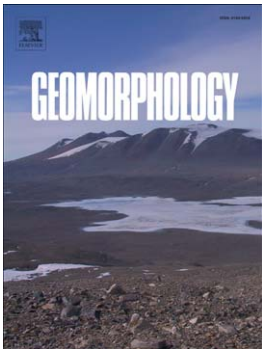

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Effects of vegetation on debris flow mitigation: a case study from Gansu province, China

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Abstract: Debris flows are traditionally controlled using civil engineering structures such as check dams. However, the misuse of such strategies may sometimes trigger environmental hazards such as the catastrophic landslide in 2010 in Zouqu county, China, and therefore other methods such as the use of vegetation as an eco-engineering tool are increasingly being adopted. The aim of the present research was to investigate the bioengineering effects of vegetation over time in an area prone to debris flows in Gansu province, China. We collected detailed data from 2012-2014 on vegetation type, density, and root system morphology, and measured profiles across the valley. In addition, we assessed the increased soil cohesion provided by the root development of three monospecific stands of *Robinia pseudoacacia* of different ages growing within the debris valley, and on a larger scale, their effects on channel morphology. These data were incorporated into a modified form of BSTEM (Bank Stability and Toe Erosion Model) and a cellular braided-stream model. The results indicate that with increasing age, the FOS (factor of safety) of the bank would be significantly increased, and that the flooded area in the valley caused by simulated flood events would be decreased by 18-24%, on average. Subsequently, field data were incorporated into a