

CHANGES IN FOREST BIOMASS AND CARBON STORAGE IN A TROPICAL ECOSYSTEM AS A FUNCTION OF LAND USE AND SOIL TEXTURE

VERÄNDERUNG VON BIOMASSE UND KOHLENSTOFFSPEICHERUNG ALS FUNKTION VON LANDNUTZUNG UND BODENTEXTUR IN EINEM TROPISCHEN ÖKOSYSTEM

MELISSA A. ATWELL, MARK N. WUDDIVIRA & MIKE P. OATHAM

SUMMARY

Assessing anthropogenic impacts on carbon storage in terrestrial ecosystems is of great value for increasing the resilience of soil resources and ecosystem sustainability of tropical Small Island Developing States (SIDS) that are known to be vulnerable to the impacts of climate change. We used historic air photos to assess land use/land cover changes and the natural capital project InVest model for carbon storage and sequestration to evaluate the carbon storage in the Aripo Savannas Scientific Reserve of Trinidad. We also presented a framework that examined the critical soil quality factors that determine soil ecosystem health for the Aripo Forest Reserve and investigated the effect of texture on soil carbon content.

Comparing 1969 and 1994 photos, there was an evident heavy disturbance in key areas of the forest reserves associated with quarrying and construction of pipelines with an estimated 5 % of grassland area affected. Carbon storage reduced by 80157.93 Mg of carbon over a 16 year period in the Aripo Savannas Scientific Reserve due to a reduction in forest extent and coverage because of land conversion activities encroaching into forested areas. Generally, carbon storage in tropical forests is a function of forest extent and density. Soil clay content had a strong linear relationship ($r^2 = 0.83$) with carbon content, hence areas with high clay content had high carbon storage. The InVest carbon storage and sequestration model is suited for the evaluation of carbon in tropical forest ecosystems. It provides information on the soil ecosystem that lead to changes in the provision of ecosystem services to people. Planners should view it as effective tool for exploring alternative management decisions among sectors and services.

Keywords: Tropical forest ecosystems, soil ecosystem health, carbon storage change, land use, land management