Geophysical Research Abstracts
Vol. 14, EGU2012-14394, 2012
EGU General Assembly 2012

A combined remote sensing and modeling based approach to identify sustainable pathways for urban and peri-urban agriculture in China

M. Wattenbach (1), J.M. Delgado (1), S. Roessner (1), M. Bochow (1), A. Güntner (1), J. Kropp (2), A.G. Cantu Ros (2), F. Hattermann (2), T. Kolbe (3), S. Sodoudi (4), U. Ulrich Cubasch (4), J. Zeitz (5), L. Ross (6), K. Böckel (7), C. Fang (8), L. Bo (8), and G. Pan (9)

(1) Helmholtz Centre Potsdam, GFZ German Research Centre For Geosciences, Public Law Foundation State of Brandenburg, Telegrafenberg, 14473 Potsdam , (2) Potsdam Institute for Climate Impact Research, P.O.Box 60 12 03, 14412 Potsdam, Germany, (3) Department for Geodesy and Geoinformation Science, Technical University Berlin, Germany, (4) Institute of Meteorology, Freie Universität Berlin, Germany , (5) Faculty of Agriculture and Horticulture, Humboldt Universität zu Berlin, Germany , (6) VirtualCitySystems GmbH, Berlin, (7) Efficient City Farming GmbH, Berlin, (8) Fudan University , Shanghai, China, (9) Nanjing Agricultural College, Nanjing, China

As the world's biggest economy, China is becoming the biggest consumer of resources globally. Given this trend, the over-proportional fast increase in urbanization presents China with fundamental problems. Among the most urgent ones is the increasing loss of agricultural land as urbanization takes place in the most productive regions along the coast. The latter is being responsible for a shift in agriculture production towards climatically less favorable areas. At the same time, the loss of green areas in and around growing cities is increasing the effect of the urban heat island.

The perception of the potential risks related to this phenomenon, in the context of climate change, has led the Shanghai city administration to increase its urban-greening efforts, expanding the per capita area of green from 1m2 in 1990 to 12.5m2 in 2008. In this context, this paper aims at identifying the influence of urban and peri-urban agriculture (UPA) on the sustainability of the urban regions of Shanghai and Nanjing. In particular, it focuses on the effects of UPA on the greenhouse gas (GHG) emissions, soil nutrients and water balances, local climate and the structure and functions of the urbanized areas.

We propose an interdisciplinary framework combining remote sensing, model simulations and GHG field observations and targeted at identifying "win-win" strategies for sustainable planning pathways showing high potentials for UPA. The framework is based on spatial scenario modeling, automatic classification of urban structure types and on a prototype of a high-quality spatial database consisting of a 3D city model. Dynamic boundary conditions for climate and urban development are provided by state of the art models. These approaches meet the needs of stakeholders and planners in China.

A special emphasis is put on interdependencies between small holder farming in the urban and peri-urban zone and climate change adaptation and mitigation strategies focusing on improved management of local water and nutrient cycles. The whole database generated will be structured and made accessible for planners and stakeholders in the form of a 3D city visualization model.