



In situ measurement of plant root contribution to soil stability, in relation to landslide hazards adjacent to transport corridors

Kenneth Loades (1), Gerrit Meijer (2), Jennifer Brown (1), Bruce Nicol (3), Jonathan Knappett (2), Glyn Bengough (1,2)

(1) The James Hutton Institute, Ecological Sciences, Dundee, United Kingdom (kenneth.loades@hutton.ac.uk), (2) University of Dundee, Division of Civil Engineering, Dundee, UK, DD1 4HN, (3) Forest Research, Roslin, Midlothian, UK, EH25 9SY

Landslides adjacent to major road and rail networks have significant economic impact with an estimated 271 shallow landslides on UK Network Rail embankments and cuttings between 2012-14 (Department for Transport, 2014). Vegetation has the ability to decrease vulnerability to landslides however quantifying the contribution of vegetation to soil stability in the field has historically been a labour intensive and time-consuming process. Key for managing, and mapping, areas at risk of failure is measuring the in situ shear strength of soils in areas adjacent to arterial transport routes.

Recently we have developed a new method for measuring root contributions to soil stability in the field using a lightweight and portable corkscrew device allowing measurements to be taken rapidly in previously inaccessible locations. The paper will consider its application and also present results, from both the field and laboratory, of soil vegetated by both grass and woody species. Results will be compared to other devices previously used to measure soil strength including shear vanes and also in field direct shear testing apparatus. Results will be presented from a study into changes in root mechanical properties and soil strength associated with vegetation death in the field. Measures of soil strength, root biomechanical properties and root mass will be considered in relation to variability in soil shear strength and temporal changes in soil stability.

Research has been funded by Scottish Government through the Rural and Environment Science and Analytical Services (RESAS) division.

Reference

Department for Transport (2014) Transport Resilience Review - A review of the resilience of the transport network to extreme weather events. ISBN 9781474106610; p. 101.