Plant Communities of East African Wetlands and their Relationships with Land Uses and Soil Properties

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Abstract

In East Africa demographic growth, degradation of upland soils and inter-annual variability of rains is increasing the pressure on both seasonal and permanent wetlands for crop production. The duration and intensity of agricultural land uses differentially affect soil properties, leading to negative impacts on a number of regulating and supporting functions of wetland ecosystems and potentially on the long-term productivity of the soils. To determine effects of land use and changing soil properties on the composition of vegetation we carried out a survey in four agriculturally used wetlands of Kenya and Tanzania between 2008 and 2009. Tanzanian wetlands were represented by a lowland floodplain of the Pangani river and a valley bottom in the Usambara Mountains. Kenyan wetlands were represented by a highland floodplain on the Laikipia plateau and a valley bottom on the foot slopes of Mount Kenya. A rapid appraisal with key informants determines the characteristic land uses and the land use history. According to preferential sampling, 224 plots of 10 m^2, representing the dominant land use types were selected. In those plots we recorded all present species and estimated their abundance as percentage cover. In each plot topsoil samples (0–15 cm) were analysed for selected physical and chemical attributes. The vegetation was classified using hierarchical clustering. Relationships between species composition / plant community types and soil properties were assessed by canonical correspondence analysis (CCA). The vegetation was classified into 10 communities types (clusters), five of which were weed communities in arable land. Ordination analysis indicated that plant communities responded more to soil property changes than to land uses, with soil exchangeable K, electric conductivity and pH being the main determinants of species composition. Interactions between soil and land use attributes in determining species composition as well as the use of plant assemblages as indicators of the wetlands ecological status will be discussed.

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