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Monitoring And Modeling Urbanization In China: A Mixed Methods And Multi-Scale Approach

This proposal aims to improve our understanding of China's extraordinary social, economic and environmental transformation and its impact on urbanization across the country. Given the size and scale of China's urban development - urban populations have more than doubled during the last 30 years, and more than 70% of economic activity in now located in cities - urban environments are playing an increasingly important role in daily quality-of-life issues, ecological processes, climate, flows of materials, and land transformations.
The study has four main objectives:
Objective 1: Characterizing the rates and patterns of urban expansion. We will use Landsat data as input to advanced data mining algorithms to derive new datasets on the rates and amounts of land cover change in 15 cities located across China. We focus on four critical periods spanning 1980 to 2005 to monitor urban growth both before and after economic reforms took effect.
Objective 2: Documenting the driving forces of urban expansion. Using econometric modeling techniques, we will integrate our satellite-based maps of urban growth with detailed socioeconomic data and policy variables to quantify the factors responsible for variations in the rates, amounts and patterns of urban expansion across China.
Objective 3: Building scenarios of future urbanization. We will develop simulations that explore how urban areas will respond to scenarios such as business-as-usual, increased economic growth and policy-based stimulus.
The primary outcome of the proposed project is a series of reconstructions of past land cover change and projections of future urban expansion in China under different political and economic scenarios. These forecasts can help improve our understanding of the dynamics of land use transformations, the relative importance of the drivers that foster/impede land conversion, and the complex interactions between urban change and sustainable systems. In addition, this project includes a substantial methodological component that will advance multi-scale predictive modeling and change detection techniques for remotely sensed data. The proposed research, undertaken by a U.S.-Chinese team, will represent the first comprehensive study of Chinese metropolitan development based on empirical results from satellite imagery, socioeconomic data and field surveys. Our proposed research falls under the Projections component NASA's Land Cover-Land Use Change Program, and is uniquely suited to answer key LCLUC questions, including What are the causes and consequences of LCLUC? The research will also contribute significantly to three international projects whose goals are closely aligned with the NASA LCLUC program: the IGBP/IHDP Global Land Project, the IHDP Urbanization and Global Environmental Change Project, and the Monsoon Asia Integrated Regional Study (MAIRS).