Geophysical Research Abstracts
Vol. 15, EGU2013-12442, 2013
EGU General Assembly 2013

Landslide driven erosion: Quantifying slope-channel coupling in forested steepland terrain from 1946 to 2011, Tamaki catchment, New Zealand

Raphael Riedler (1), Ian Fuller (2), Thomas Glade (1), Rainer Bell (1), and Mike Marden (3)

(1) University of Vienna, Department of Geography and Regional Research, Vienna, Austria (raphael.riedler@univie.ac.at), (2) Physical Geography Group, Institute of Agriculture & Environment, Massey University, Palmerston North, New Zealand, (3) Landcare Research, P.O. Box 445, Gisborne, New Zealand

Landslides are an important means of conveying sediment from slopes to channels in forested steepland environments, but their occurrence and connectivity is highly variable. This means that any single assessment in time of their contribution to the sediment cascade is of limited value. To better understand landscape dynamics and the variability of the contribution of sediment derived by landslides over time, their connectivity and sediment contribution is quantified over a time span of 60 years in the 11.3 km^2 Tamaki catchment in the SE Ruahine Range, New Zealand. The temporal variability in connectivity between landslides and the stream network was assessed using six sets of aerial photography flown between 1946 and 2011, from which landslides were mapped.
An assessment of the contribution of material delivered by landslides to the Tamaki channel system was based on field measurements of landslide scar area and depth using RTK-dGPS and tacheometric surveys. The volume of material was estimated as the difference between the measured landslide surface and an interpolation of the original slope surface.
This generated an approximate average volume of 1.2 m3 per square metre of landslide scar, which is consistent with previous estimations in this terrain. Approximate volumes of sediment delivered to the channel varied from 42,000 m3 in 1946 to over 320,000 m3 in 1977 with a second peak of 140,000m3 in 2005. This variability largely reflects the occurrence of significant rainfall events with the 1970s peak in sediment input being attributed to Cyclone Alison in 1975 and a secondary peak following a major storm in 2004.The number of landslides connected to the channel network ranged from a minimum of 10 (38% of all) in 1946 to a maximum of 96 (74%) in 1977 with a second peak of 41 landslides (78%) following the 2004 storm.
Sediment generated in this forested steepland system has caused severe channel aggradation and flooding of pastoral land downstream of the Range front. Therefore this study helps to understand the processes of sediment generation and their spatial and temporal variability in order to project future trends in sediment flux and to identify appropriate catchment management strategies.