

Damage to Reconstructed Settlements Caused by Mountain Disasters in the Wenchuan Earthquake-hit Area

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Abstract: The reconstructed settlements located along the Longmenshan Fault, which was seriously affected by the Ms. 8.0 Wenchuan earthquake, have been repeatedly suffering from mountain disasters since 2010. This phenomenon is common in other earthquake-hit areas and has aroused widespread concern in China. This study aims to find out where and how reconstructed settlements were destroyed in the Wenchuan earthquake-hit zone and why they were affected by new mountain disasters. The study relies on secondary and primary data through a combination of methods including field investigations, document reviews, and semi-structured interviews. Three modes of damage to settlements were distinguished: hit by a single hazard, hit directly by simultaneous multi-hazards, and hit by a chain of hazards indirectly. The first damage mode indicates that a settlement can be destroyed directly or can be buried by single mountain hazard such as single collapse, landslide, flash flood or debris flow, and this damage mode is obvious in dispersed settlements. The second disaster mode implies that a settlement is destroyed directly or buried by multi- hazards or a variety of mountain hazards such as collapse, landslide, flash flood or debris flow, and this damage mode is common in mountainous settlements located on joint alluvial fans or alongside rivers due to intensive soil erosion resulting from the earthquake. The third damage mode implies that the settlement damaged by a chain of hazards indirectly. The worst disasters were attributed to active hazards and inadequate human reaction to the risk from mountain hazards. The analysis showed that unreasonable location of

reconstructed settlements, unsuitable design of disaster mitigation countermeasures, and lack of public precaution and awareness of subsequent hazards were typical man-made factors. This study also revealed that the worse damage to buildings was mainly caused by unreasonable location of reconstructed settlements, in itself due to the urgency of reconstruction, the limited land resources for resettlement construction and cultivation, the lack of public participation in risk assessment for site selection, and the difficulty of identifying potential risk after the earthquake. The impacts of the 2008 earthquake will last for a long time. Pronounced challenges to disaster reduction remain and it is now acknowledged that disaster risk reduction focus on mobilizing people and performing appropriate functions at low cost. The new understanding of risks to reconstruction here can be helpful in settlement reconstruction, land use planning and disaster risk reduction in mountainous areas of the earthquake-hit zone.

Keywords: Wenchuan earthquake; Reconstructed settlements; Damage; Mountain disasters; Disaster risk reduction