POLICY RESEARCH



We set out to develop decision models for adaptation to climate variability and change, and use them to test hypotheses about the type, pace and payoff of adaptations made by resource decision-makers such as farmers, ranchers, conservationists, and infrastructure managers as they experience climate change and, especially, extreme climate events. First results for a Great Plains dryland wheat farm are reported here.

A CLIMATE ADAPTATION TEST BED

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Choices: specif	ic options for that resour	ce syste
Rubrics: rules optimal stopping	s-of-thumb; maximized ng point; and robust/resil	expec lient out
Impact and Adaptation Storylines • Great Plains Wheat Farm: A dryland wheat farmer experiencing a worsening climate (with large variability and extreme events) chooses adaptations. • Habitat & Species Protection: Performance of a portfolio of protected habitats in a changing climate	Climate Variability and Change Scenarios Model Output Statistics, Historical Analogs, Worst Case & Extremes, Simulated time series Climate Transfer Functions: Translate Impact and Adaptation Storylines into Model Parameters Decision Postures	Adaptati

Strategies: no-regret/wait-and-see; cheap

reversible; and transformation

utility; optimal stopping point; and

robust/resilient outcomes

additional performance margins/soft strategies;

Choices: specific options for that resource system

Rubrics: rules-of-thumb; maximized expected

• Stormwater Infrastructure: When should flood & drainage system capacity be altered in a changing climate?

AN AGENT-CENTERED DECISION-ANALYTIC APPROACH TO CLIMATE CHANGE ADAPTATION

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A "WORK IN PROGRESS" POSTER

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We tested hypotheses about the timing and pace of adaption in response to different profiles of climate change, especially extreme events superimposed on a gradually or rapidly worsening climate, expressed in yield and income variation for a dryland wheat farm in the U.S. Great Plains. Scenarios include gradual and rapid change, with typical or increased noise (standard deviation), and with extreme events stepped through the simulation. Adaptation choices range from cheap adjustments to transformation, and include switching crops and/or cultivation methods. In the model runs reported here we apply a rule-of-thumb income threshold for adaptation derived from recent financial performance of actual farms in the region. Negative net income drives adaptation which quickens with the rate of change but is slowed by larger noise. Extreme years evoke adaptation sooner than gradual change alone (see results to the right).



Adaptations are translated into alternative yield distributions, and at the adaptive "Go Point" the farmer starts to draw from a different yield distribution.









RESULTS

Gradual climate worsening:

Adaptation occurs 10-15 years into the gradual change scenario, and the more drastic change, from continuous spring wheat to winter wheat, pays off.

Rapid climate worsening:

Adaptation occurs **5** years earlier because the signal of change is so much stronger in the rapid change scenario.

Extreme drought

(occurring in this run in 2004), tripped adaptation any year that it occurred before the non-drought adaptation "Go Point".

A more typical drought advanced adaptation only when it occurred within a few years of the non-drought adaptation "Go Point".

Increased variability (original standard deviation X 1.5) on top of gradual climate worsening **delays the** adaptation "Go Point".