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The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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Land use/cover change in steppe zone of Russia

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Key words: land use/cover change, landscape methodology, expedient steppe land management

Introduction Land Use/Cover Change (LUCC) in steppe zone of Russia was studied using a combination of remote sensing and in-field data collection to allow different landscape level interpretation of land cover changes. Geographical scaling of LUCC investigation were taken into consideration, that's is very important for Russia where the steppes represent wide (15 thou km) latitudinal zone to the south of 55°33' N in-between broad-leaf forested and semi-desert zones, going further to the south in other countries-Kazakhstan and Mongolia. The West Siberian part of steppe zone is much narrower and represented generally by forest-steppe stripe -a temperate-climate habitat type composed of grassland interspersed with areas of forest. The steppes are characterized by high level of biodiversity with significant decreases from the west to the east and from the north to the south.

Materials and methods The landscape methodology employed used remote sensing data of different spatial and temporal resolution, traditional maps and in-field data to explain relationships between land use practices and land cover patterns. It took into consideration land use change as the driving forces of current land cover status and trends (Milanova *et al.*, 2005). Present-day landscape chosen as the core unit of land cover classification comprises various aspects of natural and socio-economic environment (Figure 1). Scale-dependent landscapes applications for study of land cover dynamics were done. For the country level a 10-km resolution NOAA-AVHRR NDVI images were used (Kineman and Ohrenschall, 1992). For regional level (case study areas-Central part of European Russia and Middle Volga region) two sources of satellite imagery were used for data simulation: AVHRR images of 1-km resolution and photographic high and medium resolution images acquired by MK-4 and MK-6 instruments on board of Russian satellites RESURS-F1 series.

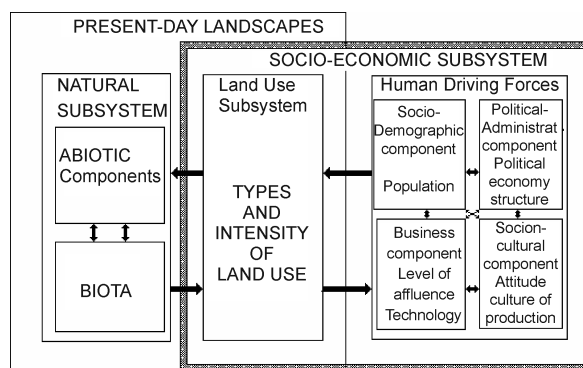


Figure 1 Present-Day Landscapes Subsystem.

Results and discussion The study of anthropogenic impacts on steppe landscapes, especially in European part of Russia, is particularly significant because more than 40% of the country's agricultural production occurs in this zone with fertile soils and high concentration of rural population. The transformations of steppe landscapes are related with their conversion to cultivation (about 90%), large industrial installations (hydropower stations in Volga basin), urbanization. The changes of land cover were caused also by political and economic transition conditions: changes in ownership, stagnation in agriculture, development of transport infrastructure. The steppe landscapes have been severely degraded during the last 25-30 years: humus content has declined by 30 to 50%, many ploughed areas are currently abandoned or transformed to grazing lands. The assessment of land cover long-term and short-term dynamics during the last 100 and 20 years has permitted identification of the principal natural and socio-economic driving forces of land transformations and the more expedient management system in steppe zone.

Conclusions The study has furthered an understanding of the causes and mechanisms of LUCC in steppes of Russia and suggests rationalized approaches to appropriate land tenure and management of steppe agricultural and pastoral lands as well as to protect of biodiversity of steppe flora/fauna -the problems, which are demanding the urgent measures for decision.

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