URBANIZATION-DRIVEN HYDRAULIC EROSION IN THE GEORGIA PIEDMONT

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Urbanization transforms natural landscapes into cultivated earth and urban concrete cover to support the demands of urban populations. These land use changes cause shifts in ground cover dynamics. Soils with poor physical buffers are subject to higher runoff and erosion rates, while sites with well-developed physical buffers demonstrate antithetical results. A three-phase approach was undertaken in Athens, GA to examine the effects of urbanization on erosion susceptibility for a representative Piedmont soil. First, four field plots were established on a moderate slope in a grassy forest gap. Each of the four plots represented a unique ground cover found in the Athens area: bare, vegetated, mulched, and manured. These plots were left exposed to natural conditions for four months in summer 2016. Second, soil from each of the sites was gathered, dried, and packed into erosion pans. These pans were exposed to rainfall simulations at a precipitation rate of 5 cm/hr to obtain erosion and runoff values. Third, the erosion rates for each ground cover were assigned to their representative area within Athens to produce a total erosion rate for each ground cover. These rates were compared to the natural vegetated rate to establish the extent of relative change in erosion. Compared to the vegetated control rates, runoff and erosion rates were hypothesized to greatly increase in the bare ground cover, marginally increase in the manured ground cover, and match the mulched ground cover. Results confirmed the hypotheses regarding the bare and mulched ground covers at erosion rates of 0.03 cm and 2.58x104 cm respectively; however, the manured plot revealed the highest runoff rates at 24.01 cm and the highest erosion rates at 0.08 cm. These data support the claim that transforming the natural forested landscape into urban environments or associated land uses increases the erosion susceptibility of Athens, Georgia.

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