

SOIL QUALITIES OR SOIL PROPERTIES? A NOVEL APPROACH FOR SOIL DATA TO ADDRESS FOOD SECURITY

HENDRIKS, C.M.J.¹ (CHANTAL.HENDRIKS@WUR.NL); STOORVOGEL, J.J.¹; CLAESSENS, L.^{1,2}

¹ Soil Geography and Landscape Group, Wageningen University, The Netherlands

² International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Kenya

Population growth and climate change continue to threaten food security. Information on soil resources is essential to address food security in combination with climate change. Simulating food production under alternative climatic conditions requires quantitative data of the soil profile and a description of the spatial soil variability. We developed a novel approach for soil data that specifically focuses on the data requirements by mapping key land qualities like nutrient availability and water availability using regression kriging. This study is performed at the Nyando-Katuk Odeyo (Kenya) research site of the CGIAR research program on Climate Change, Agricultural and Food Security (CAAFS). Conventional soil surveys provide qualitative descriptions of soil variability and quantitative descriptions of representative soil profiles. An alternative, more cost effective, approach is digital soil mapping (DSM) resulting in quantitative, continuous maps of soil properties. Standard DSM often makes use of regression kriging and interpolates individual soil properties. However, simulations often require a description of the entire soil profile with a large number of soil properties. This makes regression kriging impractical. Like in standard DSM, the novel approach makes use of a limited number of field observations. However, instead of interpolating individual soil properties a limited number of land qualities are first derive from the individual soil properties. These land qualities are interpolated by regression kriging generating continuous, quantitative maps of nutrient availability and water availability. These maps now provide the basis for the simulation of food production. A SWOT (strengths, weaknesses, opportunities and threads) analysis gives an overview of the usability of land quality maps for food security studies. An improvement in the supply of soil data for addressing food security is made, because proposed analysis of land qualities is more efficient than the standard DSM based on individual soil properties.