Studies in Land Use Economics: Land Use Conversion in Indonesia and other topics

Jeremiah Lewis, Class of 2013

Over the past three months, I have worked with Professor Nelson on a series of projects in the field of land use economics, the economics of ecosystem services, and agricultural economics. The first project investigates land use change in Indonesia, estimating the impact of economic returns, zoning policy, and soil quality on land use change from 2006 to 2009. Of primary interest in this study is the conversion of land from forest to oil palms and agriculture, and the associated CO$_2$ emissions from burning the land to expedite the conversion process. Our model, which produces probabilistic estimates of land conversion, will be used by researchers interested in creating policy to reduce the concentration of smoke produced by land conversion fires over population centers. This research is quite topical --- high levels of air pollution in Singapore during this summer are thought to be due to land burning in Indonesia.

The second project involves estimating the impact of historical weather trends and cropland soil quality on maize and soybean yields in the Midwest. This data will be used to estimate the yield benefit of improving soil quality under future Midwestern climates. One interesting finding from this research was the increase in very warm growing seasons which lead to crop failure-- in earlier decades crop failure was primarily disadvantaged by a lack of sufficient warm weather. This project pursued its aim of demonstrating the importance of climate on crop yields through two approaches, data visualization and regression. From these two approaches, we can offer both quantitative estimates and visualizations of precipitation effects on yield.

Another project was part of a cross-disciplinary, multi-institution collaboration which is developing a method to calculate the genetic diversity of the food supply in various countries. The aspect of the project that I addressed was acquiring and collating the world production, import and export data, so that the genetic diversity offered by each given crop could be weighted by production levels and so that the genetic diversity of a country's food supply due to trade could be assessed.

The last project of the fellowship was analyzing the attributes of productive fishing grounds in the Gulf of Maine. This project, like the Indonesia land use change project, used a discrete choice model to estimate the magnitude of the effects of ocean features like depth, distance from coast, distance from open ocean on the likelihood of a given section of ocean having been exploited in the 1920s and 1930s for fishing. For this project we used an innovative data source —— the recollections of Maine fishermen of where they fished, gathered through an oral history project on Maine fisheries. This was then combined with GPS data on the Gulf of Maine in a great example of how modern data projects need not rely on modern data, but rather allow for old data sets to be applied in new ways.

Over the course of my summer research my projects solidified skills developed in earlier experiences. In many cases, my work followed, in technique if not entirely in theme, from my honors research into student dining hall choice. From this earlier research, I learned how to analyze discrete choice data (where an individual makes a decision from a limited number of options) and to use R, an open source computing platform, to analyze the data.

Faculty Mentor: Erik Nelson

Funded by the: World Wildlife Fund