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THE INFLUENCE OF RAINFALL AND RIVER INCISION ON THE
MOVEMENT RATE OF A SLOW-MOVING, SOFT-ROCK LANDSLIDE IN
THE RANGITIKEI, NEW ZEALAND

A thesis presented in partial fulfilment of the requirements for the degree of

Master of Science

in

Physical Geography

At Massey University, Manawatu Campus

Palmerston North, New Zealand

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2018

Abstract

The Rangitikei Slide, a slow-moving landslide near Taihape, New Zealand, was monitored to determine the movement patterns and identify the primary movement drivers. The sediment delivery of landslide material to the Rangitikei River was also estimated to inform the sediment yield from slow-moving landslides connected to a fluvial system. RTK-dGPS monitoring, photogrammetry, and pixel tracking of time-lapse imagery was used to categorise movement patterns, and pixel tracking at different temporal resolutions (weekly and hourly) in conjunction with environmental data identified the drivers and classified the influence on movement. The findings aimed to improve the understanding of these landslide types in New Zealand in order to propose more effective management strategies both locally and around the world. It was found that the landslide comprised several blocks exhibiting different movement rates, and that movement was influenced by a seasonal trend likely from groundwater fluctuations increasing pore pressures in the landslide mass. River erosion by the Rangitikei was identified as a key movement driver and has likely influenced movement since landslide initiation. This was supported by historic aerial imagery and photogrammetry, which showed that the landslide has preserved historic movement phases and these indicate fluvial influence. The estimation of sediment contributions found that ~19,000 t/year of sediment is entering the Rangitikei River from the toe, which is considered a conservative estimate. This contribution is substantial; the Rangitikei Slide is producing almost 3,000 times more sediment per kilometre than the non-landsliding areas of the Rangitikei Catchment. Based on these findings, several management options were proposed for the Rangitikei Slide, with recommendations included for managing slow-moving landslides around the world. It was also evident that further research is needed to better understand slow-moving landslides due to the significant hazard they represent in regard to their sediment contribution to the surrounding environment.

Acknowledgements

Funding and support for this research was provided by the Physical Geography Group in the Institute of Agriculture and Environment at Massey University, Horizons Regional Council, and the British Society of Geomorphology. Without this support, the research would not have been possible.

Horizons Regional Council was especially supportive of this project, particularly Malcolm Todd and Grant Cooper in the Environmental Management Team, showing a keen interest in the work and a willingness to financially support on-going monitoring works into the future. Access to the study site was provided by Derek Mickleson, the Farm Manager for the agricultural land on the landslide, who was extremely helpful in providing personal knowledge of landform changes and also proved instrumental in extracting vehicles from his land on two separate occasions for us.

I would like to thank Dr Sam McColl and Professor Ian Fuller for supervising this project and providing much needed experience and support.

I would also like to acknowledge my parents, Kate and Andy, who wholeheartedly supported this endeavour and were always willing to provide a place for me in their home whenever I needed some time away. Your encouragement and advice has been invaluable through this process.

I could not have undertaken this research without the support of my partner, Andrew Neverman, who was not only an excellent field assistant, but who also provided technical advice whenever it was required. His expertise on Structure-from-Motion and flow hydraulics were significant in the completion of the project, and I will be eternally grateful for his unwavering support and understanding.

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