Integrating Climate Considerations into Conservation Planning Decisions by Agricultural Producers

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What climate change considerations do agricultural producers need to think about?

**Inputs**
- Temperature
- Precipitation
- Solar radiation
- Carbon dioxide

**Indirect**
- Insects
- Diseases
- Weeds

**Direct**
- Growth
- Phenology
- Yield
Challenges: Which information is useful? How do we make it usable?
Making it useful depends on the production system

Field Crops
Primary field crops:
Field corn, soybean, small grains (wheat, oats, etc.), hay crops, pasture
Primary States affected:
West Virginia, Maryland, Delaware, New Jersey, Pennsylvania, New York, Vermont, New Hampshire

Tree Fruits
Primary tree fruits:
Apples, Peaches, Pears
Primary states affected:
New York, Pennsylvania, New Jersey, Connecticut, Massachusetts, Vermont, Maine, New Hampshire, West Virginia, Maryland

Dairy
Animal System:
Dairy
Primary states affected:
Pennsylvania, New York, New Hampshire, Vermont, West Virginia, Maryland, Delaware, Connecticut, Rhode Island, Massachusetts, Maine
Site conditions need to be considered

- landscape position and proximity to water
- inherent soil properties
- plant community composition and structure
- adjacent plant and animal communities
Multiple dimensions of the human element

- Profitability
- Productivity
- Stewardship

- Social
  - Bearable
  - Equitable
- Environment
  - Sustainable
  - Viable
- Economic
Making the information useful: Integrating it into existing decision making processes
Current science is not in a usable form for land managers (farmers, ranchers, forest land managers)

Stakeholders
- USDA Service Agencies
- Cooperative Extension
- Land Grant Universities
- Farmers
- Ranchers
- Forest land owners
So much information!
BOILING IT DOWN

Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers

Adaptation Resources for Agriculture: Responding to Climate Variability and Change in the Northeast and Midwest

Maria Janowiak
Chris Swanson
FS ARS NRCS
Animal Ag Planning Guide
LPEC & NIFA
AGRICULTURE RESOURCES FOR BOILING IT DOWN

1. What is Adaptation to Climate Change?
2. How Vulnerable is your Production System?
3. Regional Tiered Menu of Climate Change Solutions
4. The Process of Adapting to a Changing Climate
5. Example Farms
6. Workbook
1. What is Adaptation to Climate Change?
2. How Vulnerable is your System?

Vulnerabilities in the Midwest
Expected changes:
- Extreme rainfall and flooding
- Increased temperatures
- Growing seasons are almost two weeks longer than in 1950, and are projected to lengthen

Vulnerabilities in the Northeast and Northern Forests
Expected changes:
- Extreme precipitation events
- Higher temperatures
- Reduced crop yields and milk production from heat stress
- Longer growing season
- Coastal flooding

Vulnerabilities in the Southeast and Caribbean
Expected changes:
- Sea-level rise
- Drought
- Temperature increase
- Spread of nonnative plants, weeds, and pests
- Increased insects and pathogens
3. A Regional Tiered Menu of Solutions

Adaptation Strategies and Approaches

Provides a **menu** to help producers translate broad concepts to specific, implementable tactics.

Shows your **rationale** for deciding on a specific action.
3. A Regional Tiered Menu of Solutions: Strategies for each Option

1. Sustain functions of soil and water
2. Reduce non-climate stressors of ag commodities
3. Reduce risks from warmer and drier conditions
4. Reduce risks and impacts of extreme weather
5. Manage fields as part of the larger landscape
6. Alter management
7. Alter production systems
8. Alter infrastructure

Manage for Persistence:
Recognizable as being the same system

Manage for Change:
System fundamentally becomes something different
3. A Regional Tiered Menu of Solutions: Two Basic Options: Persist or Change?
3. Regional Solutions: Approaches for Each Strategy

3. Reduce risks from warmer and drier conditions
   
   3.1 Adjust timing or location of on-farm activities
   
   3.2 Manage crops to cope with warmer and drier conditions
   
   3.3 Manage livestock to cope with warmer and drier conditions

4. Reduce risks and impacts of extreme weather
   
   4.1 Reduce peak flows, runoff, and water erosion
   
   4.2 Reduce severity or extent of water saturated soils and flood damage
   
   4.3 Reduce severity or extent of wind damage to crops and erosion of soil
4. The Process of Adapting to the Impacts of Climate Change

1. Where are you and what do you care about?
2. How is that particular place vulnerable to climate change?
3. What challenges or opportunities does climate change present?
4. What actions can help systems adapt to change?
5. What data will show whether those actions were effective?
5. Real World Examples of Farms Adapting to Climate Change

**Example: Adapting Confined Dairy Farm Practices in Pennsylvania**

<table>
<thead>
<tr>
<th>Adaptation Project Summary</th>
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<tbody>
<tr>
<td><strong>Property Description:</strong></td>
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<tr>
<td>- Ridge &amp; Valley, 1200ft above sea level, 44-48” precipitation, Corn Zone 2 (108 RM), Alfalfa Zone 3</td>
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<tr>
<td>- 950 dairy cows, 2200 acres crops (corn grain, silage, alfalfa hay)</td>
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<tr>
<th>Farm-wide Goals:</th>
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<tr>
<td>1. Sustain production of forage crops to feed current dairy herd</td>
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<td>2. Comply with CAFO regulations</td>
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<td>3. Maintain a profitable business to continue farm legacy</td>
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<th>Farm-wide Objectives:</th>
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<tr>
<td>1. Maintain or increase current annual forage yield</td>
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<tr>
<td>2. Prevent soil compaction, nutrient loss and water pollution</td>
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<tr>
<td>3. Reduce fuel use and minimize annual fertilizer purchases</td>
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Workshop Delivery of Adaptation Resources