Agricultural Resiliency to Climate Change in the Northeast U.S.

Joana Chan1, Allison Chatchyan2, Daniel Tobin2, Rama Radhakrishna2, & Shorna Alldred2

1Cornell University, 2The Pennsylvania State University

In 2015, the USDA Northeast Climate Hub, in partnership with Cornell University & Penn State, conducted three regional research projects to lay the groundwork for facilitating agricultural resiliency to climate change in the Northeast. We present & integrate findings from our Northeast climate change & agriculture vulnerability assessment, regional research & extension capacity survey, & literature review of agricultural stakeholder views to identify priority research & Extension needs.

NORTHEAST U.S. CLIMATE CHANGE & AGRICULTURE BACKGROUND

Climate change is posing increasing risks & potential opportunities for agricultural production in the Northeast & other regions of the US. The Northeast US is home to about 178,000 farms, comprising 21% of the region's landmass, producing agricultural commodities worth more than $21 billion per year.

Project | Research Question | Methods
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U.S. Agricultural Stakeholder Views | What are US ag. stakeholders perceptions related to climate change? | Literature review of 75 journal articles

NE Climate Change Vulnerability Assessment | What are the major regional climate change vulnerabilities in agriculture & forestry? | Review & synthesis of studies on climate change & agriculture

NE Research & Extension Climate Change Capacity | What is the capacity of NE landgrant universities to address climate change in ag. resources, & forestry? | Online survey of NE landgrant researchers & Extension specialists, N=1,751

U.S. Agricultural Stakeholder Climate Change Views

- Farmers notice changes in weather patterns & increases in extreme weather events yet many remain skeptical about climate change.
- A majority of farmers believe climate change is happening.
- Levels of climate change belief varies across regions.
- Fewer farmers believe climate change is human-caused.

- Adaptation generally more accepted than mitigation measures. Affirmative belief in climate change & personal experience with extreme weather related to increased likelihood to support adaptation practices.
- Willingness to support mitigation practices seems to be related to belief in human causation of climate change, concern for negative impacts of climate change, & the presence of economic incentives.
- Extension professionals are one of the most trusted resources for farmers. Scientists are also generally trusted by the agricultural community.

NORTHEAST U.S. CLIMATE CHANGE VULNERABILITY ASSESSMENT

<table>
<thead>
<tr>
<th>Agricultural Commodities</th>
<th>Climate Vulnerabilities</th>
<th>Climate Effects</th>
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</thead>
<tbody>
<tr>
<td>Field crops</td>
<td>Extreme precipitation</td>
<td>Reduced production</td>
</tr>
<tr>
<td>Tree &amp; vine fruits, berries</td>
<td>Short-term drought</td>
<td>Flooding</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Crop damage</td>
<td>Crop damage</td>
</tr>
<tr>
<td>Greenhouse/nursery/seed</td>
<td>Heat stress</td>
<td>Disease</td>
</tr>
<tr>
<td>Dairy, poultry, eggs</td>
<td>Disease, pest, &amp; woods</td>
<td>Shifting production zones</td>
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<tr>
<td>Aquaculture</td>
<td>Less level river</td>
<td>Higher energy costs</td>
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</tbody>
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From 1990 to 2012, heavy precipitation events (the top 1% of daily events) has increased by 7% in the NE U.S.

NORTHEAST U.S. CLIMATE CHANGE RESEARCH & EXTENSION CAPACITY

- Current research & Extension work reflects climate impacts identified in vulnerability assessment (e.g. pests & disease, extreme precipitation, crop production, water management)

- Researchers & Extension staff identify similar future priorities.

- Highest interest in collaborating on regional research & programming initiatives, attending workshops & conferences, & developing & implementing educational programs.

CONCLUSIONS & RECOMMENDATIONS

- The three research projects summarized here provide the foundation & context for research and Extension work in the NE U.S. moving forward. The U.S. Ag. Stakeholder Climate Change Views Literature Review provides the social-psychological context, the NE U.S. Vulnerability Assessment provides the physical, natural sciences, & agricultural policy programs context, & the NE U.S. Research & Extension Climate Change Capacity Survey provides the academic & institutional context for research, education, & outreach.

- USDA NE Hub activities must focus on adapting climate information to local conditions & improving communication mechanisms with farmers & other ag. stakeholders to encourage adaptation & migration actions. There is potential to build networks & collaborations among researchers & Extension within universities as well as across the NE.

- There is limited research on ag. stakeholder views & attitudes related to climate change in the NE. To build on research presented here, & develop a working model for understanding farmer decision-making around climate change, there is a need for in-depth qualitative research to explore & assess NE farmers & agricultural advisors experiences, priorities, & needs related to climate change.

- There is a need to catalogue & develop educational materials on adaptation & mitigation strategies & share approaches through decision support tools & resources, as well as demonstration sites.