Land Abandonment in Russia: Understanding Recent Trends and Assessing Future Vulnerability and Adaptation to Changing Climate and Population Dynamics

Abstract

Russia's population is projected to shrink by a staggering 29% by 2050. Differential dynamics among rural populations are correlated with ethnicity and constitute a key driver in the spatial disintegration of rural Russia. Currently, Russia is slowly transitioning into a country with an internal “archipelago” of islands of productive agriculture around cities set within a matrix of much less productive and abandoned croplands. This heterogeneous spatial pattern is mainly driven by depopulation of the least favorable parts of the countryside, where “least favorable” is some function of lower fertility of land, higher remoteness from urban markets, or both.

This project investigates potential sustainable productivity of remaining croplands under climatic and demographic changes. Our aim is to improve current understanding of the interactions of climate change and the spatio-temporal impacts of agricultural reform in European Russia. We propose to model future land abandonment based on (1) past abandonment estimates retrieved from satellite imagery, (2) age-structured population models, and (3) spatially structured metapopulation models using socio-demographic data, distance to major population centers, and bioclimatic potential derived from a combination of current temperature and moisture regimes retrieved from space-borne sensors and predicted future regimes from IPCC AR4 models. We will investigate three scenarios: A1FI and B1 project drastic decreases in the Russian population by 2050, but A2 projects minor changes.

Our modeling approach will predict how possible future climates could influence the abandonment patterns in Russia and how adaptive strategies could affect rural re-colonization and re-cultivation patterns. This work is innovative because it will treat the population dynamics of different ethnic groups as an endogenous component of the land cover land use change system and so provide increased understanding of both the effect of population size and composition as well as changing climate on land abandonment patterns in Russia.