Key Problems on Debris Flow Control Engineering after Wenchuan Earthquake in China

Yanchao Gao, Songjiang Zhao, Jiazhu Wang, and Wei Xu  
Chengdu Center, China Geological Survey, Geological Hazards Division, Chengdu±China (gaoyc@imde.ac.cn)

Strong earthquakes often induce a substantial rise in secondary geohazards. This problem has been studied more after the Great Kanto Earthquake in Japan and the Chichi Earthquake in Taiwan. In western China, after the 2008 M$_\text{w}$ 7.9 Wenchuan earthquake, large-scale regional debris flows occurred in 2008, 2009, 2010, 2011, 2013, 2014, and 2019 in the strong earthquake zone. Many control projects have been constructed, including more than 1,000 check dams. Part of the projects were damaged in the subsequent large debris flows. Debris flow after the earthquake is characterized by many loose sources, high frequency and large magnitude. Traditional design parameters and control engineering cannot meet disaster prevention requirements. In the 11 years after the Wenchuan earthquake, our research team continued to investigate the formation of the debris flow in the earthquake area, and summarized the reasons for the failure of the control projects, such as the low estimate of the loose sources and the insufficient design capacity of the check dam. In response to the above problems, we have proposed corresponding solutions, including the optimal combination of different control measures, the design of the dam site and storage capacity, and the structural form of the check dam. This optimization concept has been applied in debris flow prevention such as Qipan gully and Shaofang gully and has achieved good control results. The research provides a reference for subsequent disaster prevention and mitigation in similar earthquake areas.