use

China has to balance the requirement of grain production and the urban development because of lack of lands, so restrict land use regulation was made in China. Planning bureau in many cities has raised floor area ratio.

In rural area land use is in a very low level of efficiency because of no planning. The traditional life style prefer low-rise buildings with a large yard to high-rise buildings and apartments, mainly because of the low economic capacity

Population Density

There is higher population density in large cities than that in small towns and rural areas.

Shelter Quality

In recent years, there had been a series of engineering quality accident. The ministry of housing and urban-rural development issued the urgent message in July, 2009, and requested each region to inspect the quality of housing in construction. More than 180 projects in 30

provinces and 90 cities in China had been inspected. The result demonstrated that 96.1% of the projects were qualified.

Function

Housing functions are being further improved. According the Design Code for Residential Buildings (2003) every dwelling suit should be designed with the following basic usage rooms: living room, bedroom, kitchen and toilet.

Safety

Newly designed housing should obey the *Residential Buildings Code* and the *Design Code for Residential Buildings (2003)*.

Comfort

The housing designed in the last decade is much more comfortable than before.

- The usage spaces are much larger;
- The functions are complete;
- The new housing is built in a higher standard;
- The environment of community is better than ever.

Sustainable Development

The government and the social paid special attention in sustainable development. Since 2005 the residential energy consumption standard has been reduced by 65%.

Evaluation Standard for Green Building has been implemented since 2006. All the people come to an agreement to reduce energy consumption, materials and operation cost.

Norms and Codes

China has established a relatively complete standards and codes for urban shelter design.

There are fewer standards for rural planning and no codes for rural house design.

2 Organisation

China Architectural Design and Research Group (CAG) is one of the biggest state-owned design institutes in China. There were about 10 branches and 4000 staff, and the total income reached about 2.5 billion Yuan in 2009. There are about 600 architects and engineers in the headquarter. They design all the kinds of building in china and abroad, such as in Africa. Each year they finish designing about several millions square meters of residence. There are 17 architects in the No.4 architecture design studio, in which I am in charge of all the design and operation. Our work covers all the phrase of city design, residential planning and house design. From 2006 to present there are more than 30 large scale community

planning and design projects have been finished, such as Sinoceanland Yifang, Vanke Lanshan, Dingxiu Meiquang, Olympic Garden in Dalian and Dongying, etc. And from 2004, we also took part in the programmes of new rural village constructions. Some rewards have been received in recent years.

3 Shelter Problem

With the continuous social economic development, China's villages and small towns construction has also a huge progress. The annual average residence construction quantity in villages and small towns amounts to 650 million sq. meters, the per capita residential building area grows by 6.5% annually in the last five years. Compared with the city, the quality of living environment in rural areas is still a considerable gap.

There are several problems in rural and small town construction :

- Most of the village developed in a natural way without any planning in rural area.
- Just because of the absent of planning the rural land is used in a nonefficient way.
- Houses updating each 20 to 30 years has caused a serious waste of funds. The rural house usually has on a 20 to 30 years use life, because of financial deficit and traditional custom. The house would be rebuilt each 20-30 years which cause a considerable waste.
- Infrastructure construction lags behind, the environment quality is poor. Because of enough investment into infrastructure in rural area, it is common seen lack of drinking water, narrow and rough road, waste water flowing all around, etc.
- The construction quality hidden danger is a big problem because of the traditional thinking. The farmers would like to use their familiar technologies and materials to build their house thinking it was tested thousands of years. It is also hard for them to accept new ideas.
- The farmers' income growth is slower than that in urban area and the countryside industrial development is difficult.

4 Proposal for Change and Improvement

This proposal is a exploration to set up a guideline of rural village planning and house design in North China by analysis of two case (Bolitai Village and Dangdai Community). In 2003 the central government pushed to “build a socialist new countryside”. The Pinggu

District government decided to develop the rural areas to improve the farmer's livelihood, improving their income. Bolitai was chosen as one of four model villages to explore the way of rural renewal. From 2004 to 2005, I took part in the planning and house design of reconstruction of Bolitai Village. Only less than 60 households lives in the old village, and the per capita annual income was less than 2700 Yuan under the poorline. On the other side, the natural environment is excellent beautiful. At last the village was planned as a agri-tourist spot. Three years later the village had become very famous for its richness and success of industry transfer form agriculture to tourism.

Bolitai village renewal was a seccessful model of completely exploring the rural economy, society and environment. The key of success was balance of economy, society and environment. Dandai Village is a part of Jiegu Town, which suffered a fetal earthquake in April 14, 2010. After the earthquake I attended the planning and design for the Dangdai Village, aiming to build an ecological tourism community. In the planning and design we used our experience from Bolitai. The concept planning has been completed and approved by the experts and government before Augst 2010. This planning received a high evaluation.

Bolitai was built five years ago and it was operated about 5 years. Now the Dangdai Village planning is also finished. From this two project we explored to setup a guideline of rural village planning and house design in north China. There are some successful experience and also problems should be pay more attention.

- Rural Economy survey and develop plan
- Household participanton experience
- Rural society structure and problems
- Housing function and quality survey and solutions
- Methods to the transformation from agriculture to agri-tourism
- Ecological protection
- Flextilbly of extension and function transformation
- Organization work in the key of success

References

Li, Jiange

2007 *Survey on china's construction of new countryside*. Shanghai : Shanghai Far East Publishers (SFEP). ISBN 978-7-080706-431-2/F.293.

Chen, Xiwen ; Zhao, Yang ; Luo, Dan

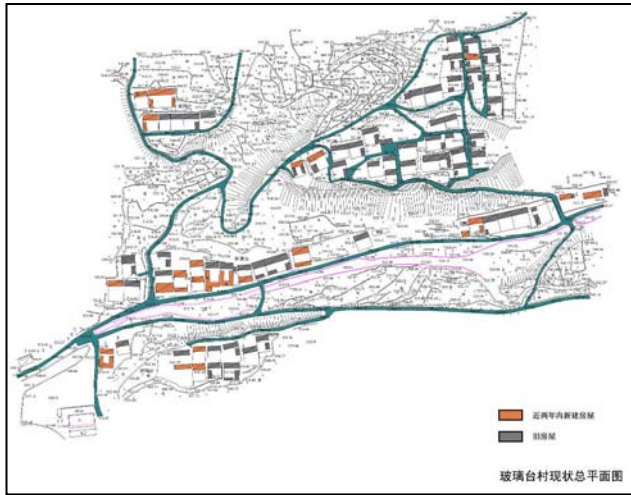
2008 *China's rural reform 30 years retrospect and prospect*. Beijing: People's Publishing House. ISBN 978-7-01-007543-3

Xu, Yong etc

2009 *Cutting-edge research on China's rural areas and farmers*. Beijing : Economic Science Press. ISBN 978-7-5058-8134-1.

Annex 1

Case 1: Planning and design of Bolitai village Renewal



Bolitai village was a small poor mountain village with only 63 households, 150 km far away from Beijing Downtown. Per capita income was 2700 Yuan (\$400) which was just under the local poverty line of 2,750 Yuan. In 2003, the Administration propelled to “build a socialist new countryside”, the local government decided to renew four villages as the model. Bolitai was chosen to take the lead.

Conditions before renewal based in site survey

1. Physical Problems of site

- Land use efficiency.

With a population of 150 and 63 households, Bolitai occupied about 27 hectares, per capita 0.18 ha. Land use efficiency is very low.

- Disaster of landslide risk;

The norther part of Bolitai is located on a high terrace. There was a risk of landslide and a record of flood 50 years ago.

- Road system

A passby road in front of the village was covered by soil and sand. There was no concrete or asphalt road.

- Unstable water supply system

The water source was leaking water from the mountain. And water supply system was a pipe sytem under the earth not more than 0.8 meters, which was often frozen in winter.

- Lack of sewage system

There was no any sewage system before rebuilding.



2. Physical Problems of houses

- Disfunction ; Most of the houses were not qualified to live according modern standard.,of which about 1/3 buit before 30 years ago is too low and too small to live in. There was no heating system in the the old houses.
- Structure not suit for anti-earthquake: 1/3 of the old house was built with stone and soil, without any anti-earthquake technology. There were a lot of cracks on the wall because of the uneven sunken the base .
- Materials: not sustainable material, such as brick is widely used in the past two dacades, which is repealed as one kind of non environmental prevention matieral. The house over 20 years were mainly made of stone and mud.
- Use life: only 20-30 years use life: Most of old house were demolished and rebuilt once 20-30 years because of disfunction or structural problems.
- Lack of efficient heating system:
- In winter the outside and indoor temperature diffifence was only 2-3 degrees because of the quality of building enclosure.



3. Social Problems

- Population and household decreased: Because of poverty the young didn't want to live in the poor mountain village. Some of them went to downtown to look for a job. Young girls prefer to marriage to people who live in plain villages. The population of Bolitai was getting less year by year. In 2004 there were only over 40 household live in there.
- Gender balance: Before the renewal male was the majority in the population.
- Loss of labour: With the young moved out agricultural labours became less and less. The old had to continue to work.
- Aging population: The old became the majority of the population as the youth went out.
- Marriage problem: Because of poverty, there had been a long time no young female married to Bolitai.

- Family dispute because of poverty: In 2004, a survey was taken before the planning in which a lot of disharmorny issues were found among alomost all the families, such as disputation on supporting old person, quaralling on property etc.

4. Economy(industry and income)

There was only agriculture. The farmers plant fruit trees which contributed 90% of income. Income: In 2003, per capita income was 2,700 Yuan which was under the poverty line of Beijing.

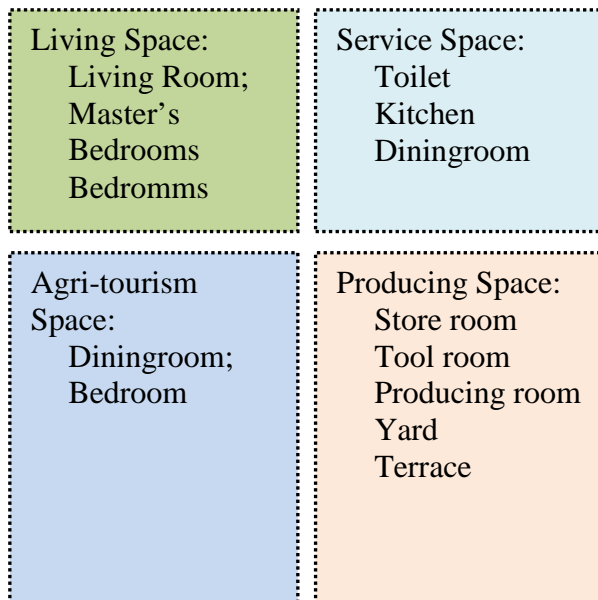
5. Environment/Ecology

There were undeveloped wild nature and excellent tourst resources around the old village. Bolitai had been a little famous, before 2003 a investor had set up a company to develop the tourist resource.

SWOT analysis of renewal of Bolitai Village

Strength	Opportunity
Powerful leader of the village	Government supporting
Excellent natural resources	National policy of building the socialist new countyside
Most of the villagers wanted to change	Suburban tourist market bursting after SARS (2003)
Enough electricity	Urban economy fast growth
Weakness	Threat
Lack of fund	Unknown in the market;
Poor infrastructure: water supply, no sewage, no waster handling	Competition of other nearer tourist villages
Poor house qulity	Risk of financial failure
Lack experience of tourism	Impact of ecology and environment
Further from the downtown than other tourist villages	
Traditional conscouseness of lifestyle and customs to develop new industry	

Solutions of Bolitai Village Renewal



- Survey and context study
In February 2004 the planning was kicked off from a context survey, including topography, population, age, gender, house situation, income, job, etc.
- Function analysis:
After the survey a function analysis was took to find the rural house had four different functions: living zone, livelihood zone, services zone, storage zone, which was very different with urban house.
- Home inn reconstruction
Farmer's new house should also have home inn functions, so new house was designed to serve as a home inn-more rooms and independent toilets.

Successful experiences of Bolitai Village Renewal

Social: Situation after renewal

1. Population increased

In 2006 one year after the renewal the population of Bolitai had increased to 200, a lot of young farmer moved back to the village.

2. Marriage problem solved /Harmony in neighborhood

In 2006 two old bachelor married. Smile went back to villager's face. When we went back for a survey, we heard more of smile than unpleasant disputation.



Roles of actors

1. Local government: as the project starter, local government is the most important stakeholder.

- Powerful organizing

A leader group was set up in charge of the whole process of renewal.

- Clear goal:

The goal of renewal of countryside is to improve the livelihood, increase income and try to find a way.

- Coordinating all stake holders

- Guarantee of loan

Local government covered the cost of infrastructure of repairing road, water system, environment improvement, anti-flood project, sewage system. The farmers cover the cost of buildings. At first the farmers only spent 20,000 Yuan, the other cost they had to repay the mortgage year by year. After a calculation, the term of debt was 8 years. The government guarantee the mortgage.

2. Village leader

- Propaganda the policy and persuade the villagers

- Provide convenience to architect and contractors

3. Villagers

- Villagers were the one of the most important stakeholder of the project. They had strong will to change their situation and lives. They also had questions and problems about the project. They were worried to lose what they had had. After a long time propaganda and explanation of policy, the villagers began to support

this project. During the construction the villagers consciously played a role in the quality supervision.

4. Loan provider/government financial department
 - Analysis of financial feasibility
 - Provide loans to the candidates
 - Supervise and audit the use of budget
5. Professionals
 - Ability to survey and hold the first hand datas of rural village which is not able to be found in normal ways
 - In a wider and longer view of rural development rules
 - Find out new ways to solve unusuall problems

Economy

Cost/income analysis before reconstruction

Before 1998, the annual total income of Bolitai was 500,000 Yuan (basically from fruit industry). After 1998, because of years fo drought, in addition with new roads occupying many orchards, in 2003 and 2004, the income was the lowest, about 300,000 Yuan. in 2002, per capita annual income was 2500 Yuan, in 2003, that was 2700 Yuan.

Table analysis of Income Cost

	200sqm house		150 sqm house	
Basic data	Gross floor area	200 sqm	Gross floor area	150 sqm
	Gross cost of construction	210,000 Yuan	Gross cost of construction	157,500 Yuan
	Construction cost per sqm	1,050 Yuan	Construction cost per sqm	1,050 Yuan
	Service Bed Number	12 beds	Service Bed Number	6 beds
	Investment per bed	17,500 Yuan	Investment per bed	26,250 Yuan
	Maximum Guest Number	12 persons	Maximum Guest Number	6 Persons
	Service days in vacation time	39 days	Service days in vacation time	39 days
	Service days in non-vacation time	26 days	Service days in non-vacation time	26 days
Estimate Income	Income for Room and Dinner per year	52,260 Yuan	Income for Room and Dinner per year	26,130 Yuan
	Extra Income beside dinner (there are 500 guest/year, at least each guest spends 20 Yuan per dinner)	10,000 Yuan	Extra Income beside dinner (there are 500 guest/year, at least each guest spends 20 Yuan per dinner)	8,000 Yuan
	Income of picking fruit	3,000 Yuan	Income of picking fruit	2,000 Yuan
	Income from souvenir	2,000 Yuan	Income from souvenir	1,500 Yuan
	Income of fruit	7,500 Yuan	Income of fruit	7,500 Yuan
	Total	74,760 Yuan	Total	45,130 Yuan
Estimated Cost	Cost of livelihood (3personin each household, each peson spends 2,000 Yuan/year)	6,000 Yuan	Cost of livelihood (3personin each household, each peson spends 2,000 Yuan/year)	6,000 Yuan
	Heating Cost(7.5Yuan/sqm)	1,500 Yuan	Heating Cost(7.5Yuan/sqm)	1,125 Yuan
	Electricity Cost	700 Yuan	Electricity Cost	600 Yuan
	Water Cost	200 Yuan	Water Cost	150 Yuan
	LPG Cost	400 Yuan	LPG Cost	300 Yuan
	Service Cost	31,000 Yuan	Service Cost	17,060 Yuan
	Total	39,930 Yuan	Total	24,860 Yuan
Term of payback	Net Income	34,330 Yuan	Net Income	17,895 Yuan
	Per capitca Annual Income	11,444 Yuan	Per capitca Annual Income	5,965 Yuan
	Term of Payback	6.12 years	Term of Payback	8.80 years

Table households' income of Bolitai Villagers in 2003

Annal Income	Portion(%)
Households' income below 1000 Yuan	8%
Households' income between 3000 to 5000 Yuan	47%
Households' income over 10000 Yuan	45%

Based on the analysis the final term of payback mortgae was 8 years. Acturally most of the mortgage were payed back within 5 years.

Ecology

1. Environment protection technologies

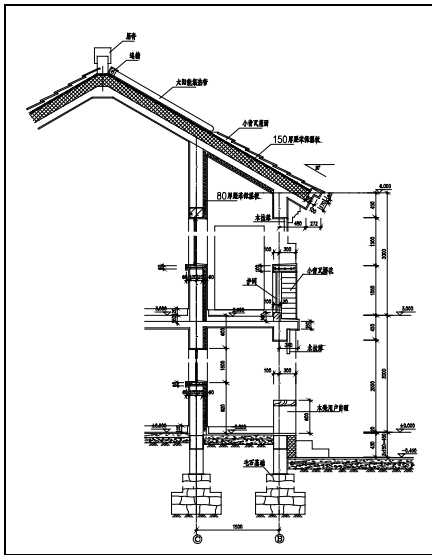
Passive design to reduce the expenditure of energy

Passive design strategy was used in the planning and house design. The most importance things is to reduce the expenditure of energy. So exterior insulation technology was used in all new houses and heating energy consumption reduce to 70% of common houses.

Solar heating systems

Solor heating system was also used to provide heating and hot water.





Biotechnology in waste water treatment

biotechnonology technique was used to waster water treatment. Every 8-12 household used a septic tank, bio-water treatment tank was piped after septic tank. After bio-treatmen water could be used to wash road or water the plant.

Garbage central collection

All the garbages were collected to a garbage treatment place.

Environment beautification and landscape

A environment beatification and landscape planning and design was implemented after all the houses had been finished. A river in front of the village was reconstructed, the bank was rebuild as a garden with Vshaped section which is also fulfil the flood prevention requirement.

Disaster prevention

To void landslide no house was located below the steep slope, upon which a protecting wall was finished.

Annex 2

Case 2: Dangdai Village Rebuilding Planning and Design, Yushu County, Qinghai Province

Yushu suffered a fatal destroy in the 4.14 earthquake in 2010, in which more than one thousand people lost their lives and mass of buildings were destroyed. It is a large village with mountains surrounding, which has rich tourism resource. Yushu is also the source of three large river-Yanzti River, Yellow River and Lancang River. Gyegu lama Temple is a fomouse tourist spot. With the richness of natural and cultural resourses, Yushu county had an 39% increase of tourism in 2009. Dandai village is located in the front of Jiegu Temple, has an opportunity to develop tourism from animal husbandry and digging worm grass.

Because of lack of subsidy, in Dangdai Village the houses will be reconstructed by the villagers according to the common planning and design. This is something different from Bolitai. But they have to face the same problems: poverty in economy, lack of public services, low quality of houses, land use non-efficiency, and a opportunity to transform rrual industry to tourism. In the reconstruction planning all the above problems should be considered carefully.



Situation:

Dangdai village is a part of Gyêgu Town with 617 households and about two thousand population. It is located on one of the northward slops of a huge mountain. On the north side there are 212 Highway and Zhaqiu River crossing the town.

Social situation

Gyêgu is the modern town which developed from the old Tibetan trade mart called Jyekundo, It is the heart of both Yushu Tibetan Autonomous Prefecture and Yushu County,

which is two-day car ride on National Highway 214 from Xining (820 km), the provincial capital.

Economic situation:

The Gyêgu town developed from an old trade hub, situated at the crossroads of important trade routes between Ya'an (formerly Yazhou) in Sichuan province and Xining in Amdo's heartland, as well as between Xining and Lhasa.

Although all the Yushu region is a realm of nomadic pastoralists, Gyêgu is one of the few places in this part of the vast Tibetan Plateau where permanent settlement proved to provide a livelihood for Tibetan farmers and traders. Here, at an elevation of 3,700 m above sea level, peasants grow barley on riverside fields.

Religion situation

Gyêgu, like most parts of Yushu prefecture, is rich in Buddhist monasteries. Being a constituent of the late Nangchen kingdom, the area was, for most of the time, not under domination by the Dalai Lama's Gelugpa order in Lhasa. The different balance of power in this part of Kham enabled the older Tibetan Buddhist orders to prevail in Yushu, and thus Gyêgu. The main lamasery in town is the Sakyapa monastery Doendrub Ling, commonly just called Yushu Gompa. Other nearby monastic sites include the important Karma-Kagyupa lamaseries Domkar Gompa and Thrangu Gompa, the famous Mahavairocana Temple (often called Wencheng Temple) and the popular religious site of Gyanamani with its billions of mani stones.

Cultural Situation



Since many different kinds of goods for trade and barter were brought in from all directions, the town became the residence of many of the richest families in the entire Tibetan highland. This wealth was and is demonstrated on two major occasions: the Tibetan New Year Festival and Gyêgu Horse Festival.[10] The Horse Festival starts on each 25 July and lasts for several days. During the festival the colorful appliqué tents so typical for Tibetan summer

outings cover the grasslands of the Bathang plain or the horse race grounds in the west of the town, with Khampas from all over Yushu prefecture, and even farther, showing off in between time and watching picturesque folk dances.

Environment/ecological Situation



Located in a high elevation of 3800 metres above sea level, Gyegu is covered by grass and a few trees. Local ecological system is extremely frail.

Road situation

Same to other small town in western China, roads in Gyegu is narrow, some covered by concrete, most covered by sand or earth.

SWOT analysis of rebuilding of Dangdai Village

Strength	Opportunity
Good transportation to outside, airport, highway	Whole nation's support to rebuild
Excellent environment and cultural resources	
Weakness	Threat
Lack of fund	Risk of financial failure
Poor infrastructure: water supply, no sewage, no waster handling	Impact of ecology and environment
Poor house quality	
Lack experience of tourism	
Vulnerable ecosystem	
Traditional consciousness of lifestyle and customs to develop new industry	

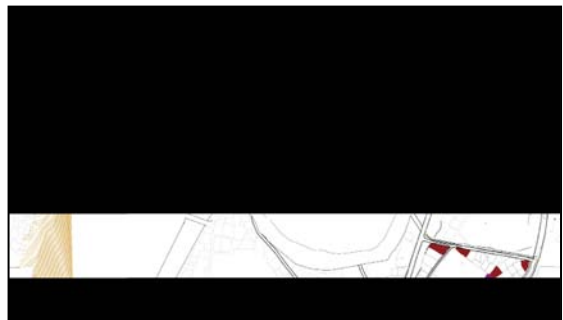
Alternative Solutions

Project A

Planning based on original sites

As the easiest operational project this scheme respect original village structure to keep the new site on original location where farmers could build their house as their needs. Some adjustment are adopted if it has such below problems:

1. Site on a steep slope where is not fit for building;
 2. Site adjacent to public road where is too narrow for cars to pass by;
 3. Site should be move to turn to public spaces, such as small square
- As result only 18.09% site be adjusted its shape or moved to site nearby.



Project B

Planning base on site adjustmen within block A statistic shows that most large site are located along the Zhaqu river where is more flat than other place and more convenient to go out. This project is to solve this unfairness of site area. Within a block site areas are adjusted to a average lever. So farmer's don't have to move to other blocks, their living place has not been changed very much.



Social logical structure is kept as much as origin. In fact it is harder to persuade farmer's to accept a small area of site.

Project C

Planning as a new site.

Because the earthquake has destroyed all the houses in Dangdai Village, of which a few houses still stood after earthquake were declared to be unsafe, this project is a plan of a new community with fairness, efficiency and affordability which is the aims and principles. Public transportation and public spaces are replanned as first important issue, all the other area are divided equally according to 3 levels.



In fact this plan is the most ideal and least operational scheme and was not accepted by the local government.

House Project

For farmers a house is not only a place to live in, but also a place to work. So new house design should listen to the farmer's requirement, reflecting the Tibetan Culture in Yushu. Finally we developed two models which can "grow" as needs change.

Living Model:

Commerical/Toursim Model:

