The effect of vegetation roots in slope stability, 2nd Civil Engineering International Conference on Civil Engineering and Sustainable Development held in Mombasa between 25h and 28th September 2008.

Abstract:

Kenya experienced extraordinarily heavy rainfall between May 1997 and February 1988 due to the El Nino weather phenomenon. This period of about 10 Months of heavy rainfall caused widespread landslides and floods in various parts of the country. An enormous number of landslides occurred in Central, Western and to the Coast Provinces. This triggered a nation-wide crusade to plant trees in an effort to counter future landslide phenomenon. However, little quantitative research has been conducted to assess the impact of plant roots on soil strength. As a result, planting of trees tend to be more empirical without consideration of the structural measures for reinforcing soil that combine the ecological benefits of vegetation. This paper describes the contribution of plant roots of various species to soil shear strength. Soil samples with roots of various plant species were tested in a large modified direct shear apparatus in a laboratory set-up. Shear stress results of rooted soils were compared with results of soil without roots of similar soil types. The contribution of roots to soil strength was estimated by comparing the difference between the maximum shear stress of the shear-displacement curves obtained for soils with and without roots for the different species tested. Results suggested that the rooted soils contributed more to soil strength than rootless soils. However there was varying degree of shear strength contribution for different root species suggesting that for each species, contribution of shear strength was governed by root density. The results suggested that a composite soil-root system consumes energy while resisting shear displacement. This feature could be included in stability analysis of vegetated hillslopes in terms of energy associated with shearing in a soil-root system.