## LANDSLIDE OCCURRENCE AS A RESPONSE TO DRAMATIC LAND USE CHANGE

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Vegetation cover is an important factor influencing landslide occurrence and movement. As a logical consequence, any fluctuations of vegetation cover results in a change of landslide behaviour. While this relation seems straightforward, it is, however, difficult to assess due to the long periods of anthropogenic influence, in particular in European countries. Human and natural factors are mostly coupled and it is difficult to directly relate variations in land use practices to the occurrence of landslides.

In contrast, New Zealand provides a unique opportunity to investigate geomorphic responses to land use changes. Before European settlers arrived from the 1840s onwards, hilly regions were only marginally influenced by human activity. The Maori, inhabitants of New Zealand prior to the Europeans, settled largely in the coastal zones or near lakes and rivers, i.e. on the plains. They did influenced general vegetation cover through burning practices only localised. In contrast, European settlers moved into the backcountry and converted large hilly areas from native forest and bush to pasture, thus reducing the strength of the regolith and consequently making the slopes more susceptible to landslides.

In these regions landslides largely determine volumes of sediment production. From the unstable slopes, thousands of landslides were triggered by subsequent high magnitude climatic events. These storms have calculated return periods of 50 or more years. While it has been shown that storms of similar magnitude produce different erosional responses at different times, a broad relationship between rainfall magnitude and landslide response does exist for specific finite periods. On the basis of such a relationship landslide-triggering rainfall thresholds can be derived. However, these thresholds give a broad indication of the probability of landslide occurrence only. They are most sensitive to any changes of natural conditions, and in particular to land use modifications.

More generalised national scale analysis of the relation between landslides and vegetation cover suggests that indeed landslide occurrence is lower under forest than under pasture. However, the analysis indicates also that landslide occurrences under forest are fewer in number but involve much more material. As a consequence it is suggested that land use change may influence the frequency of landslides - and thus increase public awareness of this process - but it may not change the amount of material supplied by landslides over long time spans. This suggestion is preliminary indeed and needs further justification by more detailed research in the future.