Northeast Farming for Climate Resilience: Floods

NOAA Climate Services Webinar
October 31, 2023

Erin Lane, Deputy Director,
USDA Northeast Climate Hub
OUTLINE

1. Increase in extreme rain events
2. Adapting to climate change
   - landscape vulnerability, soil health, decision-support
3. A word about drought
Mission

To develop and deliver science-based, region-specific information and technologies to enable climate-informed decision-making.

Partnerships with FS, ARS, NRCS, LGUs, NGOs and others
Science and data syntheses
*Translating and delivering relevant information*

Tool/technology development and support
*Supporting climate-informed planning and decision-making*

Outreach, convening, and training
*Facilitating engagement, discovery, and exchange*
FOURTH NATIONAL CLIMATE ASSESSMENT

CHAPTER 18: NORTHEAST
The Northeast has experienced a 60% increase in extreme precipitation events since 1958.
Impacts

+ Flooding
+ Crop contamination
+ Debris deposition
+ Invasive Species
+ Soil Erosion
+ Compaction
+ Crop loss
+ Delayed access (planting/harvesting)
+ Loss of seeds, fertilizer, ag chemicals
+ Nutrient runoff/Loss of nutrients
+ Risk of damage to infrastructure, equipment, and manure lagoons
Create Climate Smart Farms

Address Landscape Vulnerability

Improve Soil Health

Use Decision Support Tools for better information faster
Address Landscape Vulnerability

• Take land out of annual production
• Establish perennial systems
• Practice erosion control
Take marginal land out of annual production

- Steep slopes
- Frequently flooded/ponded soils
- Shallow to bedrock soils
- Soils that easily compact
- Areas that are prone to saltwater intrusion
Establish Perennial Systems

- Pasture or hay
- Perennial crops
- Pollinator or wildlife habitat
- Conservation buffers
**Control Erosion:** Install Grassed Waterways, Diversions, Contour Buffer Strips, and Water and Sediment Control Basins
Improve Soil Health

- Increase Organic Matter
- Improve Soil Structure (Disturb Less)
- Keep Soils Covered
Soil Organic Matter

• **Enhances infiltration:** Allows more of the soil mass to hold water.

• **Reduces erosion:** Increasing SOM from 1 – 3% can reduce erosion 20-33%.
Improve soil structure

- Disturb the soil less
- Reduce compaction
- Encourage living roots and biological communities

- No-Till
- Reduced-Till
- Shallow-Till
- Zone-Till/Strip-Till
- Ridge-Till
- Strategic-Till
Keep Soil Covered: crops, mulch, crop residue

• Buffers soil temperature and moisture
• Improves energy flow by capturing sun
• Provides living roots (food source) over a larger part of the growing season.
• Protects against erosion
Keep Soil Covered: Succession Cropping

Left to Right: Triticale planted after corn harvest, red clover interseeded between wheat, and field peas and other summer annuals planted in a fallow field.
Decision Support Tools

AgRisk Viewer
USDA SOUTHWEST CLIMATE HUB

Now Viewing
Risk Management Agency Payments

Plymouth County, MA: 12,997,190

Click on line chart points or bar chart bars or labels to narrow data

Payment indemnity by commodity

Annual totals, all commodities
(x 1,000)

1989–2021 totals by commodity
(x 1,000,000)

- Cranberries
- Adjusted gross revenue-life
- All other crops
- Corn
- Whole farm revenue protection
- Apiculture

Other
Decision Support Tools

• Apple Scab.
• Fire Blight.
• Sooty Blotch and Fly Speck.
• Apple Maggot.
• Codling Moth.
• Oblique-banded Leafroller.
• Oriental Fruit Moth.
• Plum Curculio.
• San Jose Scale.
• Spotted Tentiform Leafminer.
• Apple Carbohydrate Thinning.
• Pollen Tube Growth Model.
• Apple Irrigation.
• Blueberry Maggot.
• Strawberry Diseases.
• Alfalfa Weevil.
Climate Smart Farming Decision Tools
Cutting-edge tools to help farmers manage climate risk.

- **CSF Growing Degree Day Calculator**
  Plots Growing Degree Days (GDD) to help predict plant development and pest/disease outbreaks, and provides a climatological context.

- **CSF Apple Stage / Freeze Damage Probability**
  Charts observed/forecasted daily minimum temperatures vs. apple hardness thresholds in order to assess potential risk for freeze damage.

- **CSF Grape Hardiness & Freeze Risk**
  Charts hardiness temperature vs. daily observed/forecasted temperatures for several varieties of grapes.

- **CSF Climate Change in Your County**
  Find out how the climate has changed in your county since 1950, and what is projected over the next century.
### Cover Crop Species Selector

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<thead>
<tr>
<th>COVER CROPS</th>
<th>AVERAGE GOAL RATING</th>
<th>JAN</th>
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<td>SPRING CEREAL RYE</td>
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Weathering the Change
Adaptation Workbook

1. Understand Exposure
2. Assess Vulnerability & Risks
3. Investigate Options
4. Prioritize & Plan
5. Take Action
Trade-offs

Climate change will alter rainfall patterns in New England in the coming decades. Storms will likely become more intense, increasing the frequency of flooding.

This leaves many agricultural lands, especially those in floodplains, at risk. Farms in New England tend to use levees, or enhancing drainage may help only the very localized area. Yet these practices may actually increase the intensity of water flow. This can exacerbate flooding downstream and degrade river ecosystems.

Interviews with floodplain stakeholders

In 2014, we interviewed 36 residents and farmers in the Deerfield River watershed in western Massachusetts. This area has experienced significant flooding in recent years. Some residents proposed that all the land bor-
**TABLE 1**

<table>
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<tr>
<th>PRACTICE</th>
<th>OBJECTIVE</th>
<th>TRADE-OFFS</th>
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<tbody>
<tr>
<td>Bank Stabilization / Dredging</td>
<td>Protect land from erosion; protect infrastructure</td>
<td>Increases flood impacts downstream; degrades river ecosystems</td>
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<td>Land use change / Riparian restoration</td>
<td>Slow flood waters; prevent erosion</td>
<td>Expensive for farmers and may reduce farm area</td>
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<td>Flood Insurance</td>
<td>Protect livelihood from loss</td>
<td>Expensive for farmers</td>
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<td>Levee / Block flood waters</td>
<td>Protect croplands from flood impacts</td>
<td>Increases flood impacts downstream</td>
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<td>Drainage infrastructure</td>
<td>reduce flooding</td>
<td>Increases flood impacts downstream; degrades river ecosystem</td>
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<td>Flood debris removal</td>
<td>Preserve or boost cropland productivity; protect farmer’s health and safety</td>
<td>Expensive for farmers</td>
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<td>Regrading fields</td>
<td>Restore cropland productivity after deposition</td>
<td>Expensive for farmers</td>
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Northeast Climate Hub

Factsheets and summaries of scientific studies

Workshops and proceedings

Economic case studies

Quarterly e-newsletters

Archived webinars

360 virtual tours demonstrating climate adaptation practices
Climate Adaptation and Mitigation Fellowship Program

- Create a peer learning program for climate communications, adaptation, and mitigation for agricultural advisors and farmers

- Support producers in learning about climate impacts, creating adaptation plans, and implementing climate smart practices

Methods

Promoting climate literacy through stakeholder education and engagement
Climate Equity

A focus on facts, understanding, empathy, and collective action

Our goal is to integrate climate equity into all our projects as part of ‘This is who we are.’
More Rain and... More Drought?

Changing Characteristics of Snow, Precipitation and Drought in the Northeast U.S.

Curtis Riganti, NDMC; Lindsay Johnson, NDMC; Brian Fuchs, NDMC; Erin Lane, USDA; Anthony Buda, USDA; Lindsey Rustad, USDA

Published October 2023
Drought risk isn’t decreasing as much as expected

- Hydrologic intensification
- Increased variation in precipitation evaporation
- Drought frequency has decreased, but not much change in intensity or duration

Krakauer et al 2019
No clear signals emerged for recent changes in the number of dry periods in the NEUS.
Days with non-zero snow depth in February appear to be decreasing overall in the last 30 years when compared to the previous 30 years.
Spring and annual snowfall has decreased across most of the NEUS, especially in the Appalachian regions of Pennsylvania, Maryland and West Virginia. It is possible that some increase in snowfall has occurred in northeastern parts of New England.
Changing Characteristics of Snow, Precipitation, and Drought in the Northeast U.S.

- Increase in winter and spring precipitation and heavy precipitation events
- No clear regional change in dry periods
- Days with snow on the ground in February are decreasing
- Snowfall has decreased across the region though some increase in northeastern New England
USDA Climate Hubs

Website: https://www.climatehubs.usda.gov/hubs/northeast
Quarterly Harvest: https://www.climatehubs.usda.gov/hubs/northeast/topic/quarterly-harvest
Twitter: @USDAClimateHubs
Forest Pulse: https://www.climatehubs.usda.gov/hubs/northeast/project/pulse

Email: erin.d.lane@usda.gov
Cover Crop Strategies in Cold Climates: Successful Strategies

- Using winter rye or other cereals.
- Legumes grown for only part of the year (i.e. after a main crop is harvested) probably not an option as they need a longer growing season.
- Crop Planning (i.e. early crop -> over wintering cover crop -> late season crop the following year).
- Shorter day corn.
- Inter-seeding (i.e. red clover and wheat, rye in 3’ corn with High Boy seeder).
- Fallow rotation that include summer annuals or perennials.