Soil Quality in Developed and Agricultural Areas: How Does Neighborhood Development Degrade Homeowners' Soil?

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In city developmental processes, extended depths of soil are often removed, changing the soil composition and reducing its overall quality, especially in terms of its ability to infiltrate water. As a result, this project aims to compare the water infiltration and tortuosity of the soil to be able to make conclusions on the ecological impacts caused by city development. In order to accomplish this, three devices were used: a tension infiltrometer, a lab permeameter, and a hanging water column. Saturated and unsaturated hydraulic conductivities for the observed matric potentials in both the agricultural and developed areas were calculated using measurements from a tension infiltrometer and a lab permeameter. Soil porosity was observed from calculated pore volume measurements from the hanging water columns and compared to the hydraulic conductivity measurements to determine soil tortuosity. All hydraulic conductivities calculated at all matric potentials resulted to be lower in developed areas when compared to agricultural areas, indicating limited water infiltration due to the absence of the topsoil layer and a greater potential for soil erosion and surface run-off. Comparisons of similar pore volumes between developed to agricultural soil indicate the high tortuosity of soil in developed areas due to the presence of ineffective pores evident from slow water infiltration. From this, it was concluded that the removal of topsoil in city developmental processes has affected both the water infiltration and soil pore efficiency, resulting in negative ecological impacts such as limiting the ability of the soil to support plant life and increasing surface water runoff and erosion.

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