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Is soil permeability a good predictor for overland flow occurrence?

Sibylle Hassler (1) and Helmut Elsenbeer (1,2)

(1) Institute of Earth and Environmental Sciences, University of Potsdam, Potsdam, Germany , (2) Smithsonian Tropical Research Institute, Balboa, Ancón, Panama

In the humid tropics, overland flow is a main driver for erosion and nutrient depletion of soils. Overland flow (OF) occurrence is widely assessed using soil hydraulic conductivity (Ks) values in comparison to prevalent rainfall intensities. However, verification of this relation, i.e. measurements of OF and its relation to precipitation characteristics, Ks values and other environmental site parameters under different land cover types is scarce.
We measured OF occurrence on five and four 30 x 30 m planar plots and in flow lines under secondary forest of 5 and 25 years, respectively, in central Panama. On each plot, Ks values were measured in 0-6 cm and 6-12 cm depth using undisturbed soil cores. Additionally, we estimated vegetation cover for life forms (trees, shrubs, grasses, herbs) and determined basal area and soil texture values.
Comparison of rainfall intensities, Ks values and OF occurrence between the two sites showed differences between the plots and the flow lines. Particularly, the plots in the 25 year-old forest recorded higher OF frequency than in the younger forest, contrasting the higher Ks values and thus expectation of less frequent OF in the older forest. A possible explanation for this phenomenon might be the occurrence of pipe flow.
Although cumulative Ks values were higher than several measures of rainfall intensity, OF occurred in both forests, thus adding doubt to the suitability of Ks alone as predictor for OF generation.