



## **The influence of forest regrowth on soil permeability in the humid tropics**

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The humid tropics are subject to change in land use: on the one hand ongoing deforestation claims more area for agriculture and pastures, on the other hand reforestation efforts emerge. These changes in land use affect soil hydrological properties. Various studies have shown that a shift from primary forest to pasture leads to a rapid decrease in soil saturated hydraulic conductivity ( $K_s$ ) through animal treading, implicitly enhancing the occurrence of overland flow. Recent information about the reverse process, the possible recovery of soil hydraulic properties during forest regrowth, suggests a slow recovery of  $K_s$ .

To further explore this possibility with the help of a space-for-time substitution approach we surveyed  $K_s$  in the Panama Canal Zone. In a completely randomised sampling design we sampled several plots of four different land use classes: Pasture, secondary forest of two age classes (5-8 years and 12-15 years after pasture abandonment), and old-growth forest. Undisturbed soil cores were taken from the depths 0-6 and 6-12 cm and then subjected to the constant-head method. We also surveyed bulk density, soil organic carbon, soil texture and vegetation parameters (eg. basal area, diameter at breast height) to help interpret the observed  $K_s$  data.

Our results support the notion of a slow recovery as they exhibit an increase in  $K_s$  after more than 10 years, if only for the depth of 0-6 cm. Other studies suggest that the decrease of  $K_s$  after deforestation is limited to a distinct shallow soil layer, thus the observed recovery effect in the upper layer is in logical accordance with these findings. We will use the ancillary information to elucidate the main determinants of  $K_s$  recovery. Quantification of the hydrological relevance of these findings is especially important as land use effects are obviously limited to only the upper soil layer. To evaluate the hydrological relevance we will compare the  $K_s$  measurements with prevailing rainfall intensities and data of overland flow occurrence which we gathered at a pasture and a young secondary forest site. These results will add to the knowledge of the link between soil hydrological properties, land use and overland flow generation.