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Incorporating Spatial and Social Capital Issues into the Environmental Kuznets Curve

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Abstract and Importance

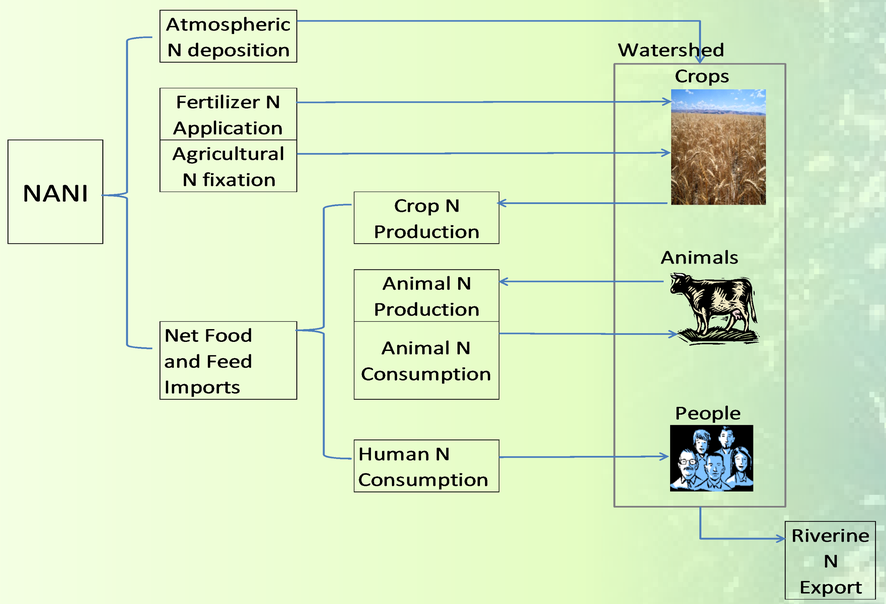
We explore county-level US data for spatial patterns in the EKC, and examine the effect of social capital on pollution. We use six different estimators: (1) OLS; (2) spatial error; (3), spatial lag; (4) general spatial; (5) spatial Durbin; and (6) GWR. This approach provides parameter estimates that allow for spatial heterogeneity in the relationship between nutrient pollution and income, as well as the other explanatory variables to vary over space.

As in previous studies, the core of our model examines the relationship between environmental quality and income/income^2. In this study, we have chosen nitrogen (N) which, in high concentrations, can be a serious pollutant, particularly causing eutrophication. We use the NANI (Net Anthropogenic Nitrogen Inputs) index developed by Cornell/NOAA. Our model also included explanatory variables such as a social capital index, a measure of rurality, age, a racial fragmentation index, educational attainment, Gini measure, and population change. Recent research indicates that local networks, social norms, levels of trust, and the ability to cooperate and undertake collective action (i.e. social capital) are vital to the explanation of local and regional pollution levels.

Results at this stage indicate a "significant" inverted U shaped EKC. Our results also suggest that spatial variations are *not* statistically significant i.e. there is no spatial heterogeneity in the EKC in this model. This implies that uniform policies that incorporate income and pollution levels across the U.S. are justified.

Net Anthropogenic Nitrogen Input

Howarth et al. (1996)



The Net Anthropogenic Nitrogren Input (NANI) is used to estimate the human-induced nitrogen inputs into a U.S. watershed. NANI estimates are shown to be good predictor of riverine nitrogen export at large, U.S. county, scale.

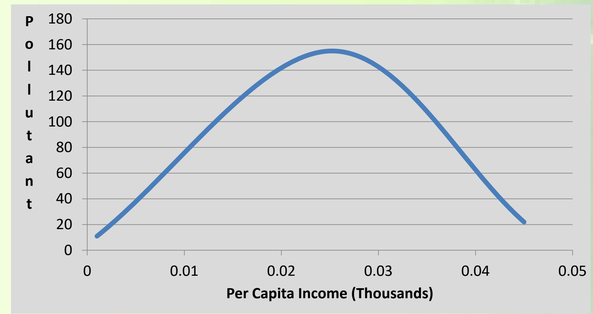
Components of the NANI dataset:

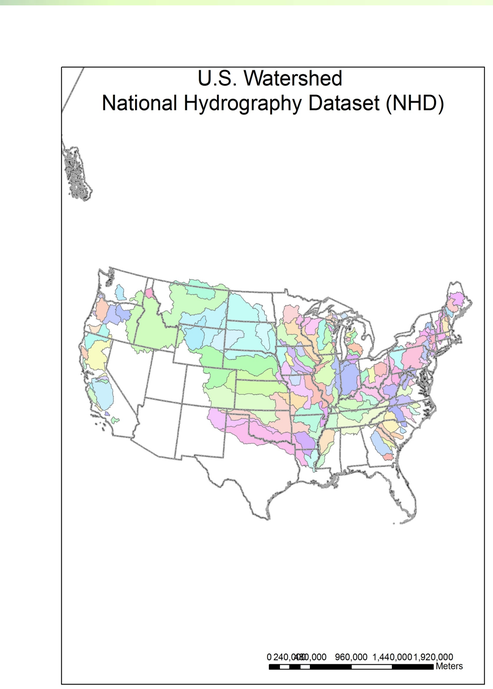
Component	Dataset
Atmospheric N deposition	Community Multiscale Air Quality Model (CMAQ) (Byun and Schere 2006)
Fertilizer application	USGS Nutrient Input Estimates
Fertilizer and agricultural N fixation	US Agriculture Census
Crop and animal production, net food and feed imports	US Agriculture Census
Human consumption, net	US Census

Hypothesized Model:

NANI= £ (per capita income, per capita income^2, social capital, control variables)

Expected Results





Map of US 144 US watersheds used as input in the NANI dataset calculations. The Net Anthropogenic Input is calculated at the county level.

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