Charles Vorosmarty
University of New Hampshire

Project Abstract

Role of Land Cover and Land Use Change in Hydrology of Eurasian Pan-Arctic

Harmonized data archive and analysis tool, which will be used to improve our current understanding of interrelationships between climate, hydrology, and land cover/land use changes over the Northern Eurasian (NEESPI) domain. The work is organized around three major Goals, with three distinct time horizons (1935- present, contemporary satellite era, future to 2050):

GOAL 1 SYNOPTIC-SCALE ANALYSIS: To combine existing data and modeling resources within an integrated framework for diagnostic studies over historic and contemporary time frames to identify the individual and combined impacts of climate, LCLUC, and other factors and to rank these in importance.
GOAL 2 CONTEMPORARY HIGH RESOLUTION ANALYSIS: To identify "hot spots" of rapid hydrologic change and to assess the fidelity of the synoptic-scale results.
GOAL 3 FUTURE TRENDS: From the computed contemporary benchmark, stage scenario analysis of future water system change as a result of climate, land use/land cover, water engineering and other key drivers across the northern NEESPI domain.
GOAL 4 PROVISIONAL DESIGN OF INTEGRATED MONITORING SYSTEM TO DETECT AREAS OF RAPID HYDROLOGICAL CHANGE. To employ consolidated environmental data sets based on modern remote sensing, groundbased monitoring, and modeling to determine the required space and time resolutions and other design criteria to detect and monitor hot spot areas across the northern NEESPI domain.

The workplan is built around several well established models, data sets, and remote sensing capabilities of the proposing group, and will be applied in the context of a set of systematic numerical experiments. These information resources are "project-ready" and will be applied in the full regional context of the northern NEESPI domain. An integrated analysis system for this domain, NEESPI-RIMS, will be developed and represent an extension of the current pan-Arctic Regional Integrated Monitoring System. Identifying the separate and conjunctive impacts of factors such as climate change, land use and land cover change, fire, permafrost degradation, the redistribution of lakes and wetlands, and water engineering will be critical to understanding the full dimension of hydrologic change in the region, and in designing environmental monitoring systems to analyze these unfolding changes.