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Thema

Kommission IV: Bodenfruchtbarkeit und Pflanzenernährung

Landnutzung und Kohlenstoffhaushalt

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Urban-Rural Gradient Analysis of Amount and Distribution of Carbon and Nitrogen in Soils of Kumasi Region, Ghana

Abstract

While urbanisation is a global phenomenon, cities in developing countries exhibit particularly high levels of growth in recent years. In Ghana, this phenomenon of rapid growth from 31% of the people living in urban areas in 1984 to 51% urban population in 2010 has created expansive urban forms, impacting natural resources. The aim of this study is to analyse some of the impacts on soils of this rapid urban development. A stratified random sampling design was used to sample soils from 70 maize fields on Acrisols within the area of Kumasi, which was urban already in 1986, and other areas that became urban later. Rural maize fields and forests were also sampled. Three replicates were taken at each site of maize mono-crop and/or mixed-crop subsistence farms to keep consistency. Topsoil samples (0-10 cm depth) were taken volumetrically in 250 cm³ steel cylinders. The samples are currently analysed for soil pH, and for C and N by use of a Leco TruSpec CHN analyser. An ANOVA will be calculated to analyse the differences in means between urban and non-urban areas. A variogram will then be fitted to characterise spatial correlations in the urban to rural continuum of C and N amounts, and consequently mapped out. We hypothesise that C and N contents of soils under maize in urbanised areas of Kumasi exceed those of comparable soils and land-use in adjacent rural areas as reported by Bellwood-Howard et al. 2015, for other West-African cities. Among other reasons, disposal of household waste including organic materials, which is generally practised in urban Ghana due to inadequate waste management, is expected to increase C and N contents. We suggest that urban farms, if well-coordinated into urban planning and management, can provide a viable source of food security to urban dwellers in developing countries. Although analyses of additional parameters are needed pH as well as C and N amounts already provide relevant information on the critical role urbanisation play in the sustainable development of cities in Ghana.

Literatur

Bellwood-Howard, I., Häring, V., Karg, H., Roessler, R., Schlesinger, J., & Shakya, M. (2015). Characteristics of urban and peri-urban agriculture in West Africa: results of an exploratory survey conducted in Tamale (Ghana) and Ouagadougou (Burkina Faso) (IWMI Working Paper No. 163). Colombo, Sri Lanka. Retrieved from <http://www.iwmi.cgiar.org/publications/iwmi-working-papers/iwmi-working-paper-163/>.