THE FUTURE OF CORN IN KANSAS

MAPPING HOW CHANGING CLIMATE WILL SHAPE OUR HARVESTS

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INTRODUCTION

- Corn is vital to agro-economy and regional food security of Kansas.
- Climate change poses a threat through increased thermal stress and altered hydrological cycles.
- A high-resolution, spatially explicit forecast of corn suitability for Kansas is currently lacking.

OBJECTIVES

- Develop a machine learning model (MaxEnt) to predict shifts in corn habitat for mid-century and end-of-century.
- Identify the key bioclimatic variables that most limit corn distribution in Kansas.
- Create spatially explicit suitability maps to inform regional agricultural planning and help stakeholders develop climate adaptation strategies.

CONCLUSIONS

- Kansas is projected to lose a significant amount of its prime corn-growing habitat by 2100, with impacts intensifying under a high-emissions scenario.
- Western Kansas agriculture is most at risk due to its reliance on irrigation and projected increases in aridity.
- A strategic shift to more drought-tolerant crops or the development of more resilient corn cultivars will be critical.

METHODOLOGY

1 DATA ACQUISITION

- Bioclimate variables (aspects of climate that directly affect living organisms) from the CHELSA dataset at 1-km spatial resolution.
- Corn presence locations from the USDA NASS Cropland Data Layer (CDL) at 30-m spatial resolution.

2 MODEL TRAINING

- The MaxEnt machine learning algorithm used to train the model using presence points (randomly created within Kansas boundaries) and baseline bioclimates (1981-2010).
- Model performance evaluated using the Area Under the Curve (AUC) of the Receiver Operating Characteristic (ROC) plot.

3 FUTURE PREDICTION

- The trained model used to predict areas suitable to harvest corn in mid-century (2041-2070) and end-of-century (2071-2100).
- Two Shared Socioeconomic Pathway (SSP) scenarios considered: SSP3-7.0 (moderate emissions) and SSP5-8.5 (high emissions/fossil-fueled development).

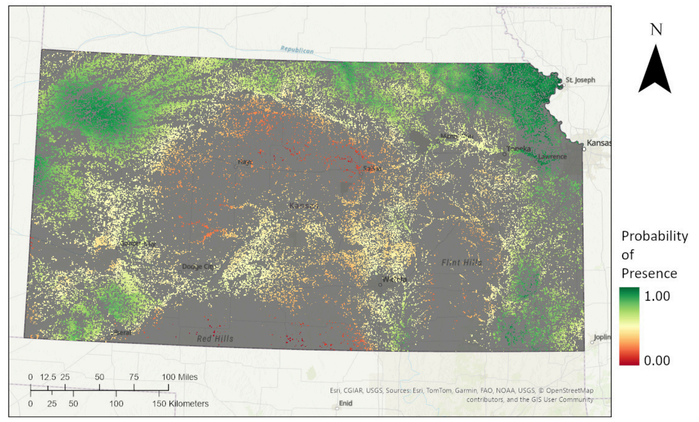
4 CREATE MAPS

- Maps created using ArcGIS Pro, by rasterizing the suitability point feature classes generated for baseline and future scenarios.

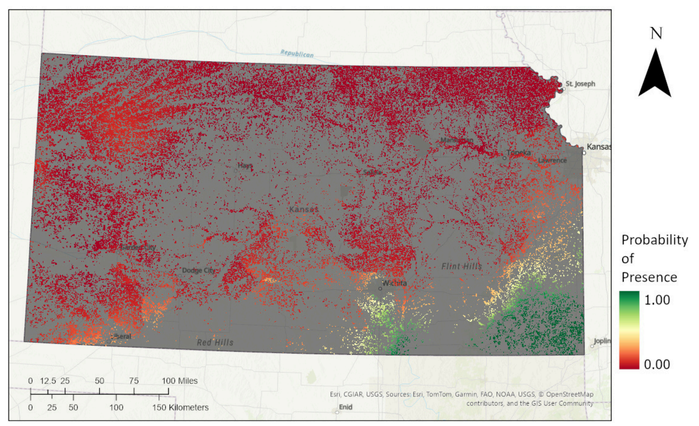
KEY FINDINGS

Models predict a significant contraction of highly suitable habitat, particularly in western Kansas, with a notable shift toward the southeast under future scenarios.

Current Suitability to Harvest Corn



Future Suitability to Harvest Corn



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