

Fate of redox-sensitive elements in two different East-African wetland systems

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We expect that an intensified cropping alters soil pH and Eh, and negatively affects the production potential of wetlands. Therefore, we investigated the redox-conditions in combination with the fate of different redox-sensitive elements in two prototypical wetland systems that show a high potential for food production in East-Africa. While the floodplains (observed near Ifakara, Kilombero District/Tanzania) serve as major crop producing areas in the region, the Inland Valleys (observed in Namulonge, Central District/Uganda) show a high potential for future production. Both systems have been divided into three positions; the fringe near to the slope, the center near to the river and the middle in between these two positions.

In order to get a better understanding of the two systems we installed continuously measuring redox-electrodes in three different positions within both systems. Additionally, the fate of mineral elements was measured using ion-exchange resins with an installation period of 3-4 months.

At the Tanzanian field sites the Eh-potential shows one major dry period with moderately reducing to well drained conditions in all sampling depths (10, 30, and 50 cm below ground) in all three positions during the measuring period from March 2015 to Dec 2016. Starting with the rains the Eh-potential drops from ~ 700 mV (in 10 and 30 cm depth) to reducing conditions at all three sites – with intermediate brakes in the middle and fringe positions, showing that there has been no rain during these periods.

At the Ugandan field sites the Eh-potential shows more fluctuations during the measuring period, especially in the center position in 2015 (~ 750 to -200 mV in 30 and 50 cm depth). Having just the Eh-potential from the first 30 cm below ground it is not really possible to differentiate between dry- and rainy-seasons at the sites.

The fate of redox-sensitive elements (Fe, Mn, and P) does not always correlate with the overall Eh-conditions (median) of the installation period. Short time events may play a crucial role in the fate of these elements.