

Cooperative Extension and Climate Change: Successful Program Delivery

Abstract

The politically charged debate surrounding climate change poses a challenge to outreach and education. A 2011 survey revealed that NC Extension professionals have approached climate change programming cautiously, citing lack of audience interest as the primary barrier—perhaps because the Southeast region has experienced relatively mild climate change impacts, to date. We propose a tiered approach to effectively communicate climate change adaptation strategies to agriculture and natural resource Extension clients: Extension should provide climate science information to early adopters and emphasize risk management of specific threats to clients not convinced about climate change, focusing on local solutions and familiar management tools.

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Introduction

Climate change will affect global agriculture and forestry in many ways. Already, farmers and foresters are witnessing temperature and precipitation changes, increasing frequency and intensity of wildfires and extreme events such as strong storms and droughts, and expanding pest and disease populations and ranges (Kirilenko & Sedjo, 2007; Tubiello & Fischer, 2007). Multiple stressors may compel Agriculture and Natural Resources (ANR) Extension clients to manage for climate change

adaptation and mitigation.

However, public debate persists about the validity of climate change (Brechin & Bhandari, 2011; Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Howe, 2012), despite scientific consensus that human-driven increases in heat-trapping gas emissions to the atmosphere are causing climate change (Bast & Taylor, 2007; Oreskes, 2007). The politically charged controversy surrounding climate change poses a challenge to effective communication about biological realities. Any successful adaptation strategy must address the human dimensions of climate change (Smith, Anderson, & Moore, 2012) since landowners and professionals ultimately decide how to manage the nation's natural resources.

Cooperative Extension's Experience with Climate Change Programming

The Cooperative Extension Service is ideally suited for climate change outreach and education, particularly to natural resources audiences experiencing and adapting to climate change (Burnett, Vuola, Megalos, Adams, & Monroe, 2014; Wojcik, Monroe, Adams, & Plate, 2014). Regions already undergoing extensive climatic changes, like the Southwest, Midwest, and Alaska, have established climate change-focused ANR Extension programs. Table 1 lists example initiatives.

Table 1.
Examples of Southwest, Midwest, and Alaska Cooperative Extension climate change initiatives

Institution	Climate Change Focus	Source
Ohio State University	Climate Change Outreach Team	http://changingclimate.osu.edu/
University of Wisconsin	Wisconsin Initiative on Climate Change Impacts	http://www.wicci.wisc.edu/
University of California Division of Agriculture and Natural Resources	California Climate Change Extension program	http://ucanr.edu/sites/CalClimateChange/
University of Arizona	Climate Science	http://cals.arizona.edu/climate/

	Applications program	
University of Alaska	2010-2015 Cooperative Extension Strategic Plan	http://www.uaf.edu/ces/about/strategic/
Michigan State University	Extension Climate Variability and Change Action Team	(Layman, Doll, & Peters, 2013)
Environmental Protection Agency Environmental Education Program	Climate Masters of Nebraska	(Pathak, Bernadt, & Umphlett, 2014)

Florida leads the Southeast as an early adopter, establishing a climate Extension program out of the University of Florida in 2004 and hiring the country's first climate Extension specialist (Breuer, Fraise, & Cabrera, 2010; Fraise, Breuer, Zierden, & Ingram, 2009). Florida's Extension initiatives track its climate trends; so far, it has experienced the most dramatic temperature increase of any Southeast state (National Climate Assessment and Development Advisory Committee [NCADAC], 2013). In addition, Florida's low elevation, extensive coastline, and concentrated coastal population and infrastructure make it particularly vulnerable to climate change impacts such as extreme storms and sea level rise (Florida Oceans and Coastal Council, 2010).

To date, the Southeast region has experienced milder climate change impacts than the rest of the country (e.g., smaller increases in temperature and number of frost-free days, and a smaller percent change in precipitation) (NCADAC, 2013). Personal observations of climate change impacts are key to climate change acceptance, since experience is more powerful than abstract knowledge in influencing behavior (Lachapelle, Borick, & Rabe, 2012). If the public does not experience local climate changes, people may not approach Extension about adaptation.

If Southeast Extension clients have not observed climate change impacts firsthand, this could explain why North Carolina Extension professionals identified "lack of audience interest" as the primary barrier limiting climate change programming. A 2011 survey examined NC Extension professionals' climate change perceptions, willingness to adopt climate change-related programming, and barriers to incorporating climate change into Extension programs (Burnett et al., 2014; Monroe & Adams, 2012). The results (Table 2) reveal that NC Extension professionals largely avoid the topic of climate change:

- 15% of respondents had participated in any climate change continuing education or professional development programs.

- 10% had ever developed climate change Extension programs or materials.
- 18% sometimes or often used the term "global warming" in their programs.
- 36% sometimes or often used the term "climate change."
- 31% sometimes or often used the term "climate variability."

Compared to other states from the same study (Wojcik et al., 2014), NC Extension professionals fall near the bottom of their regional counterparts and below the Southeast average.

Table 2.

2012 Southeast Extension Climate Change Outreach and Education Program Development, Continuing Education Participation, and Use of Climate Change Terminology

Location	% Developing Climate Change Programs	% Participating in Climate Change Continuing Education	% Sometimes or Often Using "Global Warming"	% Sometimes or Often Using "Climate Change"	% Sometimes or Often Using "Climate Variability"
Southeast regional average	13.3%	22.2%	16.7%	36.0%	35.0%
MS	8.2%	16.0%	11.5%	26.7%	26.5%
NC	10.4%	14.6%	18.4%	35.7%	30.7%
LA	11.9%	17.3%	14.1%	32.2%	37.2%
GA	12.8%	31.6%	17.1%	40.1%	37.8%
TX	13.3%	16.7%	11.0%	32.4%	35.5%
AL	13.5%	26.3%	18.1%	31.0%	31.4%
VA	14.6%	21.8%	20.6%	39.8%	34.9%
FL	19.9%	33.0%	21.6%	45.8%	42.7%

However, regional trends do not reflect the diversity of individual climate change attitudes (Leiserowitz, Maibach, & Roser-Renouf, 2007; Tyson, 2014). Recent research suggests that Extension professionals' climate change attitudes mirror those of the general public (Monroe, Plate, Adams, & Wojcik, in press). Given this, how can Extension best promote adaptation strategies when both staff and clients span the climate change attitude spectrum?

Successful Extension Climate Change Program Delivery

Extension must move forward to address the natural resource consequences of a variable climate—avoiding the topic of climate change is not a viable option. Waiting for certainty before implementing adaptive management poses risks to resource health, carbon sequestration potential, and profitability. Avoidance also fails the landowners, foresters, and farmers who will rely on Extension for climate change adaptation guidance. However, forcing climate change adaptation on unreceptive audiences risks alienating traditional clients and violating their trust in Extension. Extension relies on its reputation as an objective source of scientific information (Monroe et al., in press). Thus, programs attempting to persuade skeptical clients to accept climate change may not wisely invest Extension's resources, particularly during times of declining budgets. Instead, research from the Six Americas of Climate Change suggests focusing outreach on "cautious" and "disengaged" individuals, who lack strong convictions about climate change. These segments of the public remain more receptive to adaptation information than "doubtful" or "dismissive" individuals, who question the evidence for climate change (Roser-Renouf, September, 2013).

Extension must prepare to deliver climate science information to clients who demonstrate willingness to engage the topic. But, until clients inquire about the underlying cause of drought, extreme weather events, and pest outbreaks, Extension can first address those symptoms. Problem-solving with clients provides an opportunity to initiate conversations about future uncertainty and address risk management and economic concerns. Extension should demonstrate how best to use familiar management tools to maximize resource health, productivity, and resilience in changing future conditions. Agents must tailor outreach to clients' needs and climate change attitudes, providing resilience and climate science information as appropriate. This is entirely consistent with Extension's commitment to provide the best available science, and with the American College & University Presidents' Climate Commitment (<http://www.presidentsclimatecommitment.org/about/commitment>), which many land-grant universities have signed. We simply suggest framing the right science in the right way to maximize the likelihood that clients will accept Extension's recommendations—ensuring "appropriate information is disseminated and applied for best results" (James, Estwick, & Bryant, 2014).

A needs assessment of family forest landowners in the Pacific Northwest suggests successful approaches to ANR Extension climate change programming. The authors recommend incorporating climate change into existing Extension forest management programs through the lens of resilience to insects, disease, wildfire, and other threats, rather than developing exclusive climate change initiatives. They also advocate for Extension programming tailored to local climate change impacts in the context of regional climate history, instead of global climate projections (Grotta, Creighton, Schnepf, & Kantor, 2013).

An event convened in Pittsboro, NC, highlights a local, collaborative climate change adaptation initiative with significant Extension involvement. Farmers approached a local agriculture and sustainability nonprofit for insight into preparing for climate change. This launched a multi-stakeholder conference focused on adapting agricultural practices to climate change, which included farmers, scientists, Extension agents, and other community members. The inaugural conference, now an annual event, suspended discussion of mitigation to concentrate on apolitical adaptation actions.

It culminated in several concrete recommendations, including increased information-sharing through Extension and creating a mechanism for reporting local climate observations. In this example, Extension agents participated in a grassroots effort, co-generating knowledge with a local community (Estill, Wechsler, Schwerin, & Tacular, 2013).

Broader initiatives like the Southeast Climate Consortium (<http://www.seclimate.org/>) and the Pine Integrated Management: Education, Mitigation, and Adaptation Project (PINEMAP) (<http://www.pinemap.org/>) are conducting widespread outreach and education on Southeast climate change. Collaborative climate change efforts like the Climate, Forests, and Woodlands Community of Practice on the eXtension website (http://www.extension.org/climate_forests_woodlands) and the Climate Science Initiative with the Association for Natural Resource Extension Professionals (<https://sites.google.com/site/anrepclimate/>) reflect a national commitment to synergize the efforts of Extension climate change leaders. As public awareness grows about climate change's natural resource impacts, Extension organizations can emulate proactive states to develop explicit and locally tailored climate change programs.

In summary, we recommend that ANR Extension:

- Develop a tiered approach to address clients' varied needs: provide explicit climate change information when solicited and otherwise emphasize resource health and resilience to future uncertainty.
- Concentrate efforts on clients who lack strong opinions about climate change.
- Focus on local climate change impacts and specific threats, like drought and pests.

Extension agents may require additional training on climate science and adaptive management solutions and need to rise above institutional barriers and personal views to accommodate clients' diverse beliefs. Client adaptation to climate change is crucial to achieving the resource resilience and mitigation goals of initiatives like PINEMAP. Extension plays an integral role in realizing behavioral change. PINEMAP Extensionists have embraced this flexible strategy, combining climate science with "no regrets" solutions to future uncertainty.

Conclusions

While many Extension professionals in North Carolina and other Southeast states are not universally discussing climate change, this should not cause alarm or provoke criticism. A varied approach to climate change programming is astute and realistic—to effectively empower clients to solve problems, Extension must consider its audience. As climate change becomes more evident in the Southeast and awareness correspondingly grows, state Extension Services can build on pioneering programs to clearly address climate change. For doubtful audiences, Extension agents can still discuss climate change symptoms and capitalize on opportunities for meaningful dialogue about future uncertainty. As interest arises, Extension should deliver current climate science information and embrace grassroots momentum toward local adaptation solutions. Following a client-tailored model, Extension can help people with differing climate change views successfully adapt their management strategies based on their unique needs and aspirations.

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