

Soils Properties of Alfisols in the Nicoya Peninsula, Guanacaste, Costa Rica

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Abstract : This research studies the soil properties located in the watershed of Jabillo River in the Guanacaste province, Costa Rica. The soils are classified as Alfisols (T. Haplustalfs), in the flatter parts with grazing as Fluventic Haplustalfs or as a consequence of bad drainage as F. Epiaqualfs. The objective of this project is to define the status of the soil, to use remote sensing as a tool for analyzing the evolution of land use and determining the water balance of the watershed in order to improve the efficiency of the water collecting systems. Soil samples were analyzed from trial pits taken from secondary forests, degraded pastures, mature teak plantation, and regrowth -*Tectona grandis* L. F.- species developed favorably in the area. Furthermore, to complete the study, infiltration measurements were taken with an artificial rainfall simulator, as well as studies of soil compaction with a penetrometer, in points strategically selected from the different land uses. Regarding remote sensing, nearly 40 data samples were collected per plot of land. The source of radiation is reflected sunlight from the beam and the underside of leaves, bare soil, streams, roads and logs, and soil samples. Infiltration reached high levels. The majority of data came from the secondary forest and mature planting due to a high proportion of organic matter, relatively low bulk density, and high hydraulic conductivity. Teak regrowth had a low rate of infiltration because the studies made regarding the soil compaction showed a partial compaction over 50 cm. The secondary forest presented a compaction layer from 15 cm to 30 cm deep, and the degraded pasture, as a result of grazing, in the first 15 cm. In this area, the alfisols soils have high content of iron oxides, a fact that causes a higher reflectivity close to the infrared region of the electromagnetic spectrum (around 700mm), as a result of clay texture. Specifically in the teak plantation where the reflectivity reaches values of 90 %, this is due to the high content of clay in relation to others. In conclusion, the protective function of secondary forests is reaffirmed with regards to erosion and high rate of infiltration. In humid climates and permeable soils, the decrease of runoff is less, however, the percolation increases. The remote sensing indicates that being clay soils, they retain moisture in a better way and it means a low reflectivity despite being fine texture.

Keywords : alfisols, Costa Rica, infiltration, remote sensing

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