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Effect of Land Use Patterns on Soil Properties of Agriculturally Used Wetlands in East Africa

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Abstract

With growing demographic growth and emerging land shortages, wetlands in East Africa are increasingly converted into agricultural land. Wetland soils play an important role as storage compartments for water, carbon and nutrients. Their conversion into sites of production is seen to affect soil parameters as a function of soil type and soil management and the land use intensity, and thus determine their production potential. We collected soils from 50 wetlands in Kenya and Tanzania, differentiated by parent material, hydrological regime and the type and intensity of land use. Soils varied from coarse-textured sandy clay to heavy clay with large differences in the mightiness of the A horizon and the content in C, N and P. Wetland soils differed in their resilience to anthropogenic interventions. In undisturbed wetlands under natural vegetation, the average soil organic C, N, and P contents ranged from 0.8–7.1 % total C, 0.09–1.2 % total N and 4.3–28.0 mg P kg^{-1} available P. Land drainage and crop production were associated with a reduction in the soils' C, N, and P contents. Most dramatic effects were observed with carbon and nitrogen in sandy textured soil which declined with intensified use from 2.17 to 1.87 % C, 0.26 to 0.19 % N and from 14.1 to 11.1 % P. Sandy soils appear to be particularly vulnerable and are unlikely to sustain intensified cropping. On the other hand, clay soils showed little reduction in organic C and soil nutrient contents after conversion into cropland and may thus be preferentially selected for agricultural conversion. These findings are preliminary and a more complete understanding of the role of agricultural practices on the spatial and temporal changes of soil properties is required before making informed decisions on future wetland conversion and uses.

Keywords: Kenya, land use intensity, nitrogen, phosphorus, soil organic carbon, Tanzania, wetlands

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