Quantifying Irrigation Influence on Crop Likelihood in the Central and Eastern US

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Abstract

Meeting the rising demand for food, feed, fiber, and fuel is a key challenge this century, especially as climate change, biodiversity loss, and food insecurity threaten ecosystems. Irrigation plays a vital role in enhancing crop production and shaping farmers' choices by ensuring water availability during critical growth stages. It also interacts with environmental and farming factors to influence which crops suit a region. In this study, we used explainable artificial intelligence to explore how irrigation affects crop choices in the eastern and central United States. Our findings show that irrigation's impact varies by crop and region. Moreover, the complete collapse of irrigation significantly reduces the likelihood across all major crop-producing areas.

Keywords: cropping systems, food security, irrigation expansion, explainable AI

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