Tropentag, September 17-19, 2013, Stuttgart-Hohenheim

"Agricultural development within the rural-urban continuum"

Resources of the Agro-Pastoral Transition Zone of Inner Mongolia Grasslands: Challenges and Opportunities for 'Marginal Lands'

Carsten Hoffmann[1], Marcus Giese[2], Y.F. Bai[3], X.G. Han[4], Folkard Asch[2]

[1] *Leibniz Centre for Agricultural Landscape Research (ZALF), Institute of Soil Landscape Research, Germany*

[2] *University of Hohenheim, Institute of Plant Production and Agroecology in the Tropics and Subtropics, Germany*

[3] *The Chinese Academy of Sciences, Institute of Botany, China*

[4] *The Chinese Academy of Science, Institute of Applied Ecology, China*

Abstract

Grasslands are considered as terrestrial key ecosystems affecting sink and source dynamics of global matter fluxes. Main services provided by (semi-)natural grassland systems are, among others, biomass production, carbon and nitrogen sequestration, biodiversity conservation, and providing the livelihood base for millions of pastoralists. Traditionally, grasslands of Inner Mongolia (North China) were used as sustained grazing land by nomadic herdsman. However, since the 1950s farm based, stationary land use systems were introduced and grasslands were increasingly over-grazed and converted to cropland. Today, urbanisation, global food prices and trends to grow bio-energy crops enforce economic pressures, threatening multiple grassland ecosystem services and consequentially valuable steppe and wetland biotopes.

Most impacted by management change are natural semi-arid grasslands located in the agro-pastoral transition zone (APTZ) such as the forest-steppe ecotone in the Hailar County, Northern China. As grasslands of the APTZ are accessible from cropland-dominated and urbanized regions with developed infrastructure, they were identified as hot-spots for future land conversion. Therefore, steppe ecotones in transition zones are not only threatened by intensification of grazing management, but also by intensive cropping activities including fertilisation, pesticide application, and intensive irrigation. First negative impacts of uncontrolled intensification are already visible such as fast decreasing ground water tables, contaminated water discharge to rivers, top soil wind erosion and loss of biodiversity.

New adapted land use concepts within the APTZ are required to prevent or mitigate resource-, social- and economic conflicts in the near future. The presentation will out-line strategies for "sustainable land-use intensification" addressing both, food/life security and multiple ecosystem services from a multidisciplinary view. Concepts must be based on an improved understanding of the underlying mechanisms affecting regional matter fluxes, which will include effects on water cycles, vegetation dynamics, soil microbial activity, carbon and nitrogen cycles, soil erosion, greenhouse gas emissions and social and economic system. The paper highlights the results of an international, multidisciplinary symposium held in Hailar, Inner Mongolia in July 2013 dealing with challenges and opportunities for marginal lands within the urban-rural-continuum in currently one of the most dynamic societies of the world.

Keywords: Agro-pastoral transition zone, grassland ecotones, sustainable land-use intensification, urbanisation

Contact Address: Carsten Hoffmann, Leibniz Centre for Agricultural Landscape Research (ZALF), Institute of Soil Landscape Research, Muencheberg, Germany, e-mail: hoffmann@zalf.de