


四川大學—暨南理工大學  
灾后重建与管理學院  
5·12汶川特大地震紀念館


# Reconstruction and Sustainable Development in Beichuan

## — Reconstruction Model of Beichuan for the World



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Kobe University

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## PART 1

### Introduction to Disaster Situations

- 1.1 Overview in Beichuan
- 1.2 Disaster Situation in Beichuan
- 1.3 Characteristics and Causes

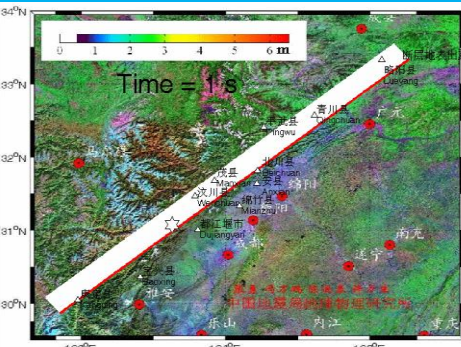


### 1.1 Overview in Beichuan

- ❑ Beichuan Qiang Autonomous County is located in northwestern Sichuan Basin, covering an area of 2867.83 km<sup>2</sup>, 42 km away from Mianyang City, 160 km away from Chengdu City.
- ❑ By the end of 2007, the Beichuan has a population of 161,000, which Qiang 91,000, is the only Qiang Autonomous County in China.



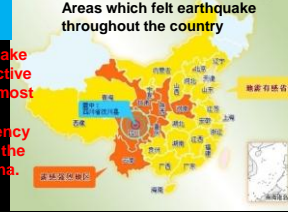
## 1.2 Outline of Wenchuan(Sichuan) Earthquake Disaster



No. of fatalities	69,227
No. of missing or unidentified victims	17,923
No. of victims rescued from debris	84,017
No. of victims who evacuated	15,100,000
No. injured	4,300,000
No. requiring livelihood support	8,810,000

Affected 417 counties, 4,667 townships, and 48,810 villages across 10 provinces (prefectures, cities), such as Sichuan, Gansu, Shanxi, Chongqing, etc. Damaged area: 500,000 km<sup>2</sup>. Affected population: 462,500,000 people.  
**Heavily affected areas and severely damaged areas: 51 counties (prefectures, cities), 130,000km<sup>2</sup>, about 19,870,000 people affected**

Areas which felt earthquake throughout the country



The Sichuan Earthquake was the most destructive earthquake with the most devastated area, and most difficult emergency relief activities since the founding of New China.

Damage	51 counties (cities, prefectures)				
Direct economical loss (million yuan)	8,437.7				
Damaged roads (Km)	34,125				
Damaged schools (no.)	7,444				
Damaged medical facilities (no.)	11,028				
Farm houses (10000 m <sup>2</sup> )	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #ffff00;">Collapsed</td> <td style="background-color: #ffff00; text-align: right;">10,709.6</td> </tr> <tr> <td style="background-color: #ffff00;">Heavily damaged rooms</td> <td style="background-color: #ffff00; text-align: right;">9,432.2</td> </tr> </table>	Collapsed	10,709.6	Heavily damaged rooms	9,432.2
Collapsed	10,709.6				
Heavily damaged rooms	9,432.2				
Urban homes (10000m <sup>2</sup> )	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #ffff00;">Collapsed or damaged</td> <td style="background-color: #ffff00; text-align: right;">1,887.9</td> </tr> <tr> <td style="background-color: #ffff00;">Heavily damaged rooms</td> <td style="background-color: #ffff00; text-align: right;">5,836.2</td> </tr> </table>	Collapsed or damaged	1,887.9	Heavily damaged rooms	5,836.2
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Heavily damaged rooms	5,836.2				

Outline of reconstruction: "Trail of reconstruction in world", "Trail of reconstruction in China, "Speed of China," and "Spirit of China"

- Evacuated **15 million people** from earthquake disaster areas in **10 days**
- Supplied **12 million victims** with temporary homes in **100 days**.
- Brought changes equivalent to **20 years** all at once to affected areas in **1000 days**.

### 1.2 Disaster Situation in Beichuan

- ❑ **Death toll:** 15,645 persons, accounting for about 10%
- ❑ **The disappearances:** 1023 persons
- ❑ 26,916 persons were injured
- ❑ **Economic loss:** 59.1 billion yuan

More than 14 million mu of arable land loss, the loss of 5.12 million mu of arable land, the county farmland damaged up to 60%.

Qiang culture suffered heavy losses: a large number of national culture Museums collapsed. Qiang cultural archives and the Dayu research historical documents buried or seriously damaged. Qiang houses mostly damaged or collapsed.

❑ **The county seat was forced off-site reconstruction, being earthquake ruins**



Before the earthquake



After the earthquake



Landslides, Sep. 21, 2008





### 1.3 Characteristics and Causes

❑ *1, the earthquake caused strong ground vibration of the super-maximum security level*

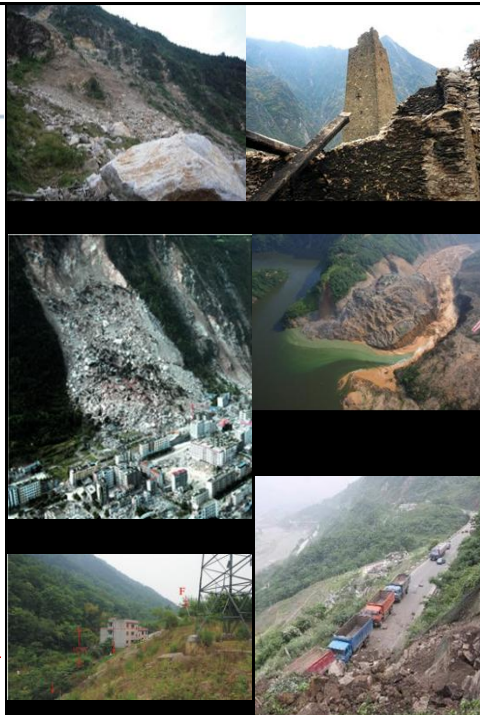
❑ *2, a huge earthquake surface dislocation*

❑ *3, avalanches, landslides and mudslides*

There are about 5,000 people died in the collapse and landslide in the Beichuan county.

❑ *4, there was a considerable number of poor seismic performance of buildings*

❑ *5, Awareness of disaster prevention and mitigation was lack*





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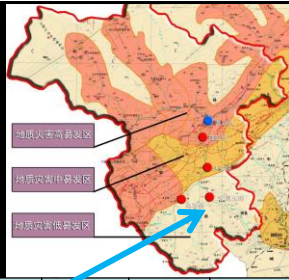
# PART 2

## Reconstruction and Recovery

- 2.1 Reconstruction Planning
- 2.2 Counterpart's Assistance
- 2.3 Life Reconstruction and Development
- 2.4 Socio-Economic Development
- 2.5 Evaluation of Socio-Economic Benefits
- 2.6 Post-disaster Revitalization and Development Planning
- 2.7 Disaster Prevention and Mitigation Education Development



2.1 Beichuan reconstruction planning

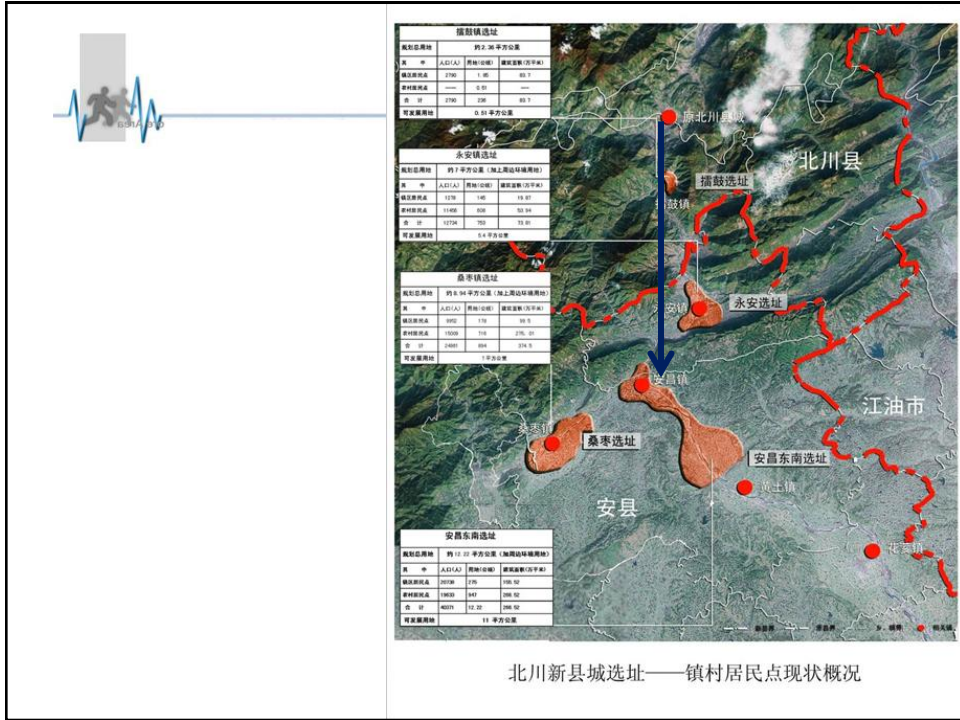


**1、Site Selection Study of the new county seat of Beichuan:**

**Principles:**

- Engineering geology feasible:** good geological conditions and high security;
- superior location:** the contact of center city and county hinterland is convenient;
- land Ample :** meet future development needs;
- Facilities relying on convenience:** the use of existing facilities, which will help the national cultural heritage;
- The adjustment of the administrative system feasible: the difficulty of the operation is low.

Location Plan Factor evaluation		Option I <b>Anchang</b>	Option II <b>Leigu</b>	Option III <b>Yongan</b>	Option IV <b>Sangzao</b>
primary condition	Geological conditions and security	A	D	C	C
	regional conditions	A	C	C	D
Other influencing factors	Site conditions	A	D	B	C
	Municipal infrastructure conditions	B	C	C	D
	Social service facilities	D	C	C	C
	Administrative divisions affect	C	A	B	D
	Qiang culture shaping and display	A	A	C	C
	Environmental landscape conditions	A	A	C	D
Comprehensive Evaluation		A	D	C	D



2.1 Beichuan reconstruction planning

**2、Town System Planning of Beichuan County ; the spatial structure of county urban**


A central heart: the new county seat of Beichuan, the industry gathering area of the population of the whole county;

Multi-points: refers to the the village system adjusted mountainous township;

Multi-corridors: refers to the combination of the main road, along the sides of the road layout of the industrial and residential areas, tourist areas and agricultural industrial area. Emphasized by the construction of the road traffic, providing high standards of protection for the mountain's lifeline corridor.

Grade	Scale (Million)	Before the earthquake, urban system planning		Restoration and reconstruction of towns and villages System Planning	
		the number of Towns and villages	Town name	the number of Towns and villages	Town name
1	5-10	2	北川县城(由曲山镇、擂鼓镇组成)	1	北川新县城(含安昌镇)
2	0.5-2	--	--	3	永安、擂鼓、禹里
3	0.2-0.5	7	通口、桂溪、小坝、坝底、禹里、陈家坝、片口	4	坝底、香泉、小坝、通口、
4	<0.2	11	青片、白坭、漩坪、开坪、白什、桃龙、墩上、马槽、都坝、贯岭、香泉	14	桂溪、陈家坝、片口、青片、白坭、开坪、白什、桃龙、墩上、马槽、都坝、贯岭、漩坪、曲山(任家坪)
总计		20		22	



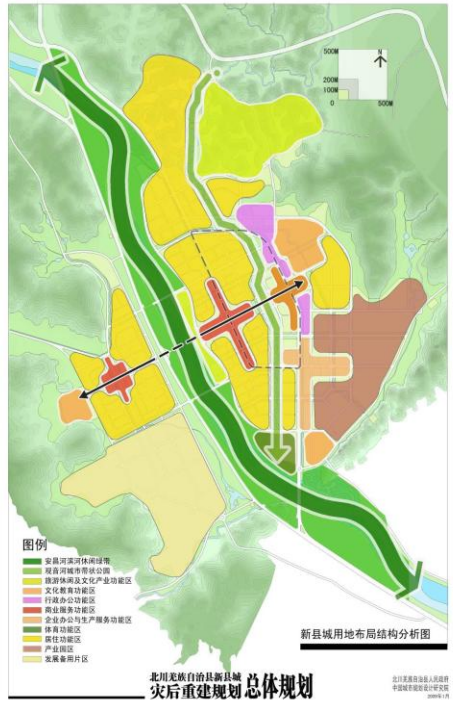


### 2.1 Beichuan reconstruction planning

**3. The master planning of the new county seat of Beichuan:**

**the land use structure:**

- A gallery
- A Link
- A Region
- A shaft

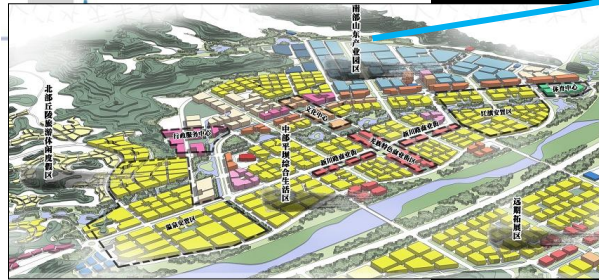


图例

- ▲ 宝泉河滨河休闲设施
- ▲ 岷江河城市带状公园
- ▲ 旅游休闲及文化产业功能区
- ▲ 文化康乐功能区
- ▲ 行政办公功能区
- ▲ 商业康乐功能区
- ▲ 居住办公与生产服务功能区
- ▲ 居住功能区
- ▲ 产业功能区
- ▲ 发展备用片区

北川羌族自治县新县城灾后重建规划总体规划


## New Beichuan's Construction




**Recovery Plan**


year	2015	2020
Population	50 thousand	70 thousand
Land scale	6km <sup>2</sup>	7km <sup>2</sup>


**Industry Development Park**



Start from June 8, 2009











Good Bye to temporary housing from January 1, 2011



**Recovery Goal :**  
**new industrialization and new Urbanization, promoting the economic to make rapid progress.**

The basic goal of the Three Year Program (2008-2010) :

- First year: life and housing recovery
- Second year: total recovery
- Third year: construction and development

加快灾后科学重建  
 确保人民安居、安定、安心

一年重点安民  
 二年全面恢复  
 三年...安

## 2.2 Counterpart's Assistance

**Reconstruction of counterparts:**  
Shandong Province (overall economic ranking the top three).  
**1% of annual revenue support is scheduled for a total of 3 years support 121 million Yuan.**

**the reconstruction projects:**

- Housing construction in rural areas
- Township resident construction
- The new county seat of Beichuan.
- Beichuan County Industrial Park: 24 enterprises signed an investment contract (Shandong, 21), the estimated total investment of 14.1 billion yuan.
- training and services on Health and human resources: training and government cadres, professional and technical personnel more than 600 persons.

	Reconstruction projects (Number)	Investment (million)
Overall	369	121 (279)
Housing construction in rural areas and Township resident construction		19.2
The new county seat of Beichuan and Beichuan County Industrial Park	59	43

	山东省	北川县
1	济南	擂鼓镇
2	青岛	曲山镇、陈家坝乡
3	淄博	香泉乡
4	枣庄	小坝乡
5	东营	坝底乡
6	烟台	濛坪乡、白垭乡
7	潍坊	桂溪乡、贯岭乡
8	济宁	马槽乡
9	泰安	墩上乡
10	威海	青片乡
11	日照	桃龙乡
12	莱芜	开坪乡
13	临沂	通口镇
14	德州	白什乡
15	聊城	片口乡
16	滨州	禹里乡
17	菏泽	都坝乡

## Counterpart support from Shandong Province

30,000 workers and worksites

## Plans of Counterpart Support (对口支援)

1	Shandong Province	Beichuan County, Sichuan Province	<ol style="list-style-type: none"> <li>1. Provide plans, architectural design, expert consultation, construction and supervision services.</li> <li>2. Construction and rehabilitation of urban and rural residential housing.</li> <li>3. Construction and rehabilitation of schools, hospitals, radio and television, culture, sports, social welfare and other public service facilities.</li> <li>4. Construction and rehabilitation of rural roads for water, gas, sewage and waste disposal infrastructure.</li> <li>5. Construction and rehabilitation of agriculture, rural infrastructure.</li> <li>6. Provide machinery and equipment, equipment tools, materials and other support. Selected teachers and medical personnel, training, off-site nursery school, labor input and output, agricultural science and technology and other services.</li> <li>7. According to market-oriented mode of operation, to encourage enterprises to invest and build factories, to construct trade flows and other market services; participation in the operation of infrastructure.</li> <li>8. Other content of counterpart support mutual agreement.</li> </ol> <ul style="list-style-type: none"> <li>• 1% of annual revenue support is scheduled for a total of 3 years support 45 billion Yuan. Utill May 10, 2011, 4,121 pieces of counterpart support project, supportive funds 84.38 billion Yuan.</li> <li>• 18 provinces support Sichuan with 2740 cadres, 31 million staff for reconstruction, and 29400 of teachers, policemen and other doctors.</li> </ul>
2	Guangdong Province	Wenchuan County, Sichuan Province	
3	Zhejiang Province	Qingchuan County, Sichuan Province	
4	Jiangsu Province	Mianzhu City, Sichuan Province	
5	Beijing	Shifang City, Sichuan Province	
6	Shanghai	Dujiangyan, Sichuan	
7	Hebei Province	Pingwu County, Sichuan Province	
8	Liaoning Province	An Prefecture, Sichuan Province	
9	Henan Province	Jiangyou City	
10	Fujian Province,	Peng City, Sichuan Province	
11	Shanxi Province	Mao County, Sichuan Province	
12	Hunan Province,	Li County, Sichuan Province	
13	Jilin Province	Heishui, Sichuan Province	
14	Anhui Province	Songpan County, Sichuan Province,	
15	Jiangxi Province	Xiao Jin County, Sichuan Province	
16	Hubei Province	Hanyuan County, Sichuan Province	
17	Chongqing City	Chongzhou, Sichuan Province	
18	Heilongjiang Province	Jiange Prefecture, Sichuan Province	
19	Shenzhen, Guangdong Province	deep geographical victims in Gansu Province	
20	Tianjin City	Deep geographical victims in Shaanxi Province	



### 2.3 Life Reconstruction and Development

#### □ Residential housing construction:

The principle of resettlement is "Local, nearby, decentralized". Housing repair and reinforcement of **29,796** urban and rural residents and **57,060** urban and rural housing reconstruction is fully completed. **11,823** tolls landless peasants are properly placed, to stay in the new county seat of the old county of **10,147** people in disaster areas and land acquisition and relocation of the new county seat of the masses through public Yaohao housing allocation.



#### □ the post-disaster living allowance:

The grants are paid by the civil affairs departments to the objects of the assistance monthly.

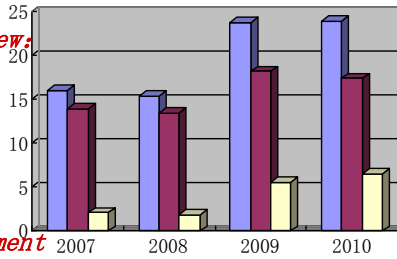
- 1) Temporary living assistance includes grants and relief food. The relief object no room to live, no production and no source of income for people in financial difficulties. Subsidy standards for grants are 10 yuan per day per person, and 1 kg of grain products. The support aduration is three months.
- 2) the tolls "solitary" (orphans, lonely old, orphans and disabled) staff subsidies per person, 600 yuan per month, affected the original "three-alone" make up to 600 yuan per month per person. The support aduration is three months.



## 2.4 Socio-Economic Development

### Population

#### Development Overview:



■ 年底总人数 (万人)  
 ■ 农业人口 (万人)  
 ■ 非农业人口 (万人)

### Economic development

#### Overview:

Years	Primary industry		Secondary industry		Tertiary industry		Gross (Million)	Per capita (Million)
	Numerical (Million)	Proportion (%)	Numerical (Million)	Proportion (%)	Numerical (Million)	Proportion (%)		
2007	43215	0.31	55422	0.40	39012	0.28	137649	8598
2008	31958	0.31	37548	0.37	32188	0.32	101694	6735
2009	56417	0.30	65619	0.35	65725	0.35	187761	8693
2010	60539	0.26	97066	0.41	76756	0.33	234361	10014

## 2.5 Evaluation of Socio-Economic Benefits

1. Accelerating the towns municipal facilities construction

2. Accelerating the towns municipal facilities construction

3. Improve the social security and disaster prevention system

4. Adding measures to solve the employment problem





## 2.6 Post-disaster Revitalization and Development Planning

The main objectives are: to achieve average annual growth rate of 15% of the county's GDP in 2015 reached 48 billion, with a per capita GDP of more than 20,000 yuan and strive local fiscal revenue reached 800 million yuan.

□ **Focus on scientific planning, Optimize the pattern of economic development**

□ **Focus on four modernizations linkage, Build modern industrial system**

Build "Chinese Qiang City" and "Chinese Thanksgiving cultural city", and vigorously promote cultural tourism products. The county realized a total tourism income of 900 million yuan in 2015.

□ **Focus on infrastructure, Improve the environment for economic development**

□ **Focus to investment, Promote regional economic cooperation**

□ **Focus fiscal and financial, Enhance the level of security services**

□ **Focused on improving people's livelihood, Improve the quality of life of the masses**

□ **Focus innovative management, maintain social harmony and stability**

□ **Focus on administrative efficiency, strengthen the government itself**

## Resilience School Reconstruction: Beichuan Middle and High School (北川中学校)

◆ 15Ha, **72,000M2**; Ethnic Building, Seismic intensity of 8

◆ Residence of 5,200 Students, Disaster Shelter for 10,000




## 2.7 Disaster Prevention and Mitigation Education Development

- *Protection and future planning of earthquake ruins:*
- *Comprehensively improve the disaster defense ability:* Focus on the construction of emergency system, and strengthen the awareness and skills of public emergency disaster prevention and mitigation. In 2013, Beichuan County can basically resist the local 6.5 earthquake capacity (equivalent to the the basic intensity) of the various regions.
- *the activities of disaster prevention and mitigation:* The Disaster Mitigation science education want to do "Six into" Into organs, into the schools, into the rural areas, into enterprises, into communities, into the family.




## Qiang Ethnic's Tourist and Shopping Center





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## PART 3

### Earthquake Ruins Area Basic Situation


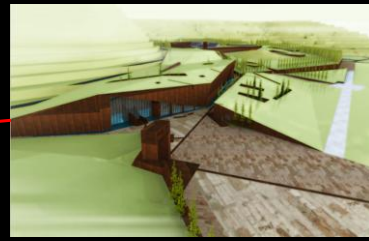



### Wenchuan Earthquake Site of the Memorial & Protection Zone Planning



total area of 91.1 km<sup>2</sup>

1. Beichuan ruins
2. Tangjiashan barrier lake
3. Beichuan Earthquake Museum



## Wenchuan Earthquake Site



Open, May, 2011  
2 million visitors

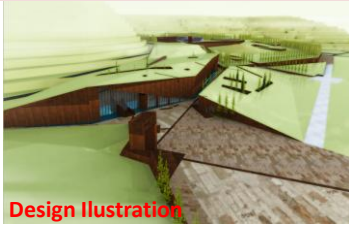


## Protection measures





## 5.12 Wenchuan Earthquake National Memorial Museum



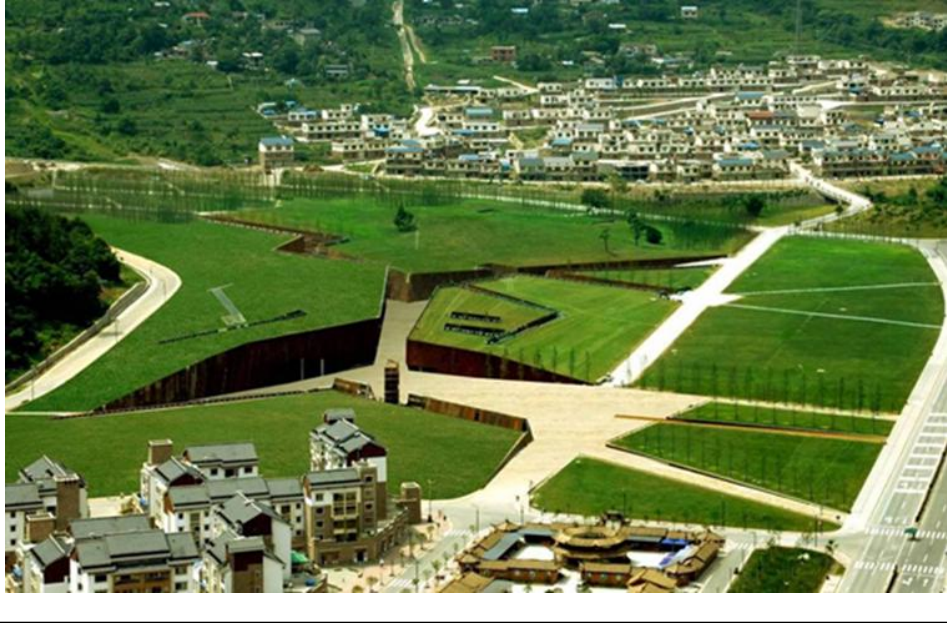
1. Outline: The area of Earthquake Memorial Museum is 14,230,000 m<sup>2</sup>, building area is 14,280 m<sup>2</sup>, exhibition area is 10,748 m<sup>2</sup>. The memorial museum is designed with cracks in the ground, the time of the devastation is marked on the ground in the shape of lighting as a permanent remembrance to future generations.
2. Function: Exhibition, commemoration, disaster prevention education, research, training, international exchange



**Two Years Construction**



## "5.12" Wenchuan Earthquake Memorial



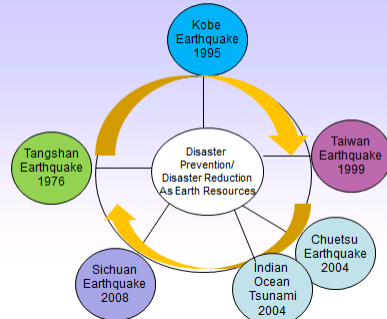
five halls: the hall of disaster , the hall of earthquake relief, the hall of reconstruction, the hall of great spirit and the tail hall.





## The Resilience Recovery and Resilience Development Strategy and Plan in Wenchuan Earthquake Site and Effected Area


- National Disaster Education Center
- Intentional Disaster Education Cooperation Center, for example DRI, Taiwan 921 Earthquake Education Park, etc.
- Improve Disaster Culture of Qiang Ethic to integrate into Regional Social and Economic Development.
- To built the date Bank of Wenchuan Earthquake Memorial as



Exchange with DRI and Taiwan 921 Earthquake Education Part







4 Experience and Inspiration

- ❑ *Experience and Enlightenment:* ➔
- ❑ *Reconstruction mode:* ➔
- ❑ *Problems:*

- ❑ *Respect for the rule, and reconstruct scientifically*
- ❑ *Serve for the people, and the masses are the main*
- ❑ *Turn crises into opportunities, and seize the opportunity*
- ❑ *Thanks giving, Endeavour, and self-improvement*
  - *the urban reconstruction mode*
  - *the rural housing reconstruction mode*
  - *the industrial rebuilding mode*
  - *the counterparts reconstruction mode*

## Characteristics of Beichun Post-Earthquake Recovery and Reconstruction

1. **Political Recovery:** Strong Power including the political Power of China Communist Party and administrative ability of Governments.
2. **Central Control Recovery:** Recovery management under the Central Government.
3. **Growth Style Recovery:** Important financing condition with a high growth of GDP.
4. **Land revolution Recovery:** the land is town ownership and village ownership, not private ownership.
5. **Counter Partnership Recovery:** The strong supported from other governments.
6. **International Supporting Recovery:** A lot of Supports from international organizations, foreign countries and NGO with finance and good idea.
7. **Ethnic Resources Recovery:** tourism
8. **Open in Recover and Reconstruction Planning**

## Problems in Beichuan Earthquake Recovery

1. Considered that speed of recovery was important and disregarded the recovery risk.
2. Shortage of technical experts and staves in the public Servers, for example school and hospitals, although there were built perfectly.
3. Sustainable development problems in disaster prevention and ecological system recovery, such as landslide.
4. Reducing employment chance after the recovery.
5. Increased poverty in the rural area that Percentage of the 2516 poverty villages increased from 11.68% to 34.88%.
6. caused new unfair between the disaster area and no-disaster area, especial the rural area.
7. Maintenance of Older Beichuan Earthquake Site

**四川大-香港理工大学 灾后管理与管理学院**  
**Institute of Disaster Management and Reconstruction (IDMR),**  
**Sichuan University – Hong Kong Polytechnic University**

Proposed design



Completed    Approx. 17,000 m2



- ◆ 6 departments : Disaster Medical Department, Reconstruction Planning Engineering Department, Restoration Sociology Department, Restoration Economics Department, etc.
- ◆ 3 research centers : Hong Kong Horseracing Association Disaster Science and Research Center, Disaster Restoration Research Support Center
- ◆ Undergraduate, Masters, Doctorate

**September 2011**  
11 members of inaugural class of doctorate course





