TEXAS A&M AGRILIFE RESEARCH | EXTENSION

TEXAS A&M UNIVERSITY

AGRICULTURE & LIFE SCIENCES

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Climate Change and Agriculture in the Texas High Plains: Effects and Adaptation

The Ogallala Aquifer supports 30,000 square miles of irrigated cropland across northern Texas that is characterized by profitable grain and cotton production. Hydrologic modeling, based on contemporary discharge rates and historic rainfall, suggests that without effective policy intervention most areas of the aquifer in Texas will run dry by 2050. Decreasing annual rainfall and increasing average temperatures will increase agricultural water demand and expedite water extraction. Declining aquifer levels and uncertain yield responses to climate change confound anticipated producer response and future agricultural output. To understand the interactions of climate variables on northern Texas agriculture, we employed a nonlinear dynamic mathematical program to model the impact of forecasted climate change scenarios and declining aquifer levels on agricultural output in the Texas High Plains from 2018-2080. Data characterizing the response of agriculture to future climate and current aquifer hydrology is integrated on the sub-county level. This work models the efficacy of proposed adaptation strategies to discern the best responses to maintain agricultural income under forecasted climatic changes. Results show transitions from irrigated to dryland crop and rangeland cattle production. Declining water availability forces cropland from irrigated to dryland production with climate change scenarios altering relative crop yields and acreage.

Friday, October 12
12:00 pm
AGLS 200