



Understanding the Views and Actions of U.S. Farmers Towards Climate Change

Key Findings:

- Many U.S. farmers have noticed changes in weather patterns and an increase in extreme weather, yet remain skeptical about climate change and the long-term risks it poses.
- Studies show that although levels of climate change belief varies among farmers in different regions, and the majority of farmers believe that climate change is happening, fewer farmers believe that climate change is human-caused than those who believe that climate change is occurring.
- Farmers generally more widely accept adaptation than mitigation measures. Factors such as affirmative belief in climate change and personal experience with local extreme weather are related to increased likelihood to support and/or adopt adaptation practices.
- Farmer likelihood of supporting mitigation practices seems to be related to factors such as belief in human causation of climate change, concern for negative impacts of climate change, and the presence of economic incentives.

Climate change is increasingly altering the nature of agriculture in terms of challenges and opportunities faced by farmers and other agricultural stakeholders in the Northeast U.S. Farmers are already experiencing increased flooding, extreme rainfall, heat stress, and more intense pest and weed pressures. At the same time, agriculture as a sector accounts for over 8% of human-caused U.S. greenhouse gas (GHG) emissions, contributing to global climate change (US EPA, 2016). By understanding what U.S. farmers believe about climate change—including its impacts and risks to operations as well as potential adaptation and mitigation strategies—researchers,

educators, and policymakers can design more effective research studies, strategies, and programs to encourage adaptation and mitigation action in the U.S.

Research Methods

To understand what U.S. agricultural stakeholders believe about climate change, a team from Cornell University and The Pennsylvania State University conducted a comprehensive review of the literature on agricultural stakeholder views and actions related to climate change in the U.S. We define agricultural stakeholders as individuals or groups that are affected by, or have a vested interest in, agricultural practices and outcomes, such as agricultural producers (farmers), ranchers, Extension specialists, agricultural advisors, and agricultural scientists. The team reviewed the literature and found 75 articles and reports published between 1997 and June 2015 that focused on agricultural stakeholder perceptions and at least one of the following themes: climate change, extreme weather, climate variability, climate change adaptation and mitigation, and climate forecasting. In this brief, we present findings related to farmer climate change beliefs and actions as well as the implications of these findings for Extension educators, researchers, and policymakers.



Farmer Wendy Burkhart-Spiegel at Common Thread Farm in Madison, NY.

Farmer Climate Change Beliefs

Farmer belief that the climate is changing ranged between 58% and 80%, depending on the study area, with a weighted average of 65% across ten studies (Figure 1)¹. The percentage of farmers believing in climate change was lowest in studies in the Southeast and highest in the Northeast (Figure 1). While some farmers remain skeptical about climate change, many farmers across the nation have noticed changes in weather patterns and incidences

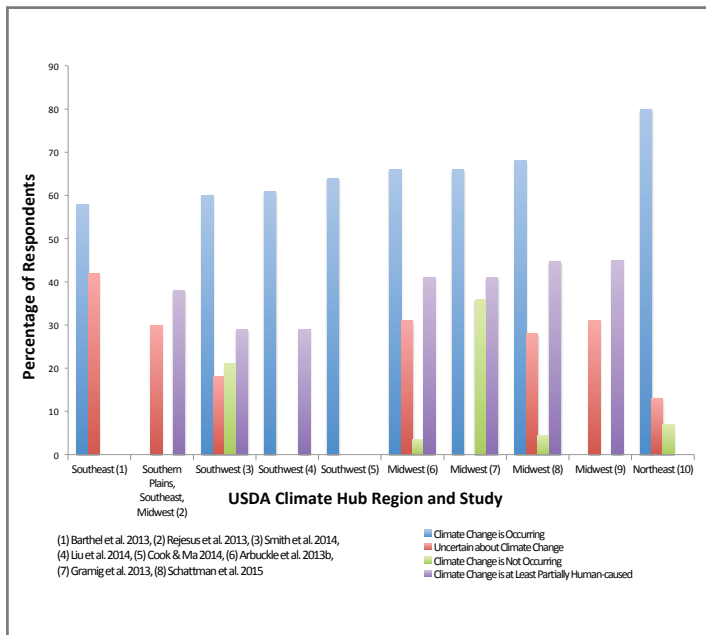


FIGURE 1: Studies of farmer climate change belief and certainty within each USDA Climate Hub region.

of increased extreme weather, such as heavy precipitation, flooding, frost risk, and drought. Researchers therefore recommend framing the issue as climate change impacts to “extreme weather” and “climate variability” and find that connecting local impacts and experiences with extreme weather events may encourage greater adoption of adaptation practices when discussing climate change to farmers. Overall, many farmers still harbor a high degree of uncertainty regarding human causation of climate change

¹ It is difficult to draw accurate conclusions from this assessment because of the wide disparity in study methods and sample populations and sizes. This points to the need for more systematic studies across regions.

(Figure 1). However, Iowa farmers who understand that climate change is caused primarily by humans are more willing to adopt both adaptation and mitigation practices (Arbuckle et al. 2013). There is an opportunity to help farmers better understand the connections between climate science, impacts, risk, adaptation, and mitigation. Further support and outreach is especially important given that agriculture is an important sector for both adaptation to and mitigation of climate change.

Support for Climate Change Adaptation and Mitigation Practices

Farmers’ beliefs and concerns about climate change are related to their willingness to adopt climate change adaptation and mitigation practices. Farmers who believe in climate change are more likely to support and/or adopt adaptation practices (Arbuckle et al. 2013; Weber 1997). While some farmers who do not believe in climate change are willing to adopt adaptation practices, fewer of these farmers are willing to support mitigation efforts (Arbuckle et al. 2013). Thus, they may be willing to adapt to changes in local conditions while remaining skeptical of larger-scale change. Farmers were found to be more willing to adopt climate change adaptation measures if they had experienced climate change impacts locally, while farmers were more likely to support mitigation efforts if they experienced both local impacts and believed that climate change posed global risks (Haden et al. 2012). Haden et al. suggest that adaptations are motivated by perceived local climate change impacts, whereas mitigation efforts are more influenced by farmer concerns for society at large.

Insights for Extension Educators

There are many changes that farmers can make to their operations to become more resilient to climate change and to mitigate future risks. Extension professionals can promote these as best management practices and provide resources to assist farmers in making these changes. Studies have shown that Extension professionals are one of the most trusted resources for farmers on issues of climate change (Hibbs et al. 2014; Prokopy et al. 2015). Since some of farmers are skeptical of climate change, agricul-

tural Extension professionals can focus on providing more education and programming to help farmers understand the challenges and opportunities provided by a changing climate. However, Extension educators need support in terms of information, time, and funding to engage in this work (Tobin et al. 2015). Further climate change-related training, resources, and financial support are recommended so that these educators can provide the best possible advice to the stakeholder groups with whom they work.

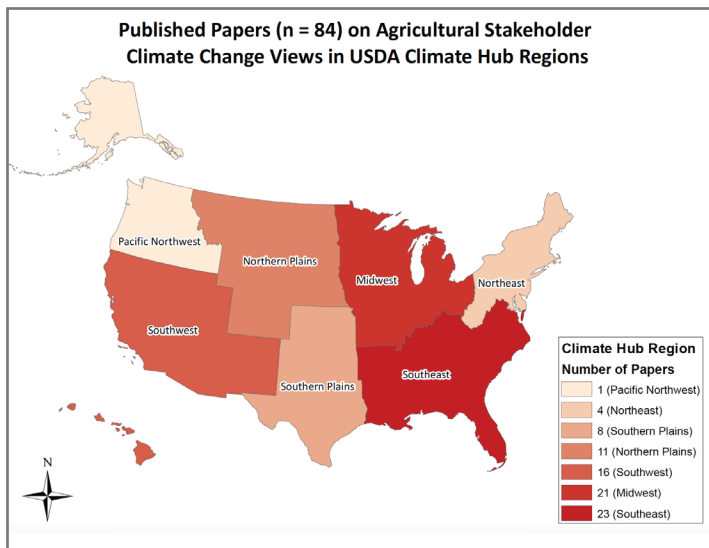


FIGURE 2: Map of research related to agricultural stakeholder views on climate change and/or extreme weather by USDA Climate Hub regions by number of published papers on the topic from 1977- 2015 (n=84).

Insights for Researchers

Scientists are generally trusted by the agricultural community and can play a key role in helping develop applied models and tools based on their research to give farmers the information they need to respond. Scientists can also be valuable as participants in reciprocal learning networks with other agricultural stakeholders rather than solely as expert presenters of information. Recent research shows that farmers and agricultural advisors tend to underutilize weather and climate information as well as decision support tools due to factors such as low trust in forecast accuracy, lack of context-specific forecasts, short forecast lead times, and greater concerns with policy and market conditions than weath-

er risks (Mase & Prokopy, 2014). There is opportunity to develop decision-making tools and educational resources that focus on localized weather risks, adaptation strategies, as well as political and economic circumstances (Tobin et al. 2015). Additionally, future USDA Climate Hub research should focus on regions that are under-studied, specifically the Pacific Northwest and the Northeast (Figure 2). More long-term, interdisciplinary research incorporating varied disciplines such as economics and sociology with agronomy and earth and atmospheric sciences can also help the agricultural community to understand and develop greater climate change resiliency. Importantly, scientists should work with Extension educators to determine how to make climate information accessible, relevant, and appropriate to farmers. For example, researchers should take into account cost-benefit analyses and adoption feasibility when presenting suggestions for management practices to farmers. Beyond farmers, further social science research studies should focus on all agricultural stakeholders including researchers, agricultural advisors, consumers, and non-profit staff in order to better understand the social networks and institutions that inform agricultural management and decision-making.

Insights for Policy Makers

Policymakers have a key role to play in making climate adaptation and mitigation options more accessible, affordable, and appealing to farmers. Research in Iowa indicates that a majority of the general public is willing to support funds for farmers to decrease the environmental impacts of farming while enhancing the multi-functional benefits of agricultural landscapes (Arbuckle, Tyndall, & Sorenson, 2015). There is a need for increased financial and technical support to make climate change adaptation and mitigation options more available and affordable to farmers within existing national agricultural services and programs. Policymakers should consider reviewing agricultural support programs and consider changes to encourage the adoption of practices that will increase the capacity of farmers to both adapt, and reduce their GHG emissions. Agricultural policies, programs, income support, and incentives

should also encourage flexibility in farming practices, promote income diversity, and facilitate a shift to diversified livestock and crop production systems. However, many adaptation practices may already be economically feasible, needing only demonstration and encouragement. It will take open and cooperative efforts over the long term between researchers, Extension educators, advisors, farmers, and policy-makers to address the challenge of mitigating climate change and increasing the resiliency of our agricultural systems.

Citations:

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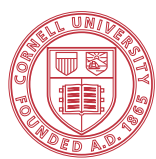
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