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China's Urbanization and Its Sustainability Under Future Climate Change

Driven by fast economic development and relaxation of the urban migration restrictions, China has experienced rapid urbanization over the past three decades. This urban transformation has profound environmental impacts, with regional climate change as the most direct presentation. We propose to examine urbanization and regional climate for selected Chinese cities to achieve the following objectives: 1) to assess the level of sustainable urban development in China, 2) to analyze the causal linkages between urbanization, urban sprawl and climate change, 3) to simulate local scale IPCC climate scenarios, and 4) to provide adaptation recommendations for various future climate scenarios. 1) We will assess urban development in strategically selected China cities through constructing a sustainability index that encompasses three key aspects of sustainable urban development: economic development, environment, and equity. 2) Using Shanghai and Urumqi as cases, we will evaluate the causal linkage between urbanization and climate change by using the Driving force-Pressure-State-Effect-Feedback (DPSEF) model. DPSEF uses socio-economic, environmental, land use, and climate indicators. 3) We will simulate future LULC scenarios and climates for Shanghai and Urumqi using the Dyna-CLUE models and the Regional Atmospheric Modeling System respectively. Decadal LCLUC (1960-2010) data for these regions will be used to drive our LCLUC activities. Using IPCC emission scenarios, the regional climate simulations will be conducted for current (2010), near-term (2021-2030) and the mid-range (2051-2060). A suite of remotely sensed parameters will be utilized to parameterize and validate our modeling activities. 4) We will evaluate current adaptation strategies of Shanghai and Urumqi and illustrate a range of possible adaptation measures that the respective city governments can use to cope with the impacts of various future climate changes. This effort will improve our understanding of China's urbanization and regional climate changes and have a practical policy dimension for selected cities.