Land use change, protected areas, and biodiversity in the Caucasus and Ural Mountains

Abstract

The overarching goal of our project to understand the effects of land cover and land use change (LCLUC) on biodiversity in the Caucasus and Ural Mountains of Russia. Russia experienced drastic land use changes after the breakdown of the Soviet Union, and harbors exceptional biodiversity and many areas of high conservation value. Our major objectives thus are to:
- Assess LCLUC between 1979 and 2007 for four selected protected areas (Kavkazsky, Teberdisnky, Denezhkin Kamen and Yuzhno-Uralsky zapovedniki) in the Caucasus and Ural Mountains using Landsat MSS/TM/ETM+ images;
- Study the relationship of LCLUC outside protected areas with population density of wildlife inside and outside these protected areas;
- Further strengthen ongoing and very successful collaborations among American, Russian and German scientists, and ensure maximum synergy among our research activities.

In Russia exist two unique long-term data sets that allow studying the relationship of land use change and biodiversity: the 'Winter Track Counts' (wildlife statistics) and the 'Chronicles of Nature' (biodiversity data for Russia's zapovedniks, i.e. protected areas). We will analyze wildlife statistics (Winter Track Counts) and the biodiversity records from the protected areas (Chronicles of Nature) in combination with the land use change data. We will use Landsat MSS/TM/ETM+ satellite images to quantify rates and spatial patterns of post-Soviet LCLUC in and near four protected areas. We will use novel LCLUC methods using dense stacks of Landsat images, and chain classification. And we will explore socioeconomic data to better understand drivers of LCLUC, and examine the effects of recent conflicts in the Caucasus Mountains on LCLUC. The relationship of LCLUC and biodiversity is still poorly understood, as are the patterns and the magnitude of LCLUC after major socioeconomic transitions such as the breakdown of the Soviet Union. We expect thus that our proposed research will make a substantial contribution to basic understanding of human-natural systems, and its relevance will far exceed the geographic scope of our work. Our research will also pertain to three of the major international programs supported by the LCLUC program, specifically NEESPI, GOFC-GOLD, and IGBP-IHDP-GLP, and contribute to the LCLUC program goals and several GOESS societal benefits.