

Erosion processes of the landslide of Mt. Bawakaraeng using multi-temporal satellite images and numerical calculation

Takeshi SHIMIZU^{1*}, Takao YAMAKOSHI¹, Yoshikazu SHIMIZU², Nobutomo OSANAI², Katsuo SASAHARA³, Keiji TAMURA¹, Shoji DOSHIDA⁴, Ken TSUTSUI⁵, Masayuki HITOKOTO⁶, Satoshi TAGATA⁶

¹Public Works Research Institute, ²NILM, ³Kochi University, ⁴NIED, ⁵NTT Data, Co.,Ltd., ⁶Nippon Koei Co., Ltd.

On March 26, 2006, a gigantic landslide occurred on the caldera wall of Mt. Bawakaraeng, Indonesia. This paper quantitatively shows the temporal change in gully erosion and sediment yield from the huge amount of the deposit of the landslide by analyzing satellite images, and also shows the total amount of bed load and suspended load discharge estimated by numerical calculation. Firstly, the landslide buried the original river channel completely. In the next year, gully erosion dominated the entire landslide deposit, and parts of the gully bed were found to have eroded by up to 60 m. The total amount of sediment discharged from the landslide deposit was estimated to be 36 million m³. In the second year after the landslide, the severe widespread degradation almost ceased and river bed aggradation started to occur in some places. The total amount of discharged sediment drastically decreased and was estimated to be 8.3 million m³. In the third year, the total amount of sediment discharge declined further. On the other hand, satellite-derived DEMs showed that the width of gullies has increased. The drastic decrease in sediment discharge might have occurred because of the reduction in the erosive force applied by water flow whose depth was inevitably reduced as a result of the widening of gully channels. In order to estimate the bed load and suspended load discharge triggered by heavy rainfall, numerical calculation was conducted. The result showed the sediment discharge by numerical calculation was underestimated compared with by satellite image analysis.

Keywords: Mt. Bawakaraeng, landslide, satellite image, river bed variation