

Introduction:

In recent decades, the importance of many environmental questions has risen. Major aspects are the consequences of land-use changes, such as the impact of deforestation and secondary succession on soil degradation and thereby their influence on the hydrologic cycle (for example generation of overland flow).

As the soil saturated hydraulic conductivity (K_s), a parameter indicating velocity of water moving through the soil matrix under saturated conditions, is directly linked to macroporosity, it is sensitive to soil disturbance and can therefore be used as a key indicator to characterize the range of impact on the soil.

Central hypothesis:

The alteration of vegetation has an effect on the soil properties, as for example macroporosity, which is detectable via K_s . By measuring a chronosequence of K_s it is thereby possible to determine the length of time necessary for the soil to recover its properties completely after anthropogen impact.

Site selection:

An area, covered by seven year old secondary forest and situated in the area of the Agua Salud Project in central Panama where K_s has already been determined in recent years.



Mean annual precipitation	Circa 2300mm
Mean annual temperature	27°C
Dry season	January-April

Methods:

Sampling design:

- division of the secondary succession catchment in 20 strata of equal area (exclusion of the riverine vegetation)
- in each strata two points have to be sampled: the same as already in the last study in 2009, and a randomly chosen location
- alternative points will be additionally randomly chosen in case that the new location can't be sampled
- one stratum has to be elided due to intense anthropogenic disturbance



Sampling:

- on each position, undisturbed soil cores with an diameter of 8.9cm and a height of 6cm has to be taken at a depth of 0-6cm and 6-12cm using a standard coring device
- the ground has to be planed if the slope is to strong

Saturation:

- upside down saturation of the samples over 64 hours, first 24 hours: water level regulated to 1cm, next 24 hours: 3cm, last 24 hours: 6cm

Measuring:

- application of a constant water head, when a constant flow rate is reached, measurement of the percolating water volume per time unit

Calculation:

- achieve K_s value by using Darcy's law

Expectations:

- K_s is lower than before the deforestation, but slightly higher compared to values of the previous studies under secondary forest in this area as an effect of slow soil recovery
- K_s in shallow depth is higher due to stronger effects of flora and fauna in upper soil layers

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