

Framing the Issue

- Daunting, a truly “grand” challenge!
- Caused by human activities (IPCC)
- Climate is changing rapidly
 - + 3-6° F by 2050; 10° F by 2100 (usual business)
 - 100X faster than recent ice age transition
- Evidence
 - Warmer winters, earlier springs, heat extremes, weather events (variation)
 - Rising sea level, melting glaciers, arctic sea ice, loss of trees in Rocky Mts., etc
- Inertia of climate system

Framing the Issue

- A Different, A Grander Challenge -

- A global problem, requiring global cooperation
- Decision making under uncertainty
- A timescale challenge
 - Weather (daily/seasonal)
 - Climate (decades, centuries)
- Complexities - supply chains
 - Shifting production, distribution...
- Non-climate factors affecting agriculture and adaptive capacity

Impacts on Agriculture

- Examples -

- Increasing carbon dioxide
- Warmer and longer growing seasons
- Increased summer heat stress
- Warmer winters
- Increased frequency of heavy rainfall, summer drought, weather events
- Less water from snowmelt in Western US
 - Increased urban – ag tensions
- US agriculture will not continue “business as usual”

Current Capacity and Science Gaps

- We have depth and breadth across US but to build adaptive capacity for agriculture we need:
 - To address uncertainties in climate model projections
 - Better decision tools for strategic adaptation
 - Ag practices, technologies, policies to increase resilience

Current Capacity and Science Gaps

- We have depth and breadth across US but to build adaptive capacity for agriculture we need:
 - Engagement of social sciences – communication and rural sociology
 - A transdisciplinary systems approach for technological adaptation, policy design, communication, equity issues, risk perception
 - To improve mitigation efforts – accounting, monitoring, costs/benefits analysis

Research Needs

- Climate Science
 - Improved and downscaled models
 - Relevant at farm level
 - Addressing nitrogen, carbon and water changes
 - Improved real time predictive tools for pests, heat stress, extreme events
 - Accounting for increased variations in weather
- Economic assessments of climate change
 - Cost/benefits of adaptation and mitigation
 - Farm gate and food system
 - Equity and social justice

Research Needs

- Decision Science
 - Design decision support tools for producers and consumers
- Adaptive Strategies and Management
 - Determine where to invest research
 - Livestock – heat stress, new breeds
 - New, more tolerant crop varieties
 - Improved water management strategies
 - Rising sea level and infrastructure changes at port facilities

Research Needs

- Mitigation, carbon sequestration
 - BMPs to reduce greenhouse gas emissions
- Communication
 - Effective communication to all audiences
 - Evaluate framing of issues
 - Use of social media, social networking
- Policy
 - Effective policy development for mitigation and adaptation
 - Land use, soil and water conservation, insurance...

A grand challenge?

Or the greatest challenge ever?

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