Research of Landslide Environment Monitoring Technology for Villages at Fluvial Terraces of the Gaoping River Basin of Taiwan

Han Chung Yang1, Chih Chiang Su2, and Yen Chang Chen3
1Shu Te University, Department of Leisure and Tourism Management, Kaohsiung, Taiwan (hcyang@stu.edu.tw)
2National Chung Hsing University, Department of Civil Engineering, Taichung, Taiwan
3National Taipei University of Technology, Department of Civil Engineering, Taipei, Taiwan

A wireless tracer real-time monitoring system was developed and verified to be suitable for the real-time remote dynamic monitoring of typhoon- and flood-related scour at riverbeds and human-made structures (such as bridge abutments, spur dikes, and embedments). This study focused on the use of a wireless tracer to aid the real-time dynamic monitoring of natural disasters, including slope landslides, thus devising a real-time warning system for sediment disaster prevention and response. We selected Dajin Bridge, which is situated at Taiwan’s Zhoukou River, as the research site for deploying the monitoring system. Monitoring stations for detecting changes in the river’s course were established at both a downstream meander of the Dajin Bridge and a nearby revetment. Specifically, scour monitoring columns were separately buried at these two locations. Each column was equipped with five wireless tracers, and 16 coding sand jars were used to facilitate vertical installation of wireless tracers. Real-time monitoring stations for tracking slope changes were constructed using two methods. In both methods, an upright column was used to install the tracers, and a shielding net cover was additionally used in the second method to expand its monitoring range. After several heavy rain events, no slides or landslides were detected by the landslide stations; an on-site investigation corroborated this observation. As for the detection of the change in the river’s course, three wireless tracers were flushed away. Nonetheless, because the scour depth posed no immediate threat to river bank safety, additional safety measures were not required. The remaining wireless tracers were also adequate for the safety monitoring of river banks, bridges, and other structures within the research area. The aforementioned results demonstrate the effectiveness of the devised remote real-time monitoring system for detecting environmental changes. The system can thus provide real-time remote safety information on changes in slope and a river’s course for residents in mountainous areas.