Comparison of Damaged Heritages in 512 Earthquake and 420 Earthquake

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A magnitude 8.0 earthquake caused severe damage of heritages in Sichuan Province in 2008. After 5 years, a magnitude 7.0 earthquake hit this area in 2013. Few heritages were damaged again. Comprising with the damage situation in these two earthquakes, this report will evaluate the problems of disaster preparedness. The purpose of this report is to study lessons of damage heritages after the earthquakes. Also it will be beneficial to the emergence management and protecting against and mitigating earthquake disasters.

Keywords : *512 earthquake, 420 earthquake, heritage prevention, protecting against earthquake*

1. Intruduction

On May 12th, 2008, an earthquake measuring 8.0 on Richter scale hit Wenchuan(汶川), Sichuan Province in China. The earthquake affected ten of China's provinces, 417 counties, affecting a total area of 500,000 square kilometers. It caused 69,226 deaths, 374,643 people injured, and 17,923 people missing (on August 25, 2008 statistics). It was named 512 Earthquake by Chinese government. It was the worst earthquake to strike China since the Tangshan Earthquake in 1976. Also, a large number of local cultural heritages of high value were severely damaged in this earthquake.

After that, an earthquake measuring 7.0 on Richter scale happened in Yaan（雅安）, Sichuan Province in China, on April 20, 2013. It caused 193 deaths, 12,211 people injured, and 25 people missing (on April 23, 2013 statistics). It was named 420 Earthquake (Yaan Earthquake) by Chinese government. Also, some cultural heritages damaged in the earthquake. In this report, based on the investigation and documents, we draw lessons, hoping to minimize the losses of these human precious cultural heritage caused by earthquake through the efforts in future work.

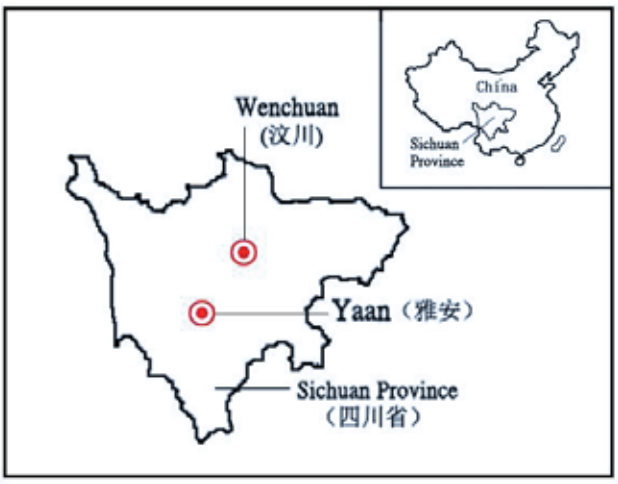

Fig.1 Position of Epicenter Wenchuan and Yaan

2. Damaged Cultural Heritages

In 512 Earthquake, the heritages in seven provinces, including Sichuan Province, were damaged. Totally, 169 national cultural heritages (including 2 world heritages), 250 provincial cultural heritages, 2766 cultural relic collections were damaged. In particular, the heritages in Sichuan province were damaged severely. 83 national cultural heritages, 174 provincial cultural heritages, 803 municipal-county cultural heritages were damaged in the earthquake.

In 420 Earthquake, heritages in Sichuan Province were damaged. Totally, 32 national cultural heritages, 120 provincial cultural heritages, 37 municipal-county cultural heritages were damaged in the earthquake. In Yaan City located in Epicenter, 8 Relics Grade 2, 49 Relics Grade 3, 75 common relics, totally 132 removable relics were damaged.

Fig.2 Damaged historic building in national cultural heritage

Qinglong temple (Fig.2) belongs to a national cultural heritage, established in Yuan Dynasty (1271-1368). It was damaged in 512 Earthquake and restored in five years post earthquake. But it was damaged in 420 Earthquake, pillars and beams were moved by the shake. Fortunately, these damages can be restored in the future.

Fig.3 Damaged relics in 512 Earthquake

Fig.4 Damaged relics in 420 Earthquake

It was shown in the Fig.3, in MianYang Museum, few cultural relic collections were damaged in 512 Earthquake. Some relics without reinforce were damaged during the shake. I believed this is an important lesson in the earthquake. But unfortunately, some relics also damaged in the 420 Earthquake as shown in Fig.4.

Above all, we can know although some historic buildings and relics damaged in the 512 Earthquake, for the government of these heritages, measures were not enough to prevent the earthquake damages.

3. Emergency Response

After Tangshan Earthquake in 1976, there was not a massive earthquake during 32 years. So when the 512 Earthquake happened, the staffs did not know what they should do after this long term. But after an hour the 420 Earthquake happened, the officials in Sichuan provincial Administration of Cultural Heritage began to confirm the staff casualties. And staffs were organized to help others and save the damaged relics. A week post earthquake, restoration team had entered the damaged area gradually. Some irremovable heritages were protected with covered shed protection, a temporary reinforcement. Some removable heritages were protected by their collection, dismantling, parcels and monitoring (Fig.5).

Fig.5 Temporary reinforcement of historic buildings

6. Conclusion

The 512 Earthquake caused the damage of heritages in a large area, not only Sichuan province. But the 420 Earthquake caused the damage of heritages in Yaan City area. Comparing to the 512 Earthquake, although the area is not so large, some heritages suffered a severe damage. Undergoing the 512 Earthquake, the staffs in Administration of Cultural Heritage start to know what they should do post earthquake. Emergency response was better than they did in past earthquake.

Facing the truth of earthquake frequent occurring in China, we draw lessons from the gigantic losses of cultural relics caused by the earthquake through the investigation of the damaged cultural relics. We hope to minimize the losses of cultural heritage caused by earthquake through efforts in future work.

The cultural relics in museum and few historic buildings still lack the essential protection facilities. Without the safe equipment and separate facilities, many cultural relics collections were damaged by dropping on the floor during the earthquake.

Above all, although the earthquake is already in the past, the lessons left to us and even the whole world are hard to forget. It all boils down to one thing that how can we deal with technology, cultural environment and adaptation of the times for the premise of disaster prevention and mitigation, and how to put it all into practice in the design and restoration area.

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References

1) Chou, Baoxin: Compilation of post-disaster reconstruction planning, China Architecture & Building Press, 2009.
2) Chinese Society for Urban Studies: Report of Urban Development (2008-2009), China Architecture & Building Press, 2009.
3) http://www.china.com.cn/zhibo/zhuanti/2008-06/06/content_15664770.htm 2008/6/6
4) http://www.ccrnews.com.cn/plus/view.php?aid=45969 2013/4/27
5) http://tupian.baike.com (青龍寺) 2013/5/6
6) http://www.ccrnews.com.cn/plus/view.php?aid=45944 2013/5/6
7) Liu Hongtao: The Recovery and Conservation of a Historic District Post-earthquake, Journal of Asian Architecture and Building Engineering, vol.11 No.2, pp. 269-274,2012.
8) Liu Hongtao: Recovery and Management of Historic District in Post-earthquake, the 11th international congress of APSA, pp.1666-1672,2011.
9) Hongtao Liu: Investigation of Damaged Old Buildings of Historic Town in Sichuan Earthquake, Disaster Mitigation of Cultural Heritage and Historic Cities ,vol.6, pp.305-312, 2012.