



The global potential of local peri-urban food production

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One big challenge for the rest of the 21st century will be the massive urbanisation. It is expected that more than 7 out of 10 persons will live in a city by the year 2050. Crucial developments towards a sustainable future will therefore take place in cities. One important approach for a sustainable city development is to re-localize food production and to close urban nutrient cycles through better waste management. The re-location of food production avoids CO₂ emissions from transportation of food to cities and can also generate income for inhabitants. Cities are by definition locations where fertility accumulates. As cities are often built along rivers, their soils are often fertile. Furthermore, labour force and the possibility of producing fertilizer from human fecal matter within the city promises sustainable nutrients cycles. Although urban and peri-urban agriculture can be found in many cities worldwide and already have a substantial contribution to food supply, it has not yet been comprehensively structured by research.

We combine several worldwide data sets to determine the supply of cities with regional food production, where regional is defined as a production that occurs very close to the consumption within the peri-urban area. Therefore, urban areas are not defined by administrative boundaries but by connected built-up urban areas, and peri-urban area by the surrounding area with the same size multiplied with a scaling parameter. Both together accumulate to an urban-bio-region (UBR). With regard to national food consumption, a linear program achieves the best possible yield on agricultural areas and allows the computation of the fraction of population, which can be nourished. Additionally, several climate scenarios and different dietary patterns were considered.

To close the gap between single case studies and to provide a quantitative overview of the global potential of peri-urban food production we used high resolution land-use data Global Land Cover Service (GlobCover), the global agricultural yield dataset from the Global Agro-ecological Zones (GAEZ) and census population data from the Global Rural-Urban Mapping Project, Version 1 (GRUMPv1) to estimate the potential of 2838 UBR worldwide.

With regard to making use of local circumstances, the results of potential worldwide peri-urban agriculture emphasize the ongoing investigation of sustainable transitions of the socio-ecologic system. Identifying areas for increased food production while maintaining the natural resources and the urban needs will be a major task for cities in future.