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**Disaster Recovery and Rehabilitation Experience of
a Centrally-Planned, Self-Constructed Village - Case
Study of One Village After Sichuan Wenchuan
Earthquake in 2008**

Submitted by: Sichuan University (SCU)



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Disaster Recovery and Rehabilitation Experience of a Centrally-Planned, Self-Constructed Village

-- Case study of one village after Sichuan Wenchuan earthquake in 2008

LUO Qian, College of Architecture and Environment, Sichuan University

Agenda

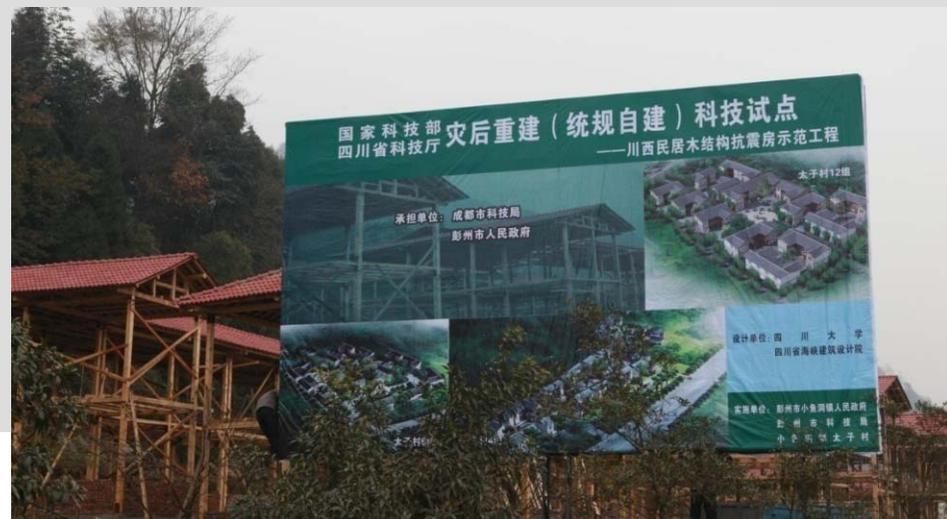
- I. Background
- II. Reconstruction Options
- III. The Case of Taizi Village
- IV. Results
- V. Learning
- VI. Talent Development

A. Background

- About our project

After the Sichuan Wenchuan earthquake hit, devastated villages urgently needed scientific planning for residential quarters, architectural knowledge and technical support for safe housing.

Disaster Recovery and Rehabilitation (DRR) project team of Sichuan University College of Architecture and Environment participated in rebuilding Taizi village of Xiaoyudong town, Pengzhou city, Sichuan province. The project was championed by China's Ministry of Science and Technology and Sichuan Bureau of Science and Technology. By applying advanced and practical technologies, the project aims to provide a DRR model and technical support, build up disaster resilience and promote sustainable development.



A. Background

- About the disaster

■ Wenchuan earthquake

The earthquake of magnitude 8.0 M_s that hit Wenchuan, Sichuan province on May 12, 2008 caused rarely seen catastrophe to local ecology, environment and human habitat. Rural houses accounted for 60-70% of all collapsed and damaged houses in Sichuan.



Background

The Disaster

Effects in Pengzhou city

Damages to rural housing. Among 202,324 rural household houses,

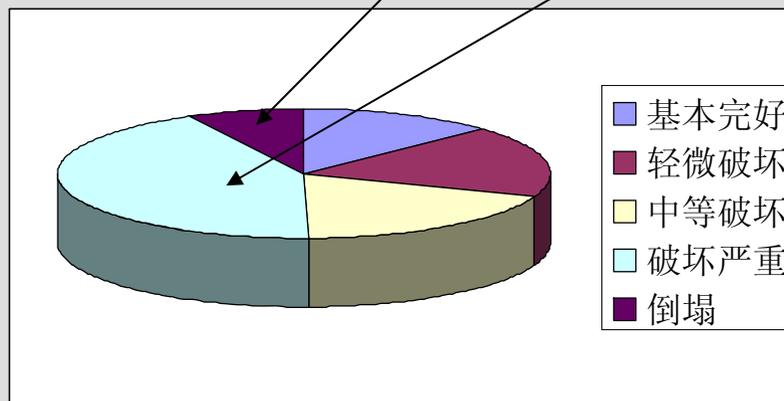
25,673 were still sound (12.65%);

36,974 minor damages (17.07%);

37,909 considerable damages (16.73%);

85,859 severe damages (43.32%);

15,909 collapsed (10.22%).



3. About Taizi village

Overview

- Taizi village of Xiaoyudong town is located at the northwest edge of Sichuan Basin. It is 32km and 72 km northwest of Pengzhou county and Chengdu city respectively. It is a key town on Pengzhou-Baishui road which links northern towns to the Pengzhou county center. It is also a key pass to Longmen mountain Yinchanggou national-accredited scenic area. At foot of mountains, the village is abundant in natural resources and beautiful scenery. It occupies about 2.4 hectares of land.



4. Effects in Taizi village



Effects

Most houses collapsed or were destroyed. Some households had just invested savings and borrowed money to build their houses, and now they were left with virtually nothing. Most households moved to government sponsored shelters, and a few chose to stay at remains of their original housing supported by some temporary structures.



Reconstruction Options

Exploring options

- 1. Problems and challenges Taizi village faced
 - Changes in landform
 - Changes in private lot
 - Severe damage to houses
 - Government guidance and administration
 - Value chain affected
 - Reconstruction capital limited
 - Mentality after the disaster

Reconstruction

Problems and challenges

- Changes in landform

Landslides, broken bridges and collapsed houses all contributed to changes in village landform and reduced availability of private lots for reconstruction. Landform changes affect choice of reconstruction sites.



Reconstruction

Problems and challenges

- Changes in private lot



Changes in private lot on which to build own house and courtyard will cause primary social relationships in the village to reshuffle. The original set of social relationships based on blood and/or proximity will be replaced by a new set of relationships to be built. Such fundamental root changes could cause conflicts in the new community and affect sense of belonging among the village survivors.

- Severe damage to houses

Before the earthquake, 26% of houses in Taizi village were built of bricks and concrete, 22% of column and tie structure, and 52% of brick and wood. Most of the houses were old, and substandard in quality due to use of simplistic materials and structures. After the quake, almost all houses were damaged and no longer safe. Only a few wood structure houses survived the quake.

To what extent should we preserve the look of traditional houses? How should we balance traditional look and modern comforts, making the houses resilient and cozy at the same time? We had to address these two questions.



- Government guidance and administration

On the one hand, planning and coordination by the government and other organizations helped to introduce and allocate capital, technology and construction staff and equipment, which were fundamental to reconstruction. On the other hand, if the government takes care of everything, villagers will become dependent, their own initiatives and resilience are stifled, not conducive to future long-term economic and social development.

- Value chain affected

Before the quake, 60% of villagers were engaged in agricultural activities. After the quake, such activities were terminated, and poultry and aquatic bases destroyed. Villagers lost their livelihood. They had to make new choices and face new challenges, as previous value chain is broken.

Taizi village has ecological natural environment, post-quake new village look, and visible earthquake impacts, which are unique resources for tourism. The challenge is how to monetize them to benefit the villagers.

Reconstruction

Problems and challenges

- Reconstruction capital limited

About half of households make RMB4,000-5,000, 25% make RMB10,000 and the rest 25% make more than RMB10,000 annually. A household has 53.09 sq. meters in living area and 250 sq. meters of courtyard, on average. More than 70% of households borrow (from others or banks) to build new houses.

- Mentality after the disaster

The villagers have a strong desire to build houses anew on their original private lot. Government sponsored shelters were small for them, and temperatures fluctuate with outside. In summer it could be 40 degrees Celsius and in winter very cold. Most villagers want to make a living by entertaining tourists in their house.



- 2. To identify options,
 - Respect villagers desires;
 - Consider overall land availability and usage;
 - Consider original social network;
 - Remember options are affected by portfolio of livelihoods.

Three main options were identified based on post-quake statistics.

Centrally designed and built

Centrally designed and self built

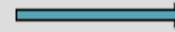
Self built on old site

Main features

Options	Centrally designed and built	Centrally designed and self built	Self built on old site
Definition	Centrally plan and construct new rural communities and residential quarters	Centrally plan and farmers self construct new rural communities and residential quarters	Residential quarters that comply with reconstruction and disaster mitigation plans can be rebuilt on old site
Changes in private lot	Return private lot to be used for farm	Return private lot to be used for farm	No changes
Availability of land	Not dependent on land availability	Not fully dependent on land availability; but need some space	Dependent on land availability; land reserved for future development
Portfolio of livelihoods	Secondary and tertiary industries	Combination of primary industry (farming, forestry, animal husbandry and aquaculture) and tourism and catering industry	Mainly traditional farming, forestry, animal husbandry and aquaculture; supplemented by tourism

Hence, an approach that is

- appropriate for disaster recovery and rehabilitation in remote regions populated by poor farmers,



Centrally planned
and self built

- and a technology that is appropriate for DRR requiring little cost and technical input yet safe, environmental and cozy.



New wood
structure houses



1. Scientific planning
2. New wood structure house
3. Government's role in organization
4. Community's participation

1. Scientific planning

Layout design

Stick to Diversity, Compatibility, Sharing and Development principles in designing rural residential quarters that exhibit local Sichuan styles.



- Village layout design that conforms to local customs and lifestyles



- Final design was based on both traditional column and tie structure and modern wood structure, and the resulting new design is more resilient to disasters, cozy, environmental and low cost.



Comparisons

Types		Traditional column and tie structure	Modern wood structure	New wood structure
F e a t u r e s	Price	Low (RMB500-600/m ²)	High (RMB>3,000/m ²)	Low (RMB700//m ² incl. basic interior decorations)
	Processes	Low requirement on timber (log), all manual, slow	High requirement on timber (imported converted timber), mass produced, easy to assemble	Introducing modern wood structure, and simplifying and improving the traditional column and tie structure
	Look	Shabby	Elegant	Elegant
	Durability	Poor in insulation, noise absorption, prevention of fire, humidity, decay and bugs.	Good performance in prevention of fire, humidity and ants	Good performance in insulation, noise absorption, and fire prevention
	Anti-shock	Good	Excellent	Good
	Applicability	Farmers are familiar with the processes	Extensively used in developed countries	Good value for money, suitable for farmers to build on their own

1. Improved structure

Even simpler, easier to mass produce and connect, more secure



2. Improved space layout

Better natural lighting, air exchange and sanitary conditions, meeting modern lifestyle needs.



3. Improved walls

Mass produced, environmental wall filings that improve insulation and comforts.



4. Different look options



5. Can go for high-end interior, depending on affordability and preference



- Government takes charge of planning, thus ensuring scientific and rational approach in DRR through technology and organization.



4. Community's participation



- Community takes part in DRR

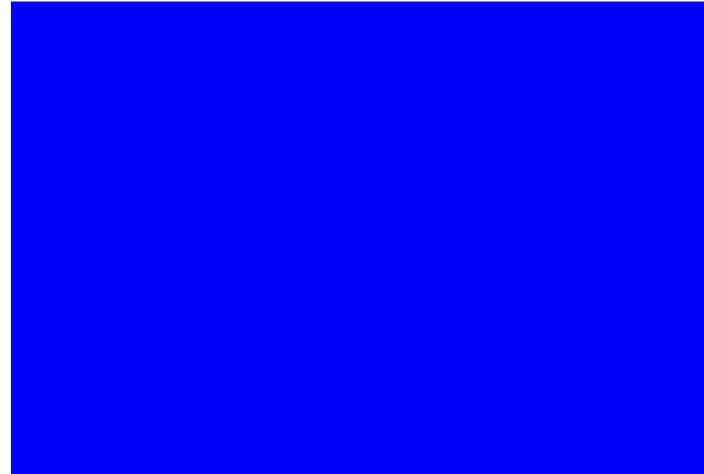
1) Villagers join in choosing village site and discussing village layout. Their opinions were collected and coordinated.



2) Villagers help each other to build own homes. They established teams to identify construction staff, negotiate price, supervise process to optimize cost and quality.



DRR



DRR results

■ Response



DRR results

■ Moving to new life



DRR results

- Dissemination – Coverage by Science Channel, Sichuan TV Station



DRR results

- New wood structure houses in Qingchuan and Pingwu counties



Learning

- What we learned from DRR post Wenchuan-earthquake:

DRR is not simply rebuilding everything tangible. It should be combined with Building New Rural China Initiative. Change lagged lifestyles and livelihoods in rural areas, and reconstruct physical and spiritual homes on a higher level.

Learning

1. Government assumes leadership role, experts provide guidance, and people take part. This help to ensure quality and efficiency of DRR.



The government provides central planning and coordinates urban and rural development. This is fundamental to ensure scientific and rational approach of DRR through technology and organization deployed. It is crucial to make villagers understand community involvement protects their own interests. Their participation helps to foster sense of value and contribution to community development, thus to build stronger communities.



Centrally planned and self built, it is a good house when it fits you. When temperature falls, our body needs warmer clothes. No housing, no peace of mind.



Self funding, government contribution, donations, financial resources from banks and market, all help to build home better and sooner.

Learning

1. Government assumes leadership role, experts provide guidance, and people take part. This help to ensure quality and efficiency of DRR.



Most disaster-affected areas are remote mountainous regions. Because of lagged economic development, low income, and little affordability, scientific support (design and construction) was not available to the farmers. They copied design of neighbor's houses, structures were simple, and anti-shock was not a considered. This time, government assumes leadership role, experts provide guidance, and people take part. Lifestyle, livelihood and ecology can exist in harmony, and economic, social and environment development are all considered.



Learning

2. Appropriate technology boosts sustainable development



Farmers' values, wish-list and aesthetic preferences are shaped by urban apartment buildings. They think brick and concrete buildings are more modern. Government guidance is needed to change their beliefs. Rebuilt houses need to be safe and environmental at the same time.

Applying appropriate construction technology is important in reducing building energy consumption, impact on the environment as well as cost while improving living comforts. DRR strategies that are energy-efficient and environmental through appropriate construction technologies can better facilitate sustainable development of rural housing.

Learning

3. Centrally planned and self-built housing facilitates creation of rural harmonious society



1) When people takes initiative to build their new homes, they develop a stronger sense of ownership, as well as acknowledgement, acceptance, tolerance and care behavior and attitude for others and for the new house in new place.

2) Self initiative and mutual assistance reduce their dependence on the government. They develop stronger sense of their value. They also help build stronger ties with neighbors and sense of belonging to the new community.



3) Self-built houses incorporate farmers' own adaptations and preferences in room layout, exterior decorations and wall materials to suit their own needs and lifestyles, as long as the houses are safe and well structured. It also produces a variety of looks. Using local building materials helps to restore local damaged views and preserve local traditional culture.



Learning

Central planning and guidance draws people together to work and inadvertently return to normal life. Huge potential social and political costs are averted. People begin to collaborate and enjoy each other. Using local building materials they know of help to calm and cure the shock and pain they experienced.



- Our faculty and students
- Grassroots level village cadres
- Professionals (Disaster Recovery and Rehabilitation Institute)

第八届中国环境艺术设计学年奖获奖结果

Receives gold medal for design of Taizi village

本科组金银铜

环境艺术设计景观奖	金奖	南京艺术学院设计学院	运河5号（工业遗存变身创意产业园区改造设计）	袁力	韩巍、姚翔翔、金晶
		四川大学建筑与环境学院建筑系	四川省彭州市小鱼洞镇太子村灾后新农村景观规划设计——“SEVEN”灾后新生态、生产、生活	鲍捷、马琳	罗谦
	银奖	上海大学美术学院艺术设计系	滨水工业遗址公园景观	王琚 王嫣	田云庆
		中国美术学院环境艺术系	Recycle的花园	何洋、吴沈懿、晋亚日	沈实现
		哈尔滨工业大学建筑学院艺术设计系	侵华日军第731部队遗址公园景观规划与设计	魏铭	赵晓龙、邵龙
	铜奖	合肥工业大学建筑与艺术学院艺术设计系	足下的原风景——逸夫建筑艺术馆景观设计	郑云	陈刚、魏晶晶
		哈尔滨工业大学建筑学院建筑系	国家开发银行黑龙江省分行办公楼设计	李宗渝	邵郁
		西北农林科技大学艺术系	秦二世遗址公园景观与景观设施设计	王洋	刘艺杰、陈敏
		哈尔滨工业大学建筑学院艺术设计系	唐山市唐丰路街道景观环境艺术设计	金梦	吕勤智 ;于稚男
		广东工业大学艺术设计学院环境艺术设计系	《广州海事文化工业公园总体规划设计》	程结成	王萍
		深圳大学设计学院环艺术设计系	时与思	张伟福 杨文龙	蔡强
		西北农林科技大学艺术系	折纸博物馆广场景观与景观设施设计	董洁	陈敏、刘艺杰
		江南大学设计学院建筑与环境艺术系	青岛小港湾滨海景观设计	李萌	史明
		中国美术学院环境艺术系	竹·树——浙江安吉竹博园规划改造设计	杨洋、宋雯、林墨洋	林墨洋
		清华大学美术学院环境艺术设计系	南通唐闸工业遗址景观设计	吴尤，毛晨悦	苏丹，郑宏，于历战
	华南理工大学建筑学院	深圳蛇口海上世界景观规划与设计	刘浩然	谢纯，萧蕾，李博懿	

Grassroots level village cadres

- The DRR project was supported financially by USAid, and a collaboration with The Asia Foundation.

1) DRR training and disaster mitigation education for rural cadres.



Compiled Guide on safe reconstruction of villages



- PPT file and DVD for training



- Guide and Posters



■ Training on safely building houses



Talent Development

PPT presentation



On-site instructions



Annex I: Disaster Recovery and Rehabilitation Institute (research entity)

The Sichuan Wenchuan mega earthquake on May 12, 2008 caused huge casualties and damages. Sichuan University and Hong Kong Polytechnic University partnered in June 2008 to create Sichuan Post-earthquake Recovery and Rehabilitation Assistance and Research Center, an effort by two public universities dedicated to serving the people and country. Our goal is to mobilize and coordinate professionals of different disciplines at both universities to join hands to contribute high-quality science and technology assistance, research and service to disaster relief, recovery and rehabilitation, and long-term community development in the disaster-hit areas.

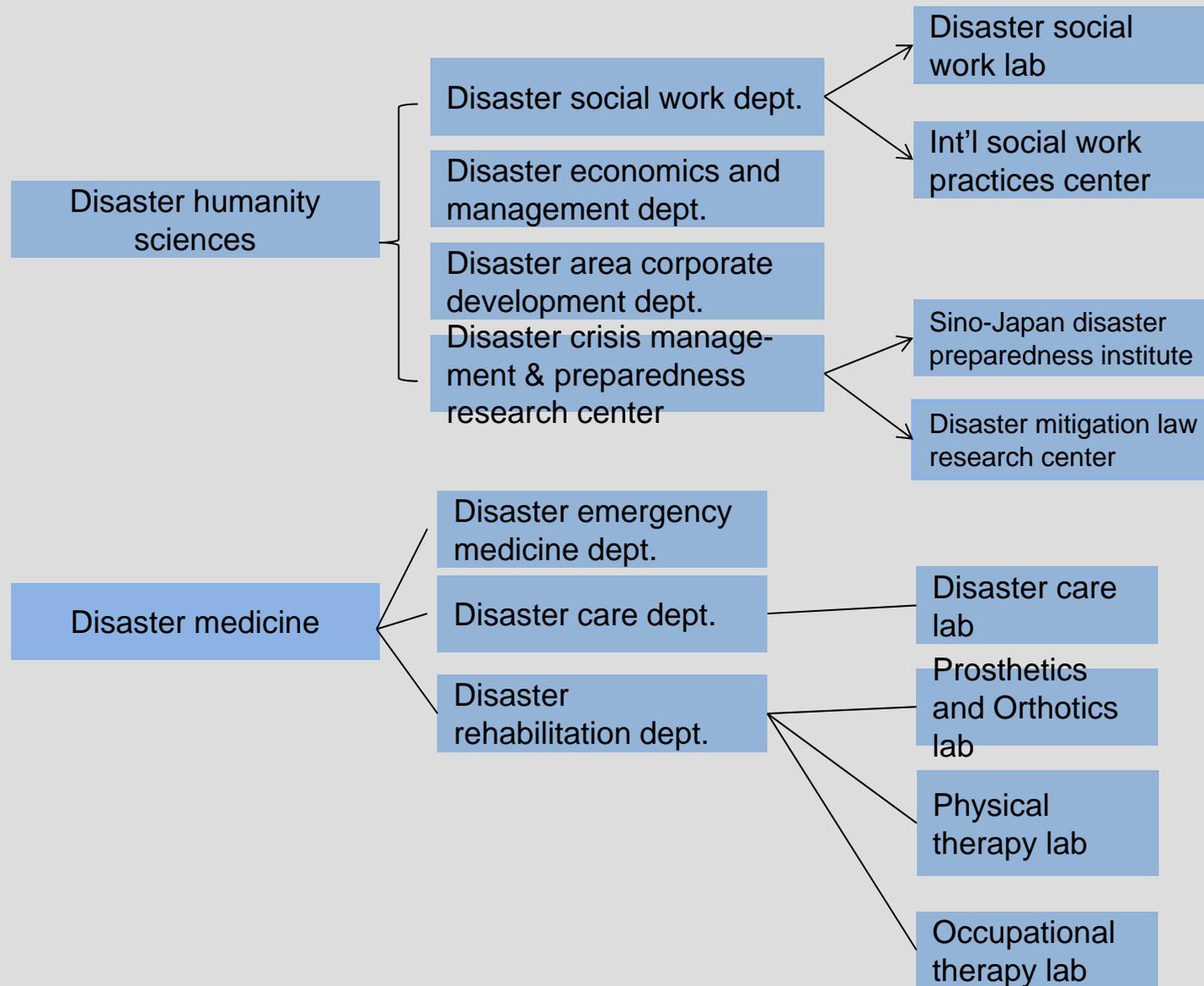


Annex I: Disaster Recovery and Rehabilitation Institute (research entity)

- **Purpose:** To train professionals in disaster mitigation, recovery and rehabilitation, and to provide scientific research and social service, so as to improve scientific level and management expertise in disaster resilience, thus minimizing human casualties and property loss and facilitating sustainable development.
- **Goal:** Build an open, multi-disciplinary, international and sustainable disaster recovery, rehabilitation and management school that integrates scientific research, talent development and social service.

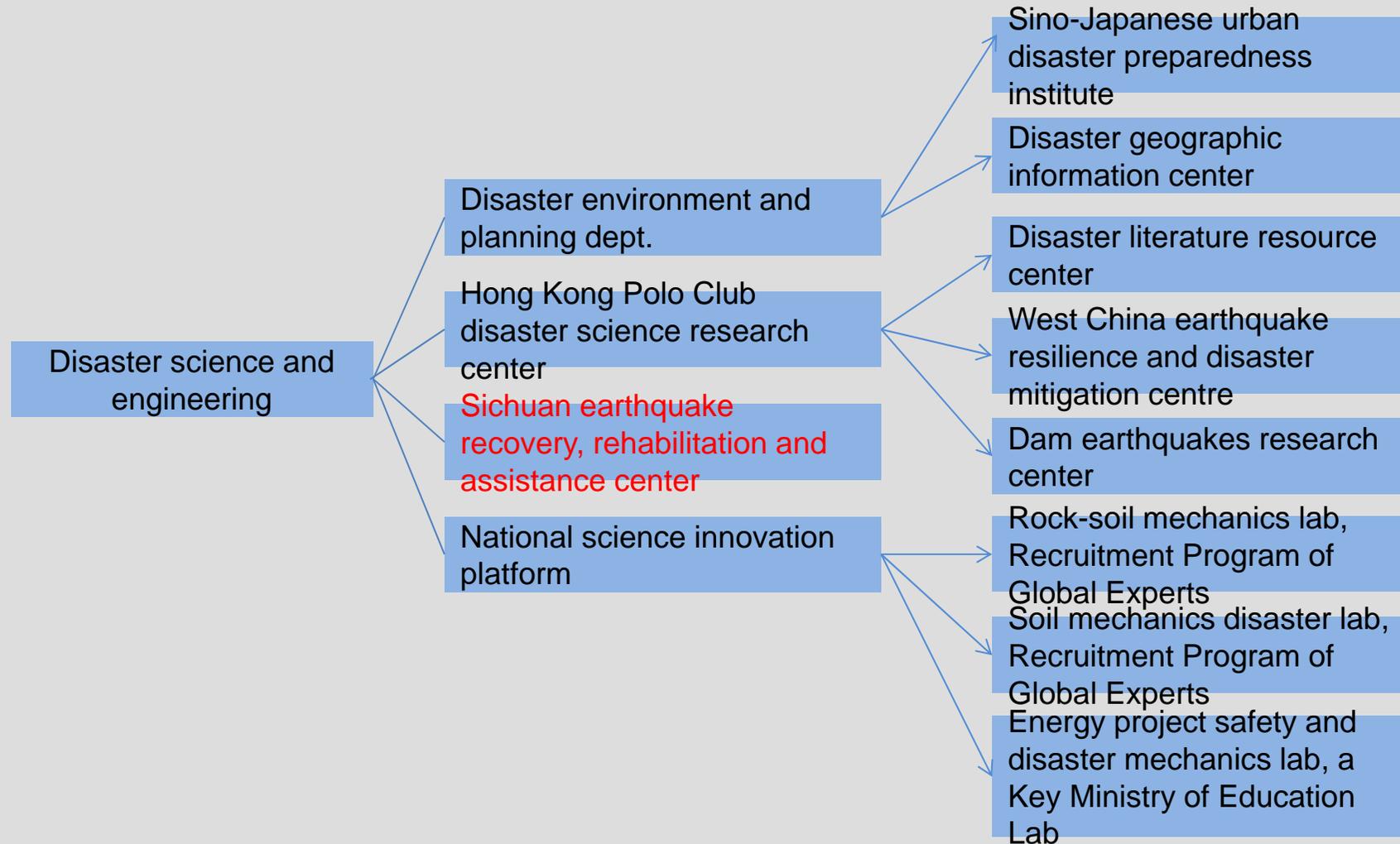
Annex II

Departments and centers



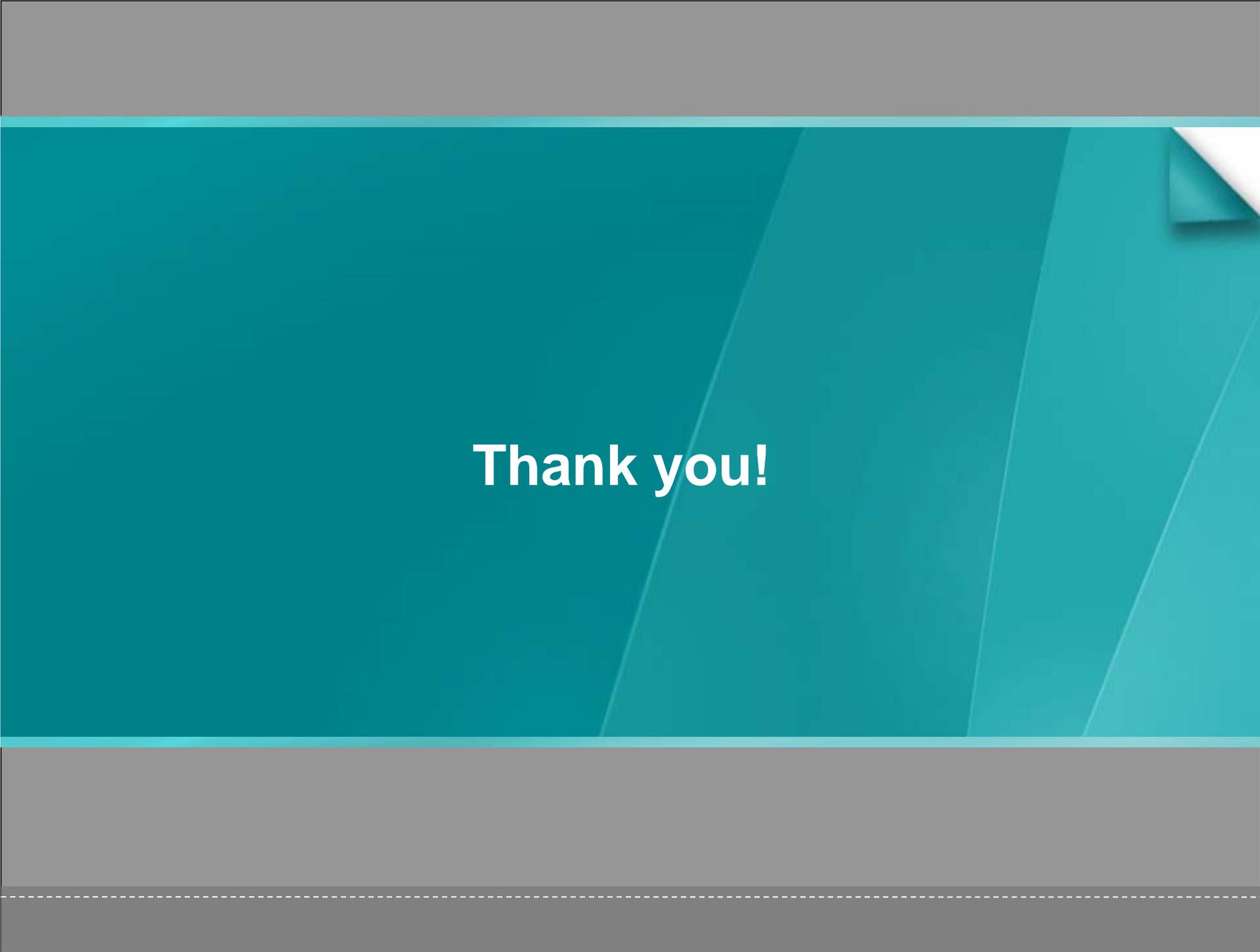
Annex II

Departments and centers



Summary

- In remote regions with less household income, using centrally-planned and self-construction organizational approach, and low-cost yet safe, environmental and comfortable disaster recovery and rehabilitation technology can effectively reduce energy consumption and house building cost, providing a good example of housing construction for rural residents. The resulting model represents a good approach for village recovery and rehabilitation and safe rural construction.



Thank you!