

Farming and Climate Change: Working Toward a Resilient Agriculture

Joshua Faulkner, PhD
Farming and Climate Change Program Coordinator
UVM Extension Center for Sustainable Agriculture

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Upper Valley Adaptation Workgroup



The University
of Vermont
EXTENSION



Center for
**Sustainable
Agriculture**

Image: www.oklahomafarmreport.com. 7/2012

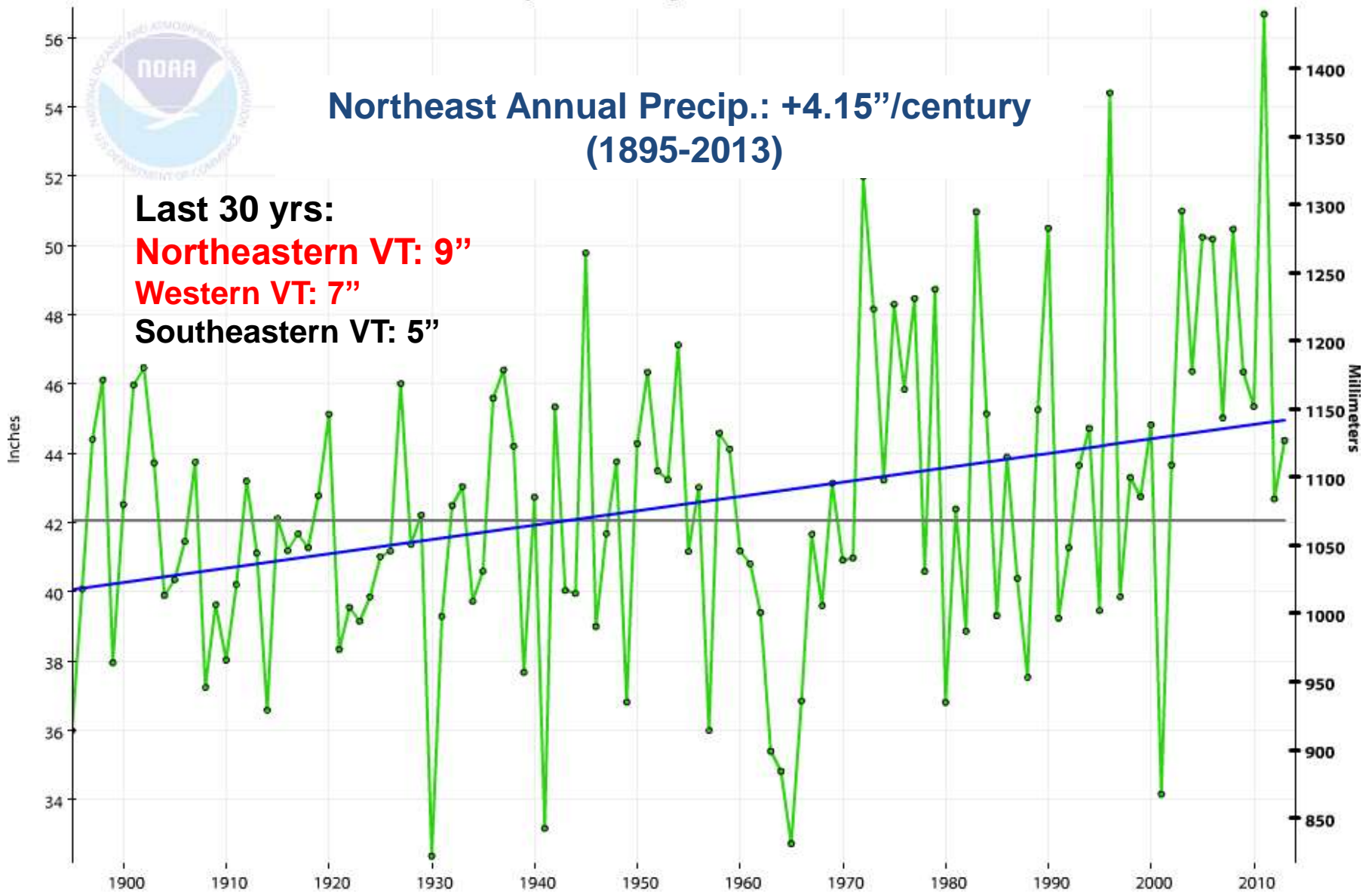
Northeast, Precipitation, January-December

1895-2013 Trend +4.15"/Century
1901-2000 Avg: 42.04"
Precip



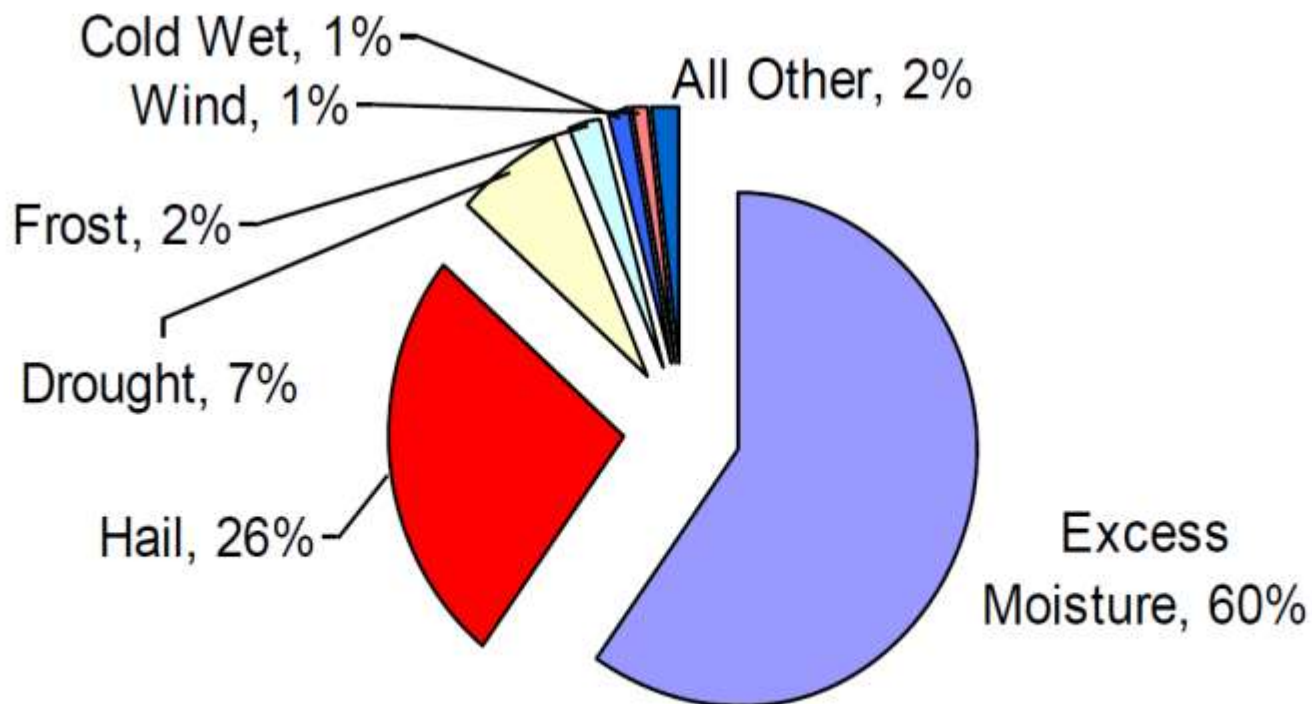
Northeast Annual Precip.: +4.15"/century (1895-2013)

Last 30 yrs:
Northeastern VT: 9"
Western VT: 7"
Southeastern VT: 5"

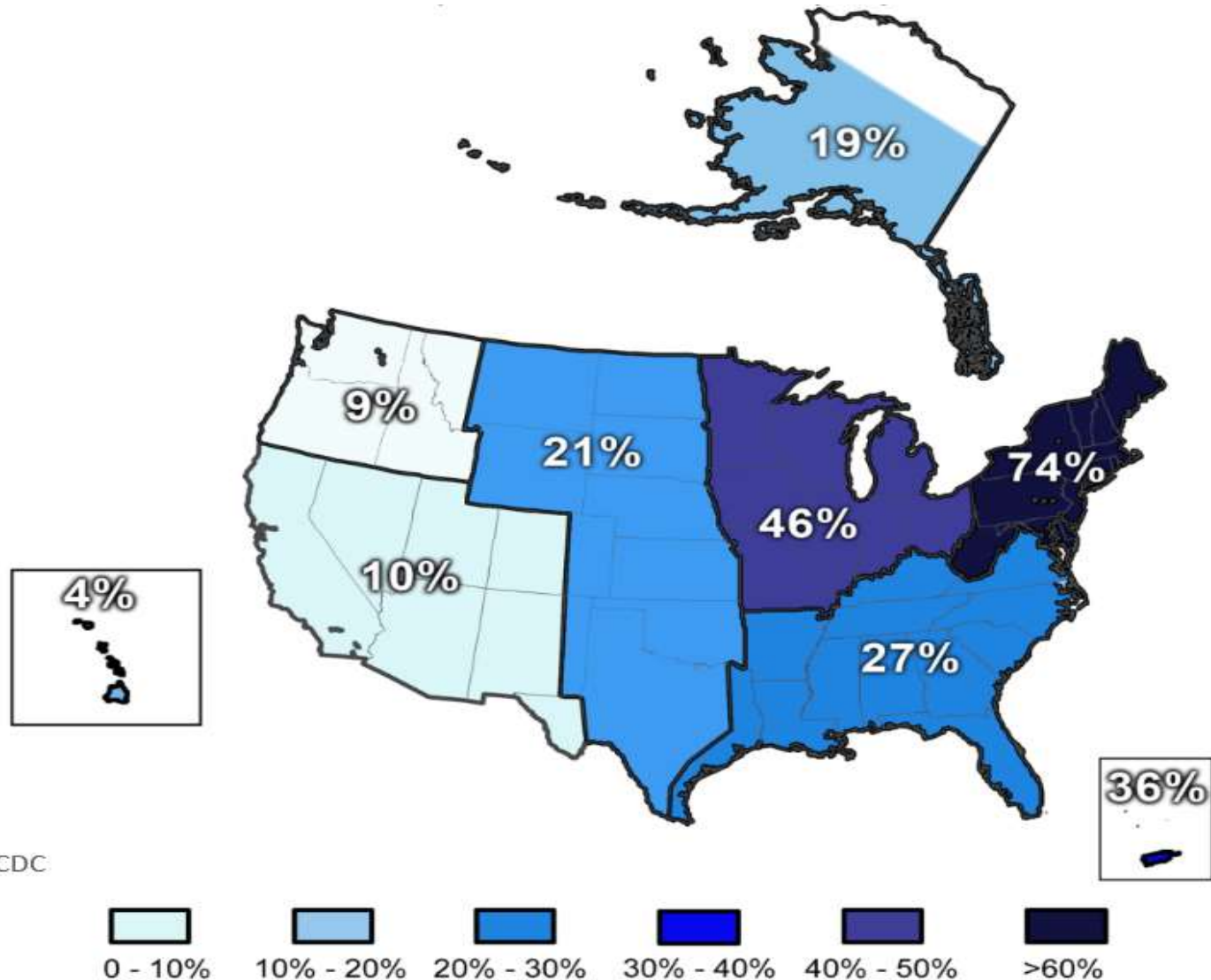


Why Vermont Crops Fail (2001-10)

Since 1988, Crop Ins. provided
\$213 Bil. of Protection and Paid \$15 Million
in Loss Payments to VT Farmers



Trend in 1-day Very Heavy Precipitation (1958-2010)



**‘In general, erosion increases at a rate
1.7 times annual rainfall increases’**

(Nearing et al., 2004)



Flooding and Downstream Impacts



- **Flooding...**
- **Increased peak flows**
- **Increased streambank erosion**
- **Nutrient loss (including leaching)**
- **'Build-up and wash-off'**

Sediment input to the Hudson R. due to Lee and Irene was 5 times long-term annual average (Ralston et al., 2013)

Connecticut River

Thames River

Long Island Sound



How does climate change impact NE crops?

- Cool-season crops will be of lower yield or quality
 - Sweet corn
- Reduced grain yield (rapid maturation and moisture)
 - Field corn, nutrient content...
- Reduced vernalization lower some fruit yields; increased frost risk?
 - Apples
- New pests are able to over-winter, emerge early; increased pesticides
 - Flea beetle, SWD?
- Some warmer season crops will do better
 - Red wine grape, peaches, watermelon
- Water stress in crops...
 - Increased irrigation demand



Building healthy, functioning, and productive soils

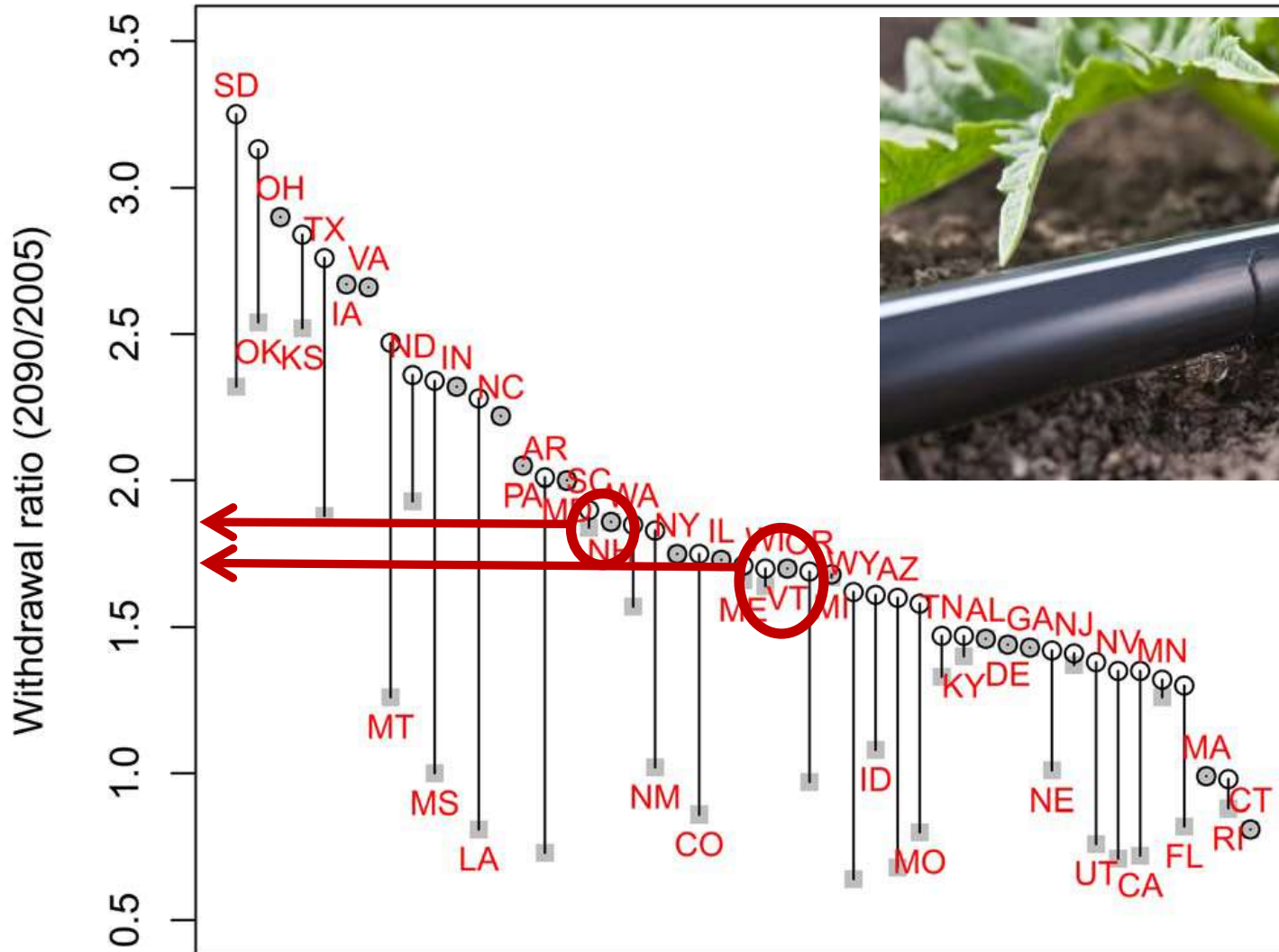
Three principles of resilient soils:

- 1. Soil cover (preferably living!)*
- 2. Increasing organic matter*
- 3. Reduced disturbance/soil structure*





Increased need for more, and efficient, irrigation



Subsurface Drainage



Photo: Dwight Burdette.

Other Agricultural Adaptations

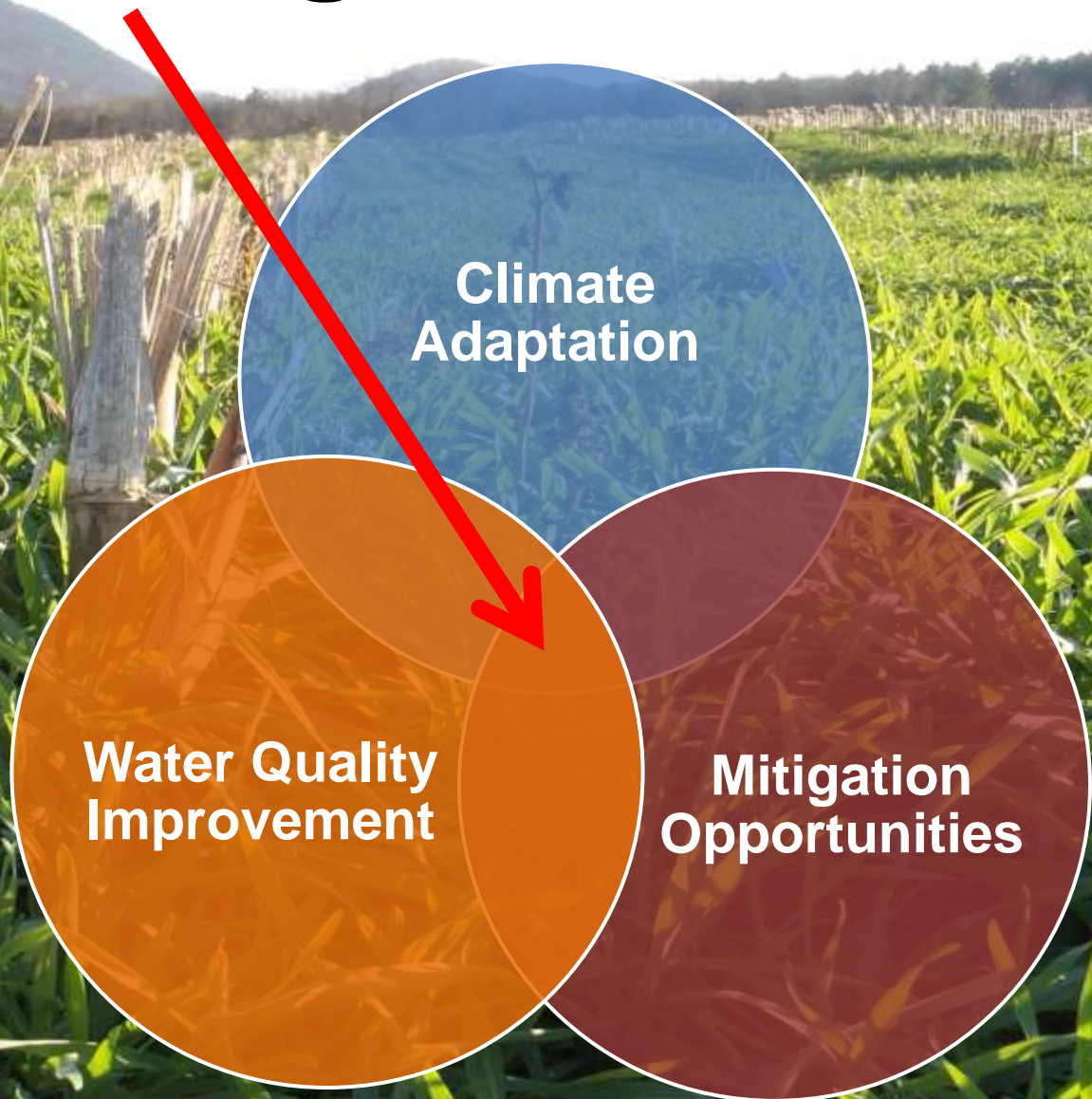
Diversification

- Crops
- Land
- Enterprises
- Markets
- Income Sources
- Social Networks



Photo: Debbie Roos, NC State Extension

Soil Management





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First-Ever Rice Farming Carbon Credits Sold to Microsoft

JUNE 14, 2017 01:56 PM



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FOOD

Save the climate, pay a farmer

By Nathanael Johnson on Oct 16, 2014

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ENERGY & ENVIRONMENT

SPECIAL REPORT: FOOD FOR TOMORROW

A Boon for Soil, and for the Environment

By BETH GARDINER MAY 17, 2016

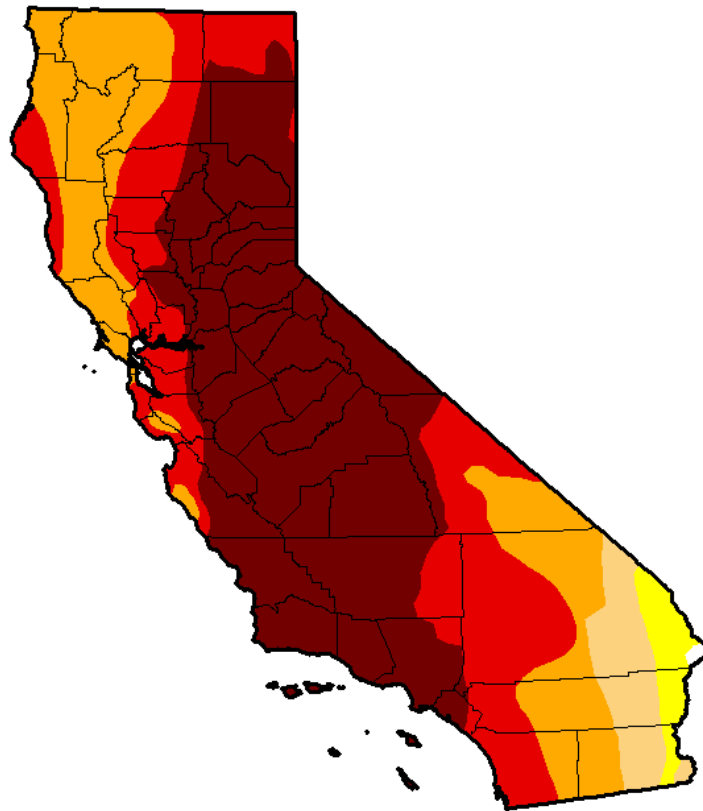
as we speed toward



que et al., 2012)

Elsewhere...

U.S. Drought Monitor California



October 6, 2015

(Released Thursday, Oct. 8, 2015)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.14	99.86	97.33	92.36	71.08	46.00
Last Week <i>9/29/2015</i>	0.14	99.86	97.33	92.36	71.08	46.00
3 Months Ago <i>7/7/2015</i>	0.14	99.86	98.71	94.59	71.08	46.73
Start of Calendar Year <i>12/31/2014</i>	0.00	100.00	98.12	94.34	77.94	32.21
Start of Water Year <i>9/29/2015</i>	0.14	99.86	97.33	92.36	71.08	46.00
One Year Ago <i>10/7/2014</i>	0.00	100.00	100.00	95.04	81.92	58.41

Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

David Miskus

NOAA/NWS/NCEP/CPC



<http://droughtmonitor.unl.edu/>

Summary: Adaptation Principles for NE Farms

- 1. Manage soil differently**
 - 2. Manage water differently**
 - 3. Variety/crop/breed/enterprise selection**
 - 4. Diversification in many ways (enterprises, crops, markets, income, networks, land base, etc.)**
 - 5. Investment in infrastructure (high tunnels, land, ventilation, equipment, structures)**
 - 6. Financial risk management tools (i.e., building financial cushion, crop insurance)**
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