



Tropentag, September 20-22, 2017, Bonn

“Future Agriculture:
Socio-ecological transitions and bio-cultural shifts”

Plant Communities Changes in Relation to Land Uses and Soil Properties in Malinda Wetland, Tanzania

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Abstract

In East Africa demographic growth, inter-generational inheritance of land, increasing land scarcity in the highlands areas, degradation of upland soils and inter-annual variability of rains is increasing cropping pressure on seasonal and nearly permanent wetlands. This study was carried out between 2008 and 2016 in order to find the changes of plant communities in Malinda wetland due to intensity of land use which results into changes of soil properties which impacts the functions of wetland ecosystems and on potential productivity of the soils. A first survey and plant communities characteristics in the area was firstly done in 2008 and a rapid appraisal with key informants was carried out to determine the characteristic land uses and to collect information on land use history of the area. Four land use types were determined which include unused part with domination of wetland vegetation, fairly used area with minimal grazing during dry period of the year, high intensity used area dominated by horticulture and fallow land which has been left after use or is used for yearly grazing. According to preferential sampling, 40 plots of size 10 m² representing the main types of land uses were selected. In those plots all species and their estimated abundance as percentage cover were recorded. In each plot soil samples of the layer 0–15 cm were taken for soil chemical analysis. The same sampling techniques and procedure were repeated in the year 2016. The vegetation was classified by using hierarchical clustering technique and the relationships between species composition (land uses and plant communities) and soil properties of the wetland. The canonical correspondence analysis (CCA) was applied and the vegetation was classified into ten plant communities (clusters), five of them were weed communities of croplands while the remaining plant communities were from fallow, grazing land and unused part of wetland. There was no great difference in vegetation composition and plant communities obtained between the period of eight years. Both showed almost the same species composition and the plant communities were determined by soil exchangeable K, electric conductivity and pH according to ordination analysis.

Keywords: East Africa, land degradation, soil properties, use intensity, wetland