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Crop Consultants as "Climate Consultants": An Extension Opportunity for Climate Change Communication

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Abstract

Extension personnel can augment climate change communication and efforts to decrease climate-related agricultural risks by engaging with producers' trusted information sources, including crop consultants. Through a survey of inland Pacific Northwest wheat producers and in-depth interviews with area crop consultants, we examined relationships among producers, crop consultants, and climate change education and adaptation. We found that crop consultants are poised to communicate climate change information to producers, given their strong relationships with producers, practice of promoting adaptive management based on science, and ability to connect climate change to immediate on-farm practices. However, success in leveraging crop consultants to achieve widespread climate change adaptation will depend largely on Extension's presenting the topic to them in accessible ways.

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Introduction

Agriculture is directly affected by climate and, therefore, climate change. Climate change affects the timing, location, and intensity of temperatures and precipitation, presenting opportunities and risks for agriculture (Anwar, Liu, Macadam, & Kelly, 2012). Climate change shifts growing seasons and changes precipitation patterns, requiring farmers of all crops to adapt to varying degrees of change.

Due to the political and scientific nature of the concept of climate change, communicating about it is challenging (Leiserowitz, Maibach, Roser-Renouf, & Smith, 2008; Ungar, 2000). Climate change communication scholars and practitioners have identified trust and personal relationships as valuable for conveying climate change realities; Extension educators can support local-level adaptation by engaging in outreach to intermediary, trusted, and targeted audiences who can help bring about cultural, practical, and institutional shifts in preparation for future climate conditions (Brugger & Crimmins, 2014).

In this article, we suggest that Extension educators work closely with crop consultants to increase the impact of climate change messaging on producers. Crop consultants are knowledgeable about individual on-farm management practices, skilled at adaptive management, closely connected to university extension through their undergraduate and continued education, discerning about scientific research methods, and aware of the effects of weather patterns and, to some extent, climate change on agriculture in their regions. They serve as agents of innovation for producers (Rogers, 2003), enabling adoption of new technologies. Extension educators could successfully engage in outreach with consultants by focusing on adaptive management, emphasizing scientific expertise, and, most importantly, communicating both short-term and long-term impacts of climate change, attending, in particular, to timing of on-farm practices and redefining the "new normal."

Climate Change Effects on Agriculture

Climate is defined as an average of weather conditions, typically measured over 30 years. Or, to use an agricultural adage, "climate is what you expect; weather is what you get." Most human-caused climate forcing and latent atmospheric and oceanic warming has occurred in the past 30 years (Foster & Rahmstorf, 2011), and independent analyses have shown that 2016 was the warmest year globally on record (Potter, Cabbage, & McCarthy, 2017). Since 1880, global average temperatures have increased by 1.53°F (Intergovernmental Panel on Climate Change, 2013). Humans contribute to climate change through greenhouse gas emissions; agricultural practices, in particular, result in the release of carbon dioxide from the burning of fossil fuels, methane from livestock, and nitrous oxide from nitrogen-based fertilizers, contributing 9% of greenhouse gas emissions in the United States and 14% globally (Intergovernmental Panel on Climate Change, 2013; Smith et al., 2014). Natural forcings (i.e., volcanoes, solar cycles) induce a small cooling effect on global temperature (Gillett, Arora, Flato, Scinocca, & von Salzen, 2012).

Within agriculture are opportunities for "win-win" climate adaptation; for example, reduced tillage and soil management can increase carbon sequestration, thereby benefiting global climate change mitigation and improving soil moisture available for crops (Brown & Huggins, 2012; Smith et al., 2014). Benefits of increased global temperatures are increased effectiveness of pesticides and increased diversity of crops (Fraisse, Breuer, Zierden, & Ingram, 2009). At the same time, the agriculture industry faces the challenges of limited water resources, increased pest pressure, changing costs of inputs such as fertilizer fuel, and fluctuations in global markets and trade agreements, all within the context of a growing human population (Dickie et al., 2014).

Socially, climate change presents particular risks to agricultural communities and the cultural fabric of the United States (Eigenbrode et al., 2013). Keeping in mind that 96% of U.S. farm operators are White and 86% of principle farm operators are male, it is important to note that White males are particularly resistant to admitting vulnerability and culpability with regard to climate change and to taking action on the basis of concern (Kahan et al., 2012; McCright & Dunlap, 2011; National Agricultural Statistics Service, 2014). Moreover, adaptive capacity may be limited by prior investments of time and capital in equipment and technology, personal preference for risk aversion, and increasing complexities in farm management (Arbuckle, Morton, & Hobbs, 2013; Haden, Niles, Lubell, Perlman, & Jackson, 2012).

Past laudable efforts by Extension educators to reduce vulnerability to climate change and communicate in creative ways (Burnett, Vuola, Megalos, Adams, & Monroe, 2014; Fraisse et al., 2009; James, Estwick, & Bryant, 2014; Morris, Megalos, Vuola, Adams, & Monroe, 2014) led us to identify a communication pathway for a targeted audience within the agricultural sector: Crop consultants are poised to communicate climate change through their strong relationships with producers in the context of adaptive management. Extension personnel can increase the efficacy of their climate change programming by communicating through trusted audiences (Pathak, Bernadt, & Umphlett, 2014) and focusing on scientific consensus (Vincelli, 2015).

Methodology

The research we discuss here was conducted in the context of an interdisciplinary project that incorporated climate, socioeconomic, and cropping system studies for the purpose of fostering sustainable cereal agriculture. According to the National Agricultural Statistics Service (2012), 13.5% of total U.S. wheat (by bushel) is grown in the states of Idaho, Oregon, and Washington, produced by 3,500 operations. Our study area was wheat-growing counties of the inland Pacific Northwest and included both dryland and irrigated farming. In this article, we present both survey results and interview results to illustrate how Extension can work with consultants on climate change.

Between November 2012 and March 2013, the University of Idaho Social Science Research Unit administered a mail survey of agricultural producers in the inland Pacific Northwest area where wheat is grown. The sample was drawn from the National Agricultural Statistics Service database: 2,000 producers who had grown more than 50 ac of wheat in 2011. We employed the total design method, including sending four mailings and a postcard (Dillman, Smyth, & Christian, 2009). We received 900 completed and eligible surveys. There were four nondeliverable surveys and 38 ineligible recipients. The result is an overall response rate of 46.2%, with a sampling margin of error of +/−3% at the 95% confidence interval (American Association for Public Opinion Research, 2011).

To inform survey results with in-depth details, we conducted a qualitative study of crop consultants (Dodd & Abdalla, 2004). Whereas survey results provide a description of the scale of social phenomena, interviews provide intimate details of why a phenomenon is occurring. The interview protocol addressed climate change perceptions and impacts, decision-making processes, and reliance on scientific research. Respondents were recruited in person at Extension field days, by phone, and by email. The composition of respondents (n = 8) was seven men and one woman whose occupations were distributed as one chemical distributor, one crop insurance agent, and six crop consultants, including certified/uncertified and company/independent consultants. In discussing our findings, we use the abbreviations CD, CI, and CC, respectively, to represent the three types of respondents. Moreover, we have numbered the crop consultants CC-1, CC-2, and so on. Although not all respondents are quoted directly in this article, inputs from all respondents were included in our analysis. Interviews lasted 45–120 min. Despite the sample size of eight, we have concluded that the findings from the interviews are (a) representative of the study region and the focus of the grower-consultant relationship relative to climate change, (b) illustrative of how Extension can capitalize on that relationship, and (c) supported by data triangulation (Guion, Diehl, & McDonald, 2011). Interviews were transcribed and coded through use of the qualitative analysis software NVivo10. We employed an a priori and emergent coding scheme. Both studies were approved by the University of Idaho Institutional Review Board under protocol number 10-139.

Key Findings from Survey of Wheat Producers

Similar to previous research on producer perceptions of climate change (Arbuckle et al., 2013), our findings indicate that most Pacific Northwest wheat farmers (51% of respondents) do not believe climate change is caused by humans. A minority of the respondents (21%) agreed with the statement "I will have to make serious changes to my farming operation to adjust to climate change."

With respect to information and advice for production management strategies, most producers considered the following sources trustworthy: other producers in their counties (85%), company crop consultants (81%), university extension (73%), and independent crop consultants (68%). With respect to climate change information, at least a third of the producers considered the following sources trustworthy: university extension (48%), company crop consultants (42%), fellow producers (39%), and independent crop consultants (37%). Crop consultants affiliated with companies were considered relatively trustworthy on both subjects, whereas independent consultants were considered much less trustworthy on both subjects. The important distinction between company and independent consultants was further clarified by the in-depth interview investigation.

Key Findings from Interviews with Crop Consultants

Consultant-Producer Communication

The crop consultant functions as an important resource for decision making on most farms in the region. Consultants know intimate details about farms, including personal information about a producer's family life, financial situation, and management style (e.g., aggressive adopter of new technologies or risk averse). The consultant works within the context of the goals of the producer ("I have to know the rotation, the past history of the field, and what the grower's goal is" to make recommendations [CC-5]) and provides options, based on price and effectiveness, for the producer to select from (CC-4). Crop consultants typically manage accounts on approximately 20 to 40 farms (CD, CC-3). They visit fields, meet clients in their offices, and are available by phone, email, and text. Although company consultants are compensated for their advice, they usually are not paid for the quantity of product they sell, likely improving their credibility regarding chemical and nutrient applications. Consultants are often "fieldmen" with a company, bringing the producer the security of insurance, supply of needed products, information from multiple scientists, and educational resources. Those who are independent crop consultants, on the other hand, may not have certification and may sell products directly, likely reasons for surveyed producers' viewing them as relatively less trustworthy.

Adaptive Management

Both climate change adaptation and adaptive management are iterative, long-term strategies for responding to changing conditions. Though crop consultants do not term their work "climate adaptation," they address many anticipated climate change impacts through their day-to-day work. Crop consultants are in a state of constant adaptation related to economics of regional to global markets, products, pests, and crops. They adapt management plans to meet the budgets of individual producers, often providing options for productivity relative to anticipated precipitation. As one consultant defined the struggle, "You're torn because the tight-fisted agricultural economist is pulling one way and the proud agronomist is the other way, you know? . . . It doesn't pay to be cheap, but you still have to just analyze all the costs" (CC-2).

Consultants' Expertise and Reliance on Scientific Information

The process of becoming a certified crop advisor is rooted in education, especially related to scientific knowledge, new information, and logical, local, pragmatic application of information. Certification units are often acquired at university field days (CC-2, CD), an important resource for education, as exemplified by the following statement from a respondent: "[To learn new research] from the universities, the Extension agents, I travel to as many meetings as I can throughout the winter. When I'm not speaking at them, I'm trying to go to different ones that are hosted and seeing what other people are looking at and what research is available" (CD). Many companies require an apprenticeship, and some companies hire only certified crop advisors as fieldmen (CC-1). Most consultants grew up farming and hold 4-year degrees in agriculture (CD, CC-3, CC-5).

Consultants identified various areas of their work that are connected with research from local land-grant institutions: adoption of new technologies (CC-4), establishment of new organizations (e.g., Pacific Northwest Direct Seed Association) (CC-3), introduction of alternative cropping systems (CC-4, CC-6), and contributions to increased efficiency (CC-2). Respondents identified 24 university researchers by name as important information sources. One consultant claimed, "We're just blessed here to have all of these resources so close" (CC-2). Consultants reported that they acquire new knowledge and "tailor the research" to their region and their clients (CD), enabling their growers to implement new ideas (CC-5).

Consultants' Climate Change Perceptions

For the interview participants, climate change is a contentious, confusing, and lower priority issue. Younger consultants believed that climate change is happening (CC-5), that it is foolish to ignore climate change (CD), and that "[climate change is] definitely something that needs to be addressed . . . and [is] not going to get any better" (CC-1). But they reported being hesitant to raise climate change with clients because it is not an immediate issue. One respondent said, "I try not to think about it too much to be honest . . . [and] most of the people we work with are probably not too receptive to the idea of climate change . . . I think they think the jury is still out" (CC-3). In some cases, consultants reported, producers believe they will not witness the majority of changes (CC-4, CC-5). Consultants made comments such as "we need to learn more about it" and "I just don't know which direction we need to go to address it" (CD, CC-1).

All the consultants noted changes related to weather: changes in snow pack; changes in timing of tillage, planting, and spraying; working year round; presence of pests; and diversity of crops grown (CD, CC-1, CC-4, CC-5, CC-6). One consultant said, "We'll be raising bananas, but we'll be alright" (CC-6).

For most producers, planning horizons are short (3 years typically, 5 maximum) in comparison to climate change projections (30–50 years). One consultant claimed that it is difficult to convey the consequences of climate change because "it's not on [the farmers'] radar . . . because they have a memory of [only] one, maybe two seasons behind them. They're not looking at a long-term average" (CC-5). Another consultant pointed to a deeper problem of "[farming] too much for immediate gratification rather than long-term" (CC-6).

The discussions with consultants often shifted from the unknown to the known, from long-term climate projections to issues surrounding immediate precipitation. The greatest observed factor respondents identified was the change in timing of weather patterns; for example, producers have experienced heavy spring precipitation that prevents planting, the need to spray weeds and pests multiple times, and winter kill of early-growing winter wheat and a late extreme frost (CD, CC-3, CC-4, CC-5). As explained by one interview participant, consultants rely on analyses of weather information from their companies or local weather stations to compare long-term "normal" patterns to a current crop year, especially with respect to moisture

(CC-3). Consultants and their companies carefully synthesize weather patterns across a broad region, enabling them to apply analogous weather adaptations to new regions; for example, techniques from a dryer area might be used in a newly dry area to conserve moisture (CC-1, CC-3, CC-5). Another consultant stated, "You go to every branch [of my company] around here and everybody knows the moisture line in their particular area—that is huge, but global climate change I would not say is discussed as much" (CD).

Despite observations, most consultants anticipated a recovery to past normal temperatures and precipitation levels and expressed hope for a return to normal practices. Such a recovery, one consultant said, "would just depend on what kind of rainfall came after that to get the stored moisture back up to where it would need to be to support a 3-year rotation" (CC-1).

Consultants were confident in producers' capacity to adapt. One consultant who does not believe that climate change is caused by humans noted, "It doesn't have to be my fault to be my problem" (CC-6). Progressive growers are already paying attention to climate change because "those are the kind of people . . . that are always mindful of change—how does it affect them, how can they affect it?" (CD).

Discussion

One goal of Extension work is to support long-term agricultural production. In this article, we have demonstrated the opportunity to work with crop consultants to communicate climate change information to producers. Growers see consultants as trusted advisers and partners with a shared heritage and shared political perspectives. Consultants have been instrumental in supporting producers' adoption of technologies new to a region (Yorgey, Davis, Painter, Bernacchi, & Kantor, 2014). Grower adoption of climate change adaptation strategies will require messaging from multiple organizations on a variety of topics that are familiar to growers and useful in their everyday business and planning processes.

We have determined that to effectively engage in climate change communication with producers via consultants, Extension educators should focus on adaptive management, scientific expertise, and practical climate change information. We recommend that Extension educators adhere to the guidelines that follow when communicating about climate change with consultants.

1. *Adaptive management.* We found that aiding producers in responding to changes in annual and regional weather conditions—essentially engaging them in short-term climate change adaptation—is already a common practice for consultants. They pivoted discussions of the past and future to focus on a present-tense problem, grounding the issue of climate change in the reality of last year's yields and this year's moisture levels. This circumstance suggests that addressing annual challenges is not entirely different from engaging in long-term climate adaptation and that Extension educators' adaptive management recommendations should involve specificity and practicality relative to the location and to the immediate goals of the farmer and the consultant.

2. *Scientific expertise.* Extension educators should convey clear research methods because consultants have experience with, respect for, and trust in the scientific process. They are skilled at making new research locally actionable and relevant. In sharing results, consulting companies use proprietary software, and Extension could make weather, climate, and pest distribution data available in importable file types (e.g., shapefile).

3. *Practical climate change information.* Contentious issues, such as the causes or uncertainty of climate change, should be left out of arguments for climate change adaptation. Instead, Extension educators should frame observation of climate change within the context of timing of existing practices and on-farm operations. Farmers are their own almanac writers, often measuring and monitoring crop timing and keeping detailed records, and, by proxy, are observers of climate change at the local scale. Extension educators should provide consultants with ways of linking producers' existing present-day experiences with the past and the future. For example, a consultant might note, "This year is similar to what this region will experience regularly by 2030" (a not-too-distant, relevant future). Describing odds is another way consultants might convey a connection between observed and anticipated changes. For example, a consultant might say, "By 2030, 7 out of 10 years will have the same amount of precipitation we're having this year."

Conclusion

Extension is widely regarded as an unbiased resource. Consultants, despite their knowledge of cutting-edge practices, are deeply connected with their heritage and their clients: They are unlikely to acknowledge the full degree of climate risk they are witnessing and learning about. For example, although they could calculate how long a producer could last without a solid crop, crop consultants are more likely to steer toward an optimistic, resilient, and sustainable narrative for their producers. Armed with an understanding of the relationship between and priorities of growers and consultants, Extension can help both groups face the reality of the new climate risks and opportunities.

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