

# Challenges in Natural Resources Management

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## Agricultural Trade

How do we analyze the impact of tariffs and trade policies on international trade?

### Challenges

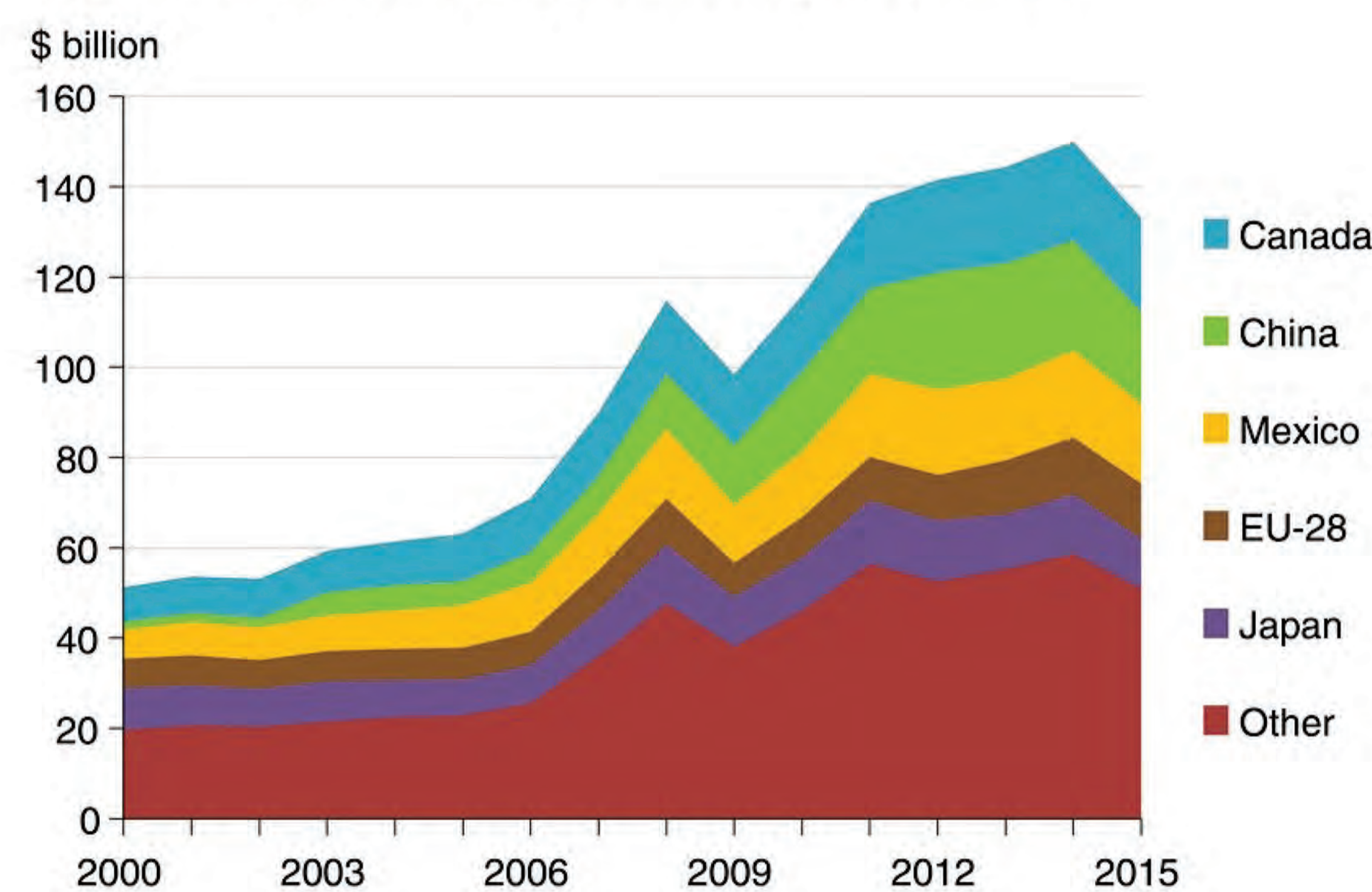
Data come from different sources in multiple formats. Data change every day but research takes time. There are thousands of country-product combinations.

### Solution

We automated and visualized data so that the effects of tariffs and trade policies can be quickly calculated and easily understood.

Figure 1. U.S. Exports by Country

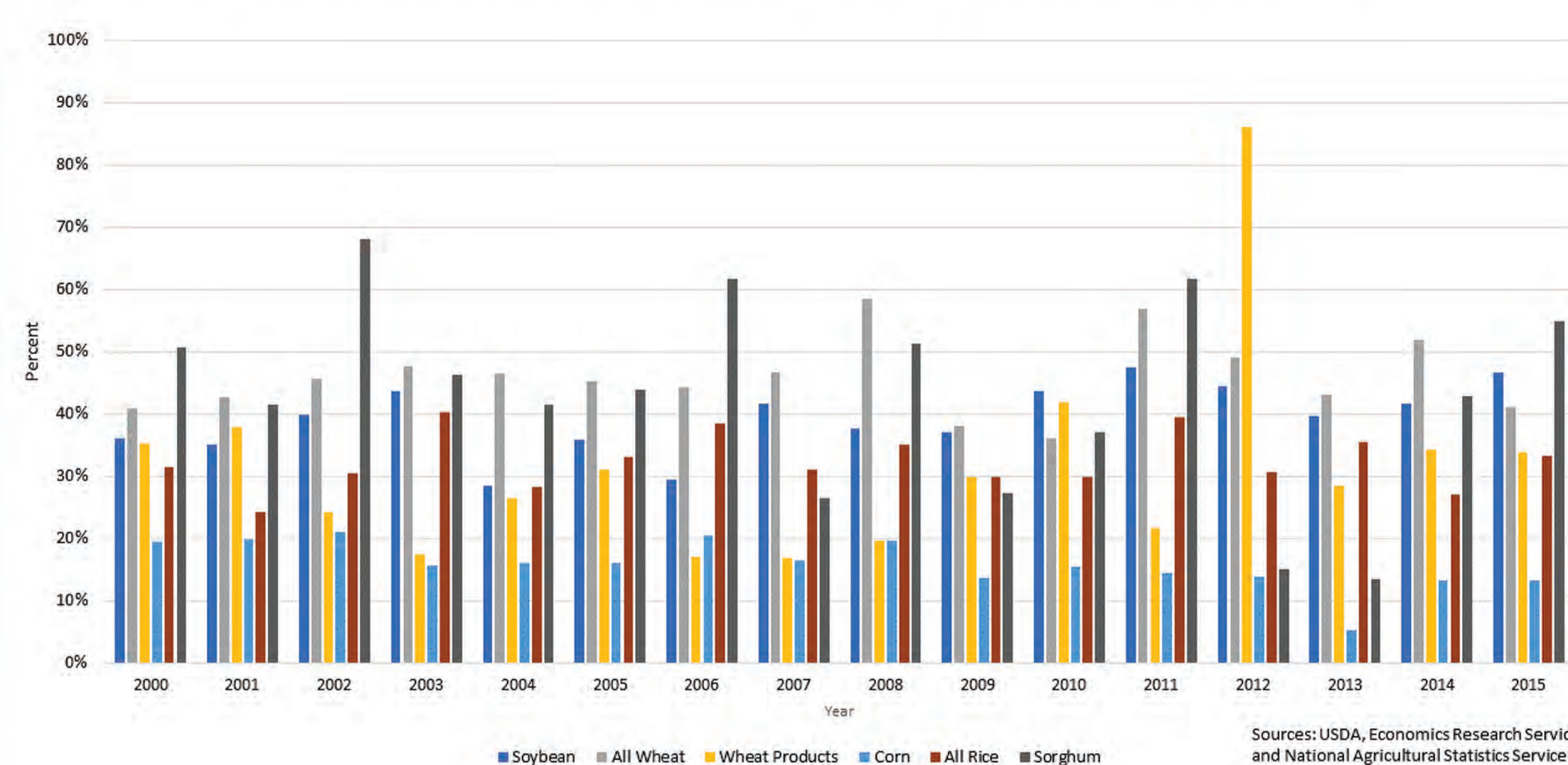
Top five markets for U.S. agricultural exports, 2000-15



Source: USDA, Economic Research Service using data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Database.

What if we could account for the variability of how data are reported across sources for all countries that import U.S. agricultural goods?

Figure 2. Percent of U.S. Crops Exported, 2000-15



What if we could quickly and accurately predict the impact of tariffs and trade policies?

## Biofuels

What is the effect of biofuel policies on land use, commodity prices, and commodity production?

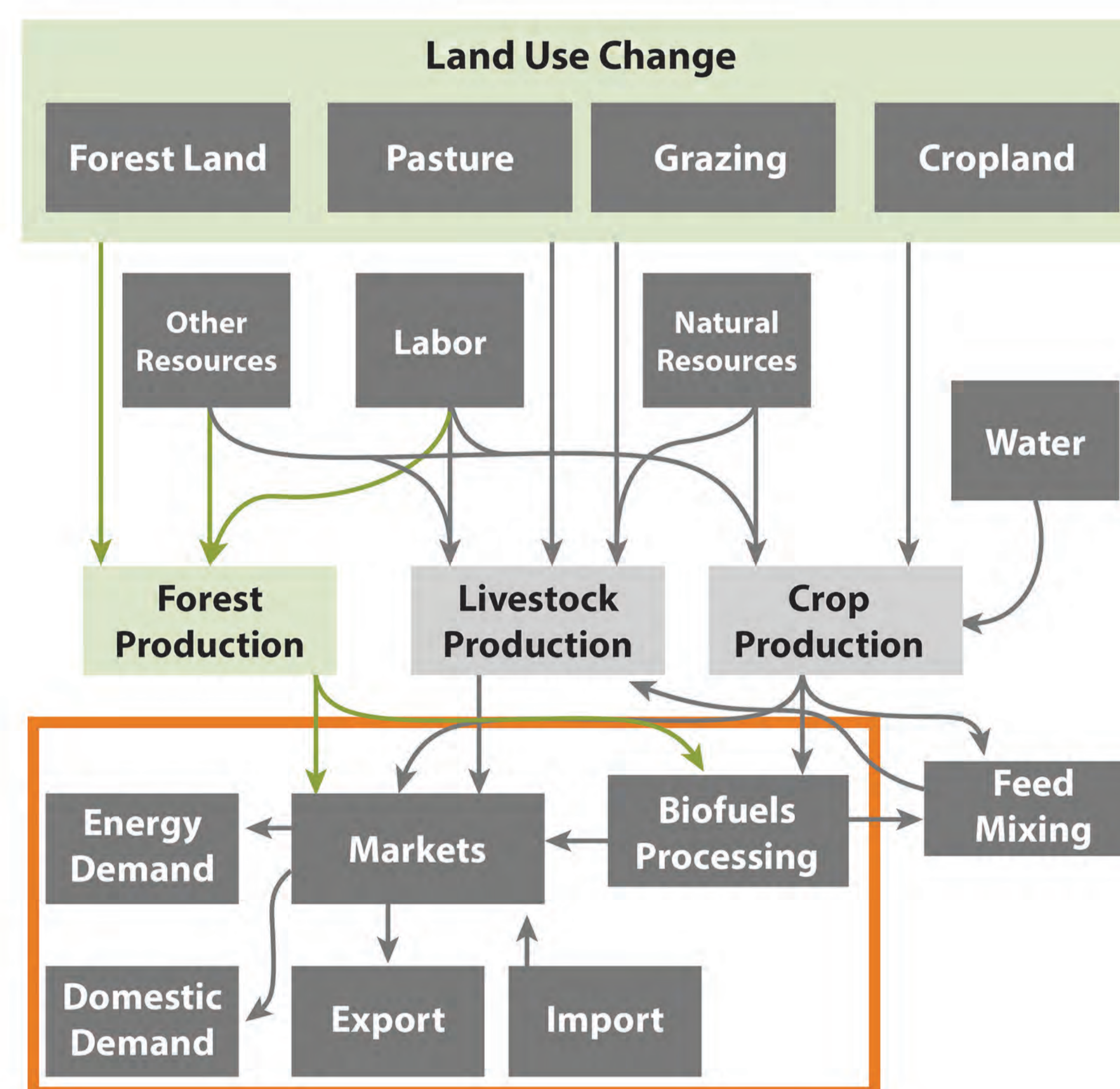
### Challenges

Multiple potential market and environmental impacts. Policies may be synergistic or counteractive.

### Solution

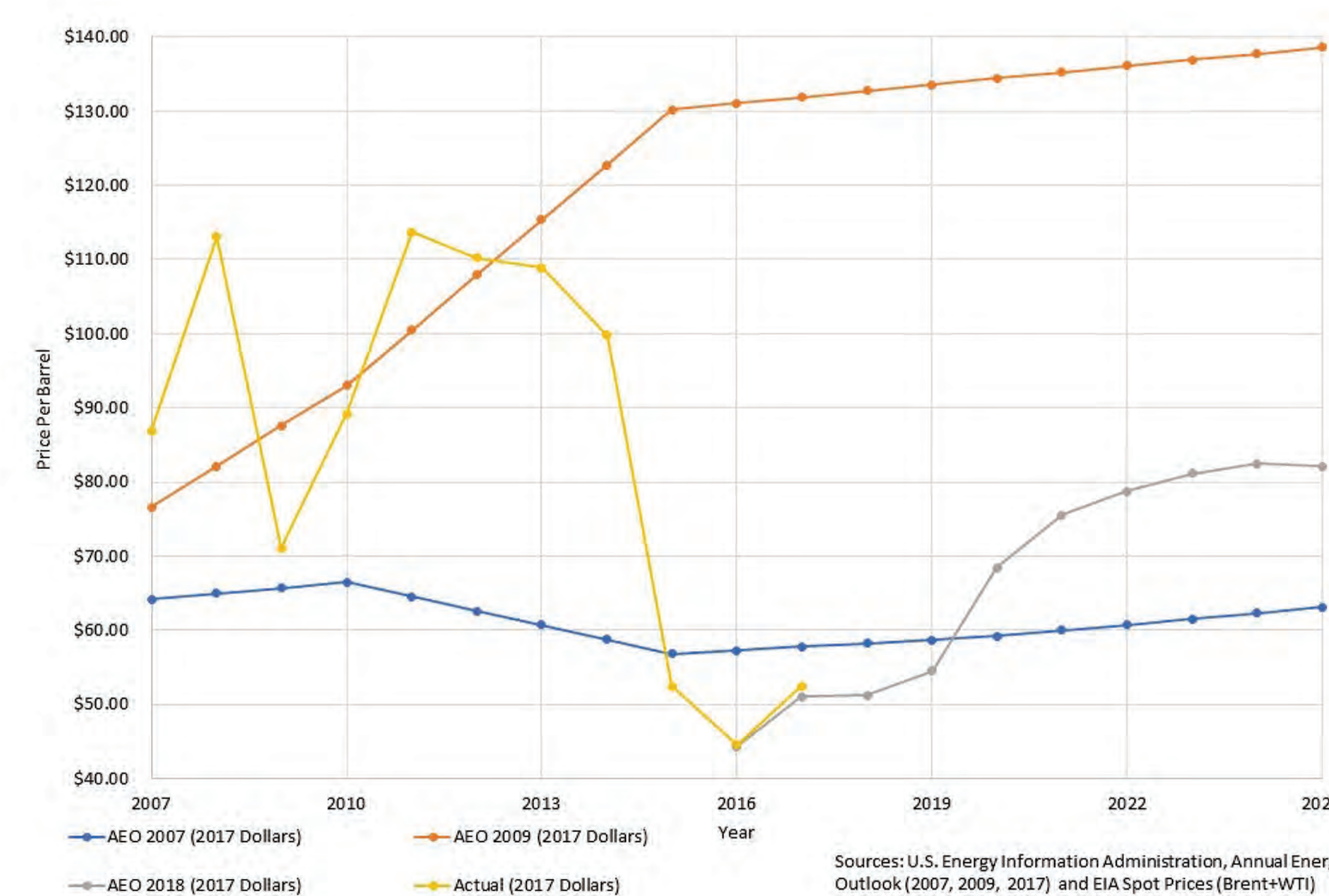
We used different models to predict the effects of different impacts caused by the market, the environment, or policies.

Figure 3. Complexity of Modeling Land Use



The complexity of land use models allows for more accurate predictions but makes solve-time longer and increases the risk of errors.

Figure 4. Annual Energy Outlooks, Real vs. Projected Crude Oil Prices



The volatility of oil prices makes predictions difficult and models rely on macro-economic predictions to work; therefore, capturing uncertainty is key.

## Carbon Price

What is the cause of the variability in different carbon price studies?

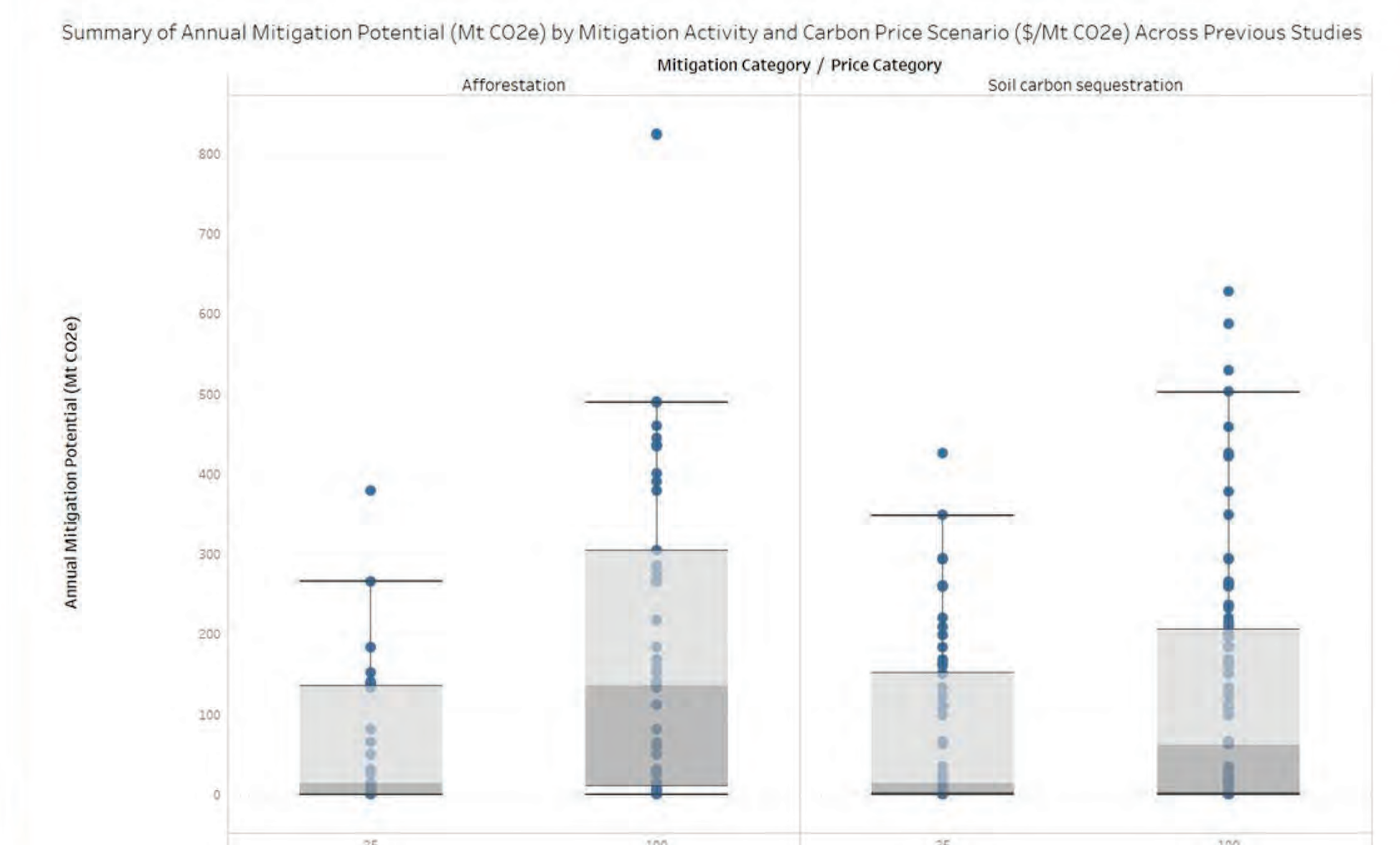
### Challenges

Different models and methods for predicting CO<sub>2</sub> offsets. Different mitigation activities have more studies than others.

### Solution

We aggregated different carbon price studies to see which variable(s) led to the range in CO<sub>2</sub> offsets.

Figure 5. Carbon Prices and CO<sub>2</sub> Offsets



For carbon prices that are \$25 or less, there is variation in CO<sub>2</sub> offsets within the same mitigation activity. For \$100 or less, there is variation in CO<sub>2</sub> offsets both within and across different mitigation activities.

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