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“Development on the margin”

Effect of Land Use Duration of the Agricultural Production of Lake Naivasha Wetland, Kenya

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Abstract

Lake Naivasha is one of the fresh water lakes within the Kenyan part of the Great Rift Valley. In the last decades Lake Naivasha has been shrinking dramatically due to water abstraction. The sinking lake level is associated with an increase of the riparian land area. This newly uncovered land is being used for agricultural production by both small scale farmers for food crop production and by pastoralists as grazing land, leading to the emergence of chronosequences of land use. We hypothesise that the duration of land use differentially affects both the solid and the solution phase soil parameters, which in turn influence the agricultural production.

Using the chronosequence as a model, we study the effect of land use duration on soil parameter changes, including spatial and temporal dynamics of water and nutrient availability. Furthermore we assess (1) maize yield potential and yield gaps and (2) forage productivity. We aim to derive threshold levels of resource based quality parameters in relation to land use duration.

Chronosequence positions of 30, 25, 20, 15 and 5 years were used to determine parameters relevant for agricultural production during the short and the long rainy seasons of 2010 / 2011. Soil moisture is being continuously monitored from 0–60 cm depth (TDR) and available soil nutrients (ion exchange resins) are determined. The biomass, species composition, palatability and digestibility of forage are assessed in 400 m² enclosures at monthly intervals. Biomass, leaf area, nutrient uptake and grain yield of maize were determined along chronosequence adjacent to the forage study site. Preliminary findings indicate that with increasing land use duration, physical and chemical soil quality and soil moisture availability appear to decrease and this resource based degradation is reflected in declining forage yield and quality as well as in the yield potential of maize. Implications for sustainable use of the riparian land of Lake Naivasha will be discussed.

Keywords: Chronosequence, enclosures, ion exchange resins, TDR, yield gap