
PROJECT PLAN: LAND USE AND WATER USE IN KANSAS

Kansas Department of Agriculture

ABSTRACT

This project analyzes the relationship between land use for agriculture and water use. The analysis is conducted at the county and the sub-county levels and uses regression to establish a relationship between the amount of acreage planted for different crops and the use of water pumped from wells.

1 INTRODUCTION

Given that the composition of crops in Kansas has changed over time, we investigate the rate at which those changes show up in annual water use data. The data in our analysis ranges from 2008 to 2022 and accounts for other important factors such as precipitation, temperature, population changes in addition to land use to explain changes in aggregate water use.

In addition to quantifying the relationship between the composition of land use and aggregate water use, this analysis helps establish trends in water use and explores what features are different between areas where aquifer water depths are stable and areas where aquifer water depths are declining.

2 BASELINE OR INITIAL ANALYSIS

To begin this project, the students and faculty in the Kansas Data Science Consortium will work to integrate land use data with water use data at different levels of geography. For instance, the data could be integrated at the county level as well as different HUC levels (e.g. HUC 10).

Once the data is integrated, summary statistics should be prepared to show how use and well depth levels have changed over time. These summaries should be made both graphically and with tables.

3 FINAL ANALYSIS

Once the data integration and the summary statistics are complete, the final analysis of this project is to establish the relationship between land use and water use. Doing this may require incorporating additional data about precipitation levels to think about how farmers can substitute between rainfall and water pumped from their wells.

An additional step that could be taken with this analysis is to incorporate information about conservation programs to think about how cropland rotates use and how conservation programs may remove certain land from irrigation for a time period.

4 FINAL GOALS & EVALUATION

The final goal of this project is to be able to establish the relationship between land use and water use for irrigation. There is particular interest in understanding how water intensive different types of crops are and how their use impacts water consumption through irrigation.

Additionally, this project will establish the reliance of each county on agriculture as a share of its economic activity and determine the use of water for other commercial activity. A successful project will establish how economic activity might be substituted between agriculture and other economic sectors to maintain employment and opportunity while enabling reductions in water use.

5 RELATED WORK

6 DATA & TECHNICAL REQUIREMENTS

This project will require different sets of data:

The analysis for this project will require a statistical software package such as Stata, R, or Python.