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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

Direct
Growth
Phenology
Yield

Indirect
Insects
Diseases
Weeds

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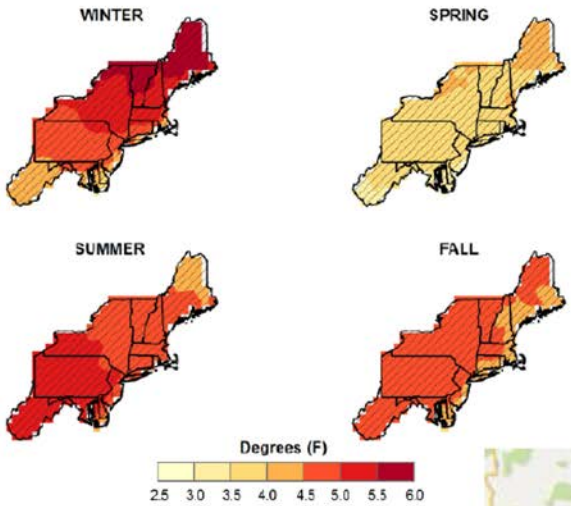
Challenges: Which information is useful? How do we make it usable?

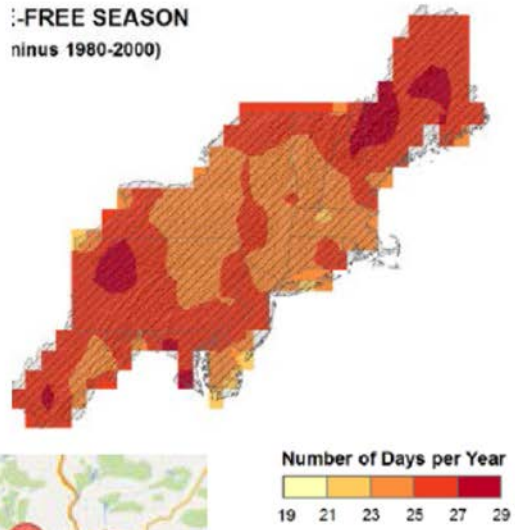
Mean Temp Δ

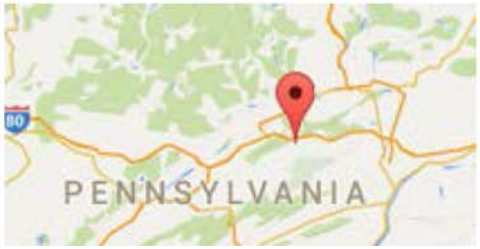
Multi-Model Mean Simulated Difference - (2041-2070 minus 1971-2000)



Length of Freeze Free Season

(2041-2070 minus 1980-2000)





Downscaling?

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Making it useful depends on the production system

Field Crops

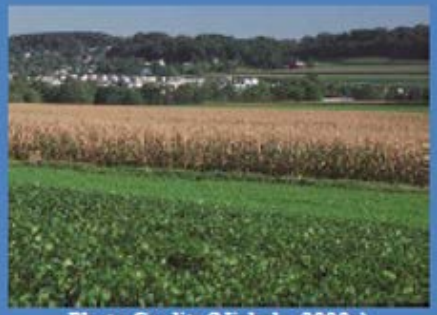

Photo Credit: (Nichols, 2000a)

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

Photo Credit: (Bauer, 2006)

Primary tree fruits:
Apples, Peaches, Pears

Primary states affected:
New York, Pennsylvania, New Jersey, Connecticut, Massachusetts, Vermont, Maine, New Hampshire, West Virginia, Maryland

Dairy

Photo Credit: (Nichols, 2000b)

Animal System:
Dairy

Primary states affected:
Pennsylvania, New York, New Hampshire, Vermont, West Virginia, Maryland, Delaware, Connecticut, Rhode Island, Massachusetts, Maine

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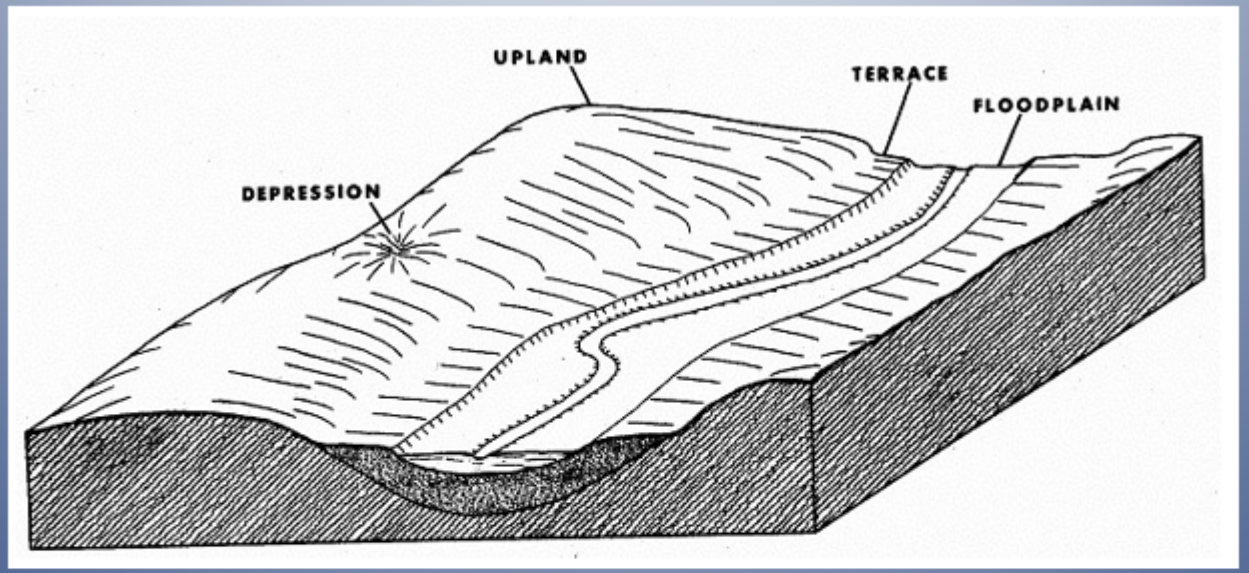
Site conditions need to be considered



- landscape positon and proximity to water
- inherent soil properties
- plant community composition and structure
- adjacent plant and animal communities

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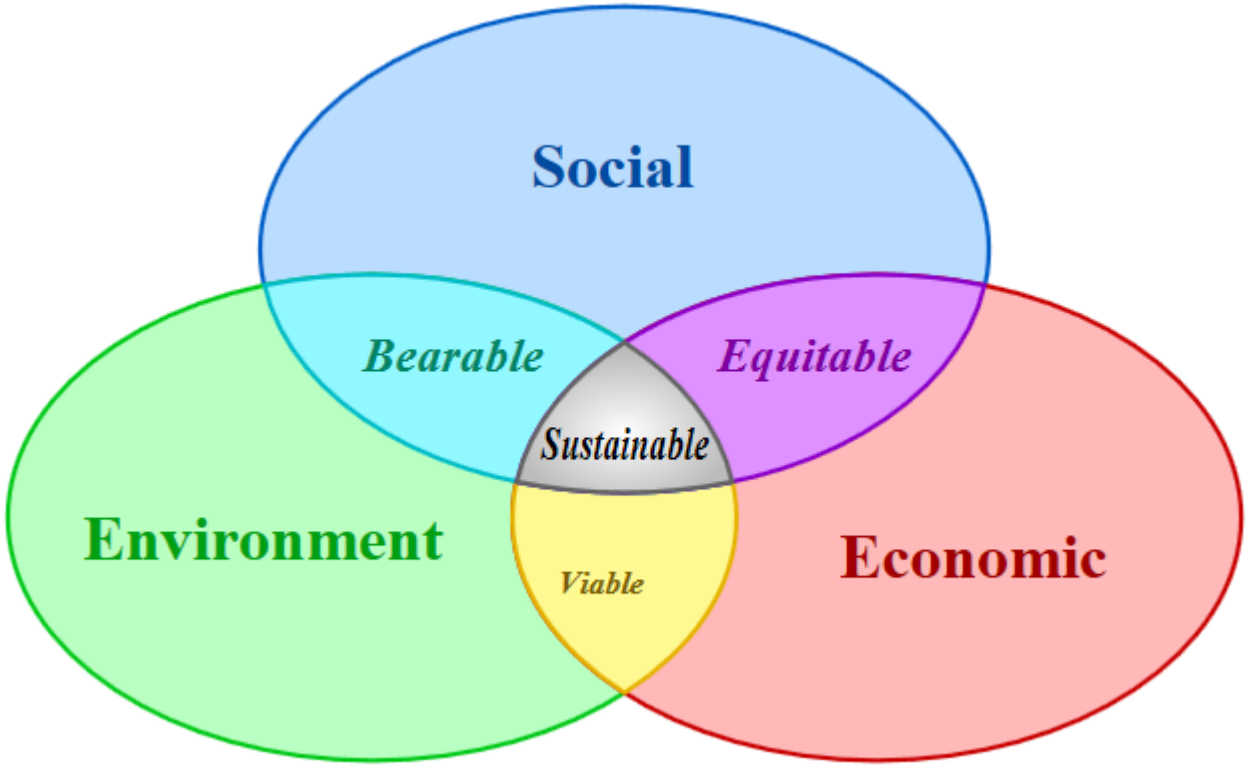
Multiple dimensions of the human element



Profitability **Productivity** **Stewardship**

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Making the information useful: Integrating it into existing decision making processes

Farm Enterprise Risk Management

Farm-Risk-Plans.USDA.gov
Helping farmers & ranchers find success

Natural Resource Conservation Plan

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Current science is not in a usable form for land managers (farmers, ranchers, forest land managers)

Foundational Research → Applied Research → Package & Develop → Outreach / Extension

Stakeholders

- USDA Service Agencies
- Cooperative Extension
- Land Grant Universities
- **Farmers**
- **Ranchers**
- **Forest land owners**

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So much information!

Northeast and Northern Forests Regional Climate Hub Assessment
Change Vulnerability and
Mitigation Strategies

Photo Credit: Scott Bauer (2007)

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Pennsylvania Climate Impacts Assessment Up

May 2015

James Shortle[1] (PI), Professor

Sectors

- Energy
- Agriculture
- Tourism and outdoor recreation
- Water quantity and quality
- Human health
- Forestry

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ENVIRONMENT & NATURAL RESOURCES INSTITUTE

NOAA Technical Report NESDIS 142-1

Regional Climate Trends and Scenarios for the U.S. National Climate Assessment

Part 1. Climate of the Northeast U.S.

Washington, D.C.
January 2013

NOAA

U.S. DEPARTMENT OF COM
National Oceanic and Atmosph
National Environmental Satellite,

Climate Change Impacts in the United States

CHAPTER 6
AGRICULTURE

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On the Web: http://nca2014.globalchange.gov/report/sectors/agriculture

INFORMATION DRAWN FROM THIS CHAPTER IS INCLUDED IN THE HIGHLIGHTS REPORT AND IS IDENTIFIED BY THIS ICON

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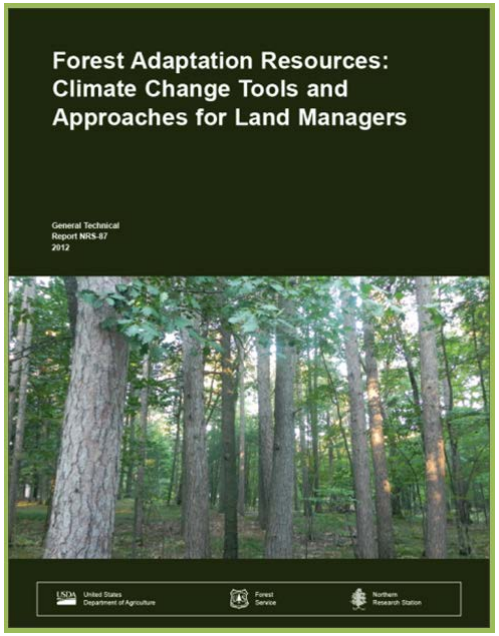
BOILING IT DOWN



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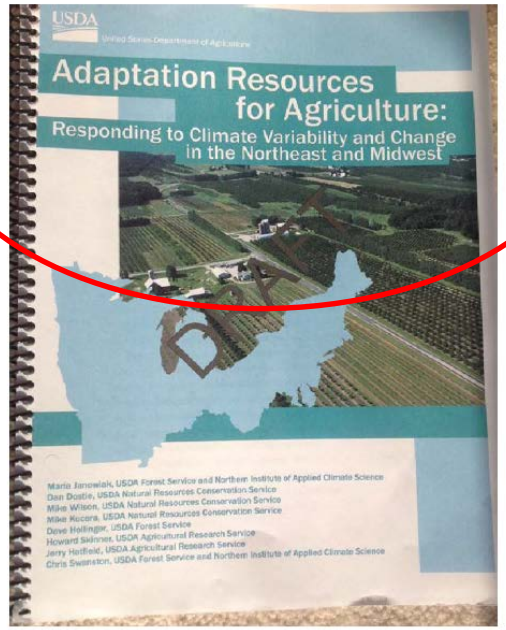

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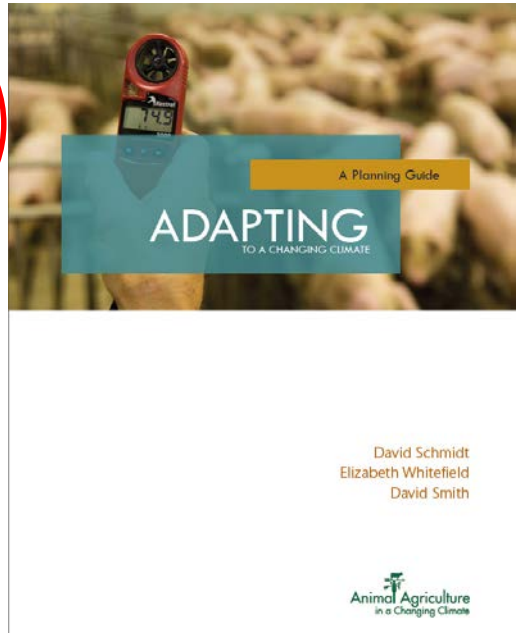

Animal Ag Planning Guide
LPEC & NIFA

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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

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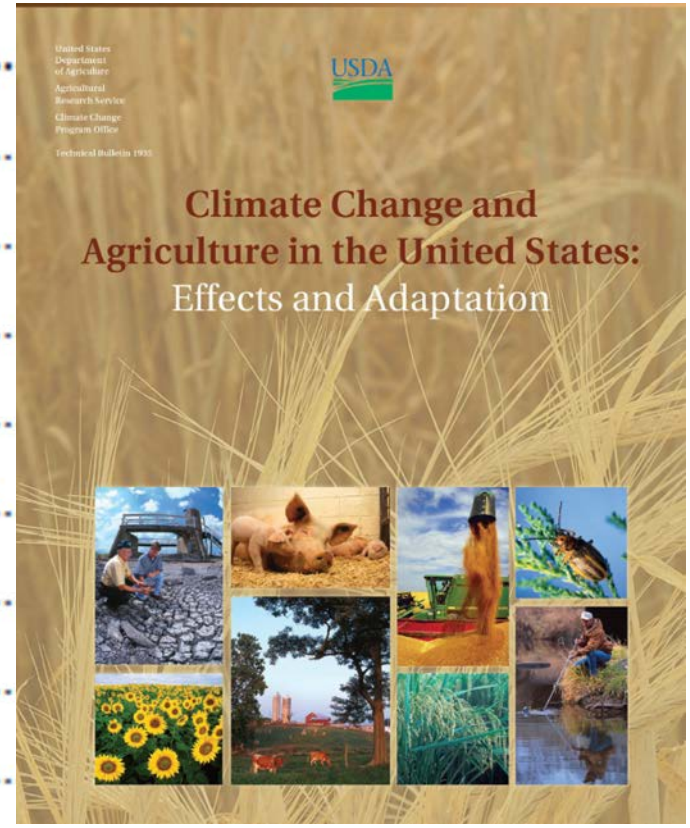
1. What is Adaptation to Climate Change?



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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

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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

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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

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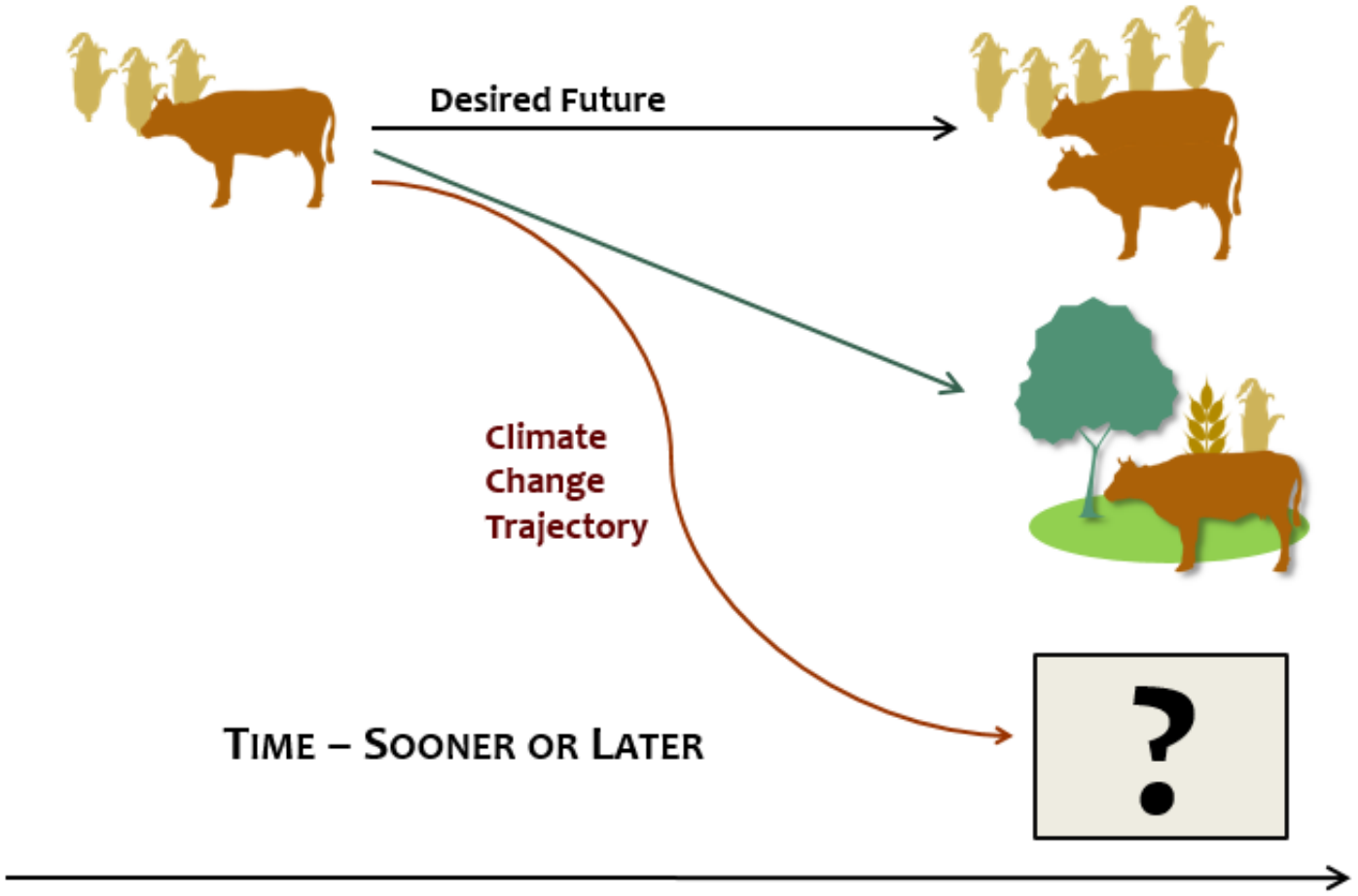
3. A Regional Tiered Menu of Solutions: Two Basic Options: Persist or Change?



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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 driver conditions
- 3.3 Manage livestock to cope with warmer and driver 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

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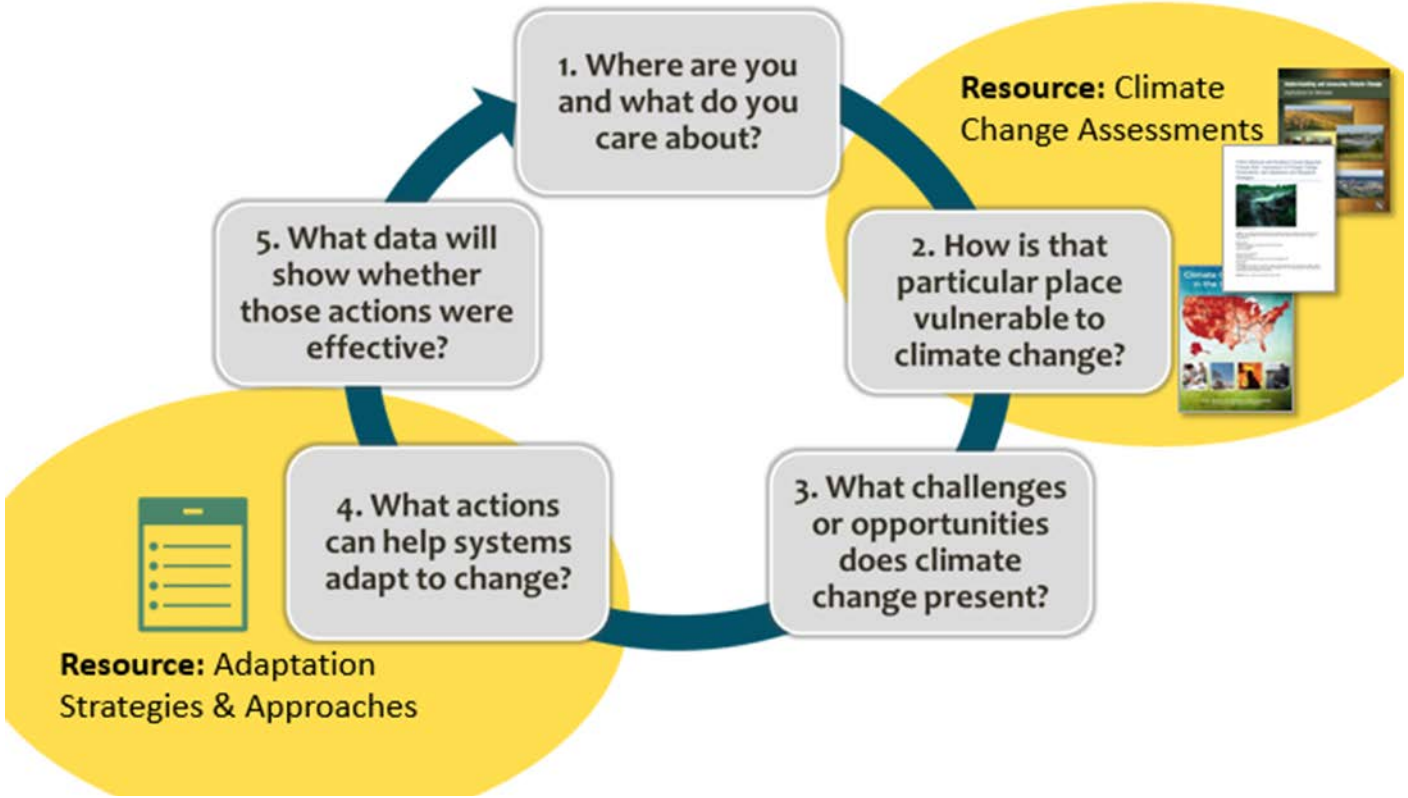
4. The Process of Adapting to the Impacts of Climate Change



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5. Real World Examples of Farms Adapting to Climate Change

Example: Adapting Confined Dairy Farm Practices in Pennsylvania

Adaptation Project Summary

Property Description:

- Ridge & Valley, 1200ft above sea level, 44-48" precipitation, Corn Zone 2 (108 RM), Alfalfa Zone 3
- 950 dairy cows, 2200 acres crops (corn grain, silage, alfalfa hay)

Farm-wide Goals:

1. Sustain production of forage crops to feed current dairy herd
2. Comply with CAFO regulations
3. Maintain a profitable business to continue farm legacy

Farm-wide Objectives:

1. Maintain or increase current annual forage yield
2. Prevent soil compaction, nutrient loss and water pollution
3. Reduce fuel use and minimize annual fertilizer purchases

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Workshop Delivery of Adaptation Resources