University of Arizona Cooperative Extension Climate Change Needs Assessment

April 2024

University of Arizona Extension Climate Science Working Group:

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THE UNIVERSITY OF ARIZONA
Cooperative Extension

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Executive Summary

This report presents the findings from a 2023 needs assessment survey of University of Arizona (UArizona) Cooperative Extension personnel regarding their interest and involvement in climate change-related programming. It provides information regarding existing collaborations, program reach, and training needs for capacity-building. The survey was conducted to inform Extension leadership about existing interest and involvement in climate change-related research and programming, as well as to help Extension faculty leverage resources and opportunities to better serve Extension and the people of Arizona.

Major Findings

- 85% of UArizona Extension respondents indicated moderate or great concern about the effects of climate change on future generations.
- Half of respondents (50%) reported that they do not currently incorporate climate change into their Extension programming.
- Survey respondents overwhelmingly agree that climate change programming should be included in the University of Arizona Extension Strategic Plan, with 83% either strongly or somewhat agreeing.
- The top concerns reported by respondents related to incorporating climate change information into programming were feeling unsure about their ability to present complex climate change information accurately (27%), not having access to climate change curriculum specific to their field (27%), and concerns about the reaction of their clientele to the information (21%).
- Generally, respondents disagreed with the statement that they had sufficient training to incorporate climate change into their extension programming, indicating a need for training and greater access to pertinent knowledge networks.
- When asked whether they see value in joining a working group within Extension to build capacity for incorporating climate change into research and extension, 71% responded 'yes' and 29% responded 'no' (n = 107).

Overall UArizona Extension personnel…

- ✓ Are concerned or alarmed about human-caused climate change
- ✓ Want to incorporate climate change information into their programming
- ✓ Need training and support as well as opportunities to bolster networking, infrastructure, leadership, and coordination around this issue

Recommendations

UArizona Extension is uniquely positioned to lead climate adaptation and mitigation efforts across the southwest U.S. due to our existing relationships with diverse clientele and communities, our experience with cutting edge applied research, and our skills in seeking cooperation on complex environmental issues. Specifically, the University of Arizona Extension Climate Science Working Group recommends:

- Developing and supporting a Program Manager position within Extension Administration that coordinates UArizona climate change programming efforts;
- Developing a UArizona Extension climate advisory board consisting of stakeholders that can guide existing and future climate change programming efforts;
- Identifying, developing, and supporting new Extension faculty positions to support inter-disciplinary climate change programming. These could include sustainability and resilience-oriented positions, such as a Renewable Energy Extension Specialist, a Carbon Sequestration and Management Specialist, and a Climate Science Agent, embedded within Agriculture and Natural Resources, Family, Consumer and Health Sciences, Tribal Extension, and 4-H Youth Development;
- Exploring partnerships with other aligned efforts like the nascent American Climate Corps (American Climate Corps, 2024).

Introduction

The Earth's climate system is comprised of the atmosphere, land, oceans, cryosphere (snow and ice), and biosphere (life). The sun powers interactions between the parts of Earth's climate system, stimulating the cycling of energy, water, and other substances, such as nitrogen, on timescales from days to thousands of years. Scientific evidence shows that human activities are changing the climate, through the accumulation of heat-trapping gases in Earth's atmosphere and through changes in land cover (Leung et al. 2023). The direct effects differ between geographical regions and include changes in the intensity and frequency of (a) episodes of extreme heat, (b) drought, (c) heavy rain events, (d) severe storms and other climate and weather phenomena, along with (e) sea level rise, and (f) ocean acidification. Indirect effects include increased incidence of wildfire, changes to the timing of snowmelt runoff and peak river flows, flooding, coastal erosion, and other effects (IPCC, 2023). There are also direct impacts on human communities as altered climate and weather affect built infrastructure, agriculture, disease incidence, and natural ecosystems. The combination of these effects is of concern to many people, including managers of land, water, natural resources, ecosystems, energy, transportation, the built environment, and human health.

Motivated by the importance of human-caused climate change to society, broadly, and Cooperative Extension clientele, specifically, this report details the results of a survey effort conducted within University of Arizona Cooperative Extension (UArizona Extension). The survey was modeled after work undertaken by Grantham et al. (2017) who surveyed approximately 1,000 University of California Cooperative Extension, Agriculture and Natural Resources (UCal ANR) scientists and outreach professionals. The prior work done in California used an online survey to evaluate UCal ANR interests and experiences in incorporating climate change science into research and extension programs. They analyzed 144 responses noting recognition of the importance of addressing climate change, the additional training and institutional support that is needed for capacity building, and a broad range of efforts that were underway to build climate change resilience across California.

In 2023, a cross-disciplinary team of UArizona Extension faculty surveyed 570 scientists, staff, and administrators with a whole or partial Extension position. This report presents the findings from 160 completed responses. The UArizona team took a similar approach incorporating many questions originally developed by Grantham et al. (2017) after consulting with the group for guidance. The most significant difference in the UArizona approach was the inclusion of the first four questions of the Six Americas Super Short Survey (SASSY!) (Chryst et al., 2018). This allowed the UArizona team to analyze survey responses and use the SASSY! Group Scoring Tool to compare the UArizona results to national averages. Extension employees receiving survey solicitations included individuals involved in Agriculture and Natural Resources, 4-H Youth Development, Family, Consumer and Health Sciences, and Tribal Extension program areas. They represented a mix of faculty, staff, and administrators. The UArizona online survey instrument can be found in Appendix A. Also included in this report are observations made during in-person discussion sessions. During the August 2023 Arizona Extension Annual Conference, Extension employees participated in one of five discussion groups: 1) Agriculture and Natural Resources, 2) 4-H Youth Development, 3) Family, Consumer and Health Sciences, 4) Tribal Extension, and 5) Extension Staff and Administrators). The facilitated discussion prompts are provided in Appendix B.

The UArizona online survey questions were designed to gauge interest and involvement in active climate change-related programming and collaborations, current program reach, and training needs for capacity-building. The

information was collected to inform Extension leadership about existing interest and involvement in climate change-related research and programming, as well as to help Extension faculty leverage resources and opportunities to better serve Extension and Arizona citizens. Institutional Review Board Statement: This study was approved by the Institutional Review Board of the University of Arizona (STUDY00002676).

The UArizona Extension Climate Change survey online link was distributed via email to all University of Arizona Cooperative Extension faculty and staff via Extension distribution lists and using QR-coded links during the in-person Annual Extension Conference held August 2-4, 2023. The Qualitrics online survey platform was used to deploy questions and data capture in English only. Responses submitted were both anonymous and voluntary. Survey responses were recorded from May to August of 2023. The survey received 194 responses, 160 of which provided usable answers to one or more questions. The following sections present the survey results.

Survey Results

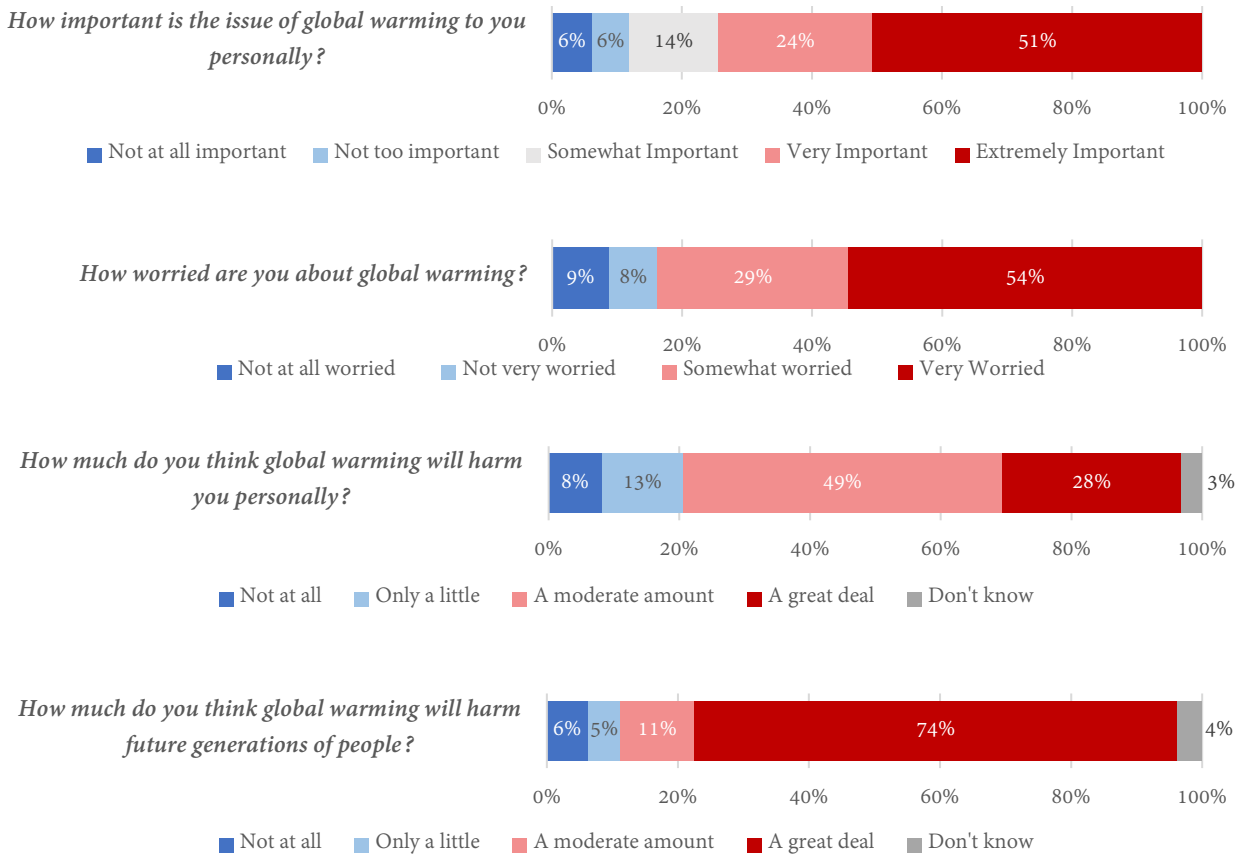
Personal Views of Climate Change: The SASSY! Survey

The first four UArizona Extension Climate Change survey questions gauged respondents' personal views about climate change and were identical to the Six Americas Super Short Survey (SASSY!) questions (Chryst et al., 2018). These four questions have been used to categorize respondents into six subgroups (Chryst et al., 2018). The classification system, known as 'Six Americas' (Yale Program on Climate Change Communication, 2023), partitions people into one of the following six groups: Dismissive, Doubtful, Disengaged, Cautious, Concerned, or Alarmed (Yale Program on Climate Change Communication, 2023).

More than three quarters of respondents report thinking global warming will affect them personally, and more than 85% think global warming will harm future generations of people (Figure 1). Seventy-seven percent of respondents think global warming will personally harm them a moderate amount or a great deal. Seventy-four percent report they expect global warming will harm future generations of people a great deal. Only 9% indicated they were not worried about global warming, and 6% thought future generations would not be harmed by global warming. Generally, respondents think climate change will have a larger negative impact on future generations than on themselves. Twelve percent of UArizona Extension respondents believe global warming is not too important or not at all important.

The SASSY! data are reported at the state-level, which allowed for a comparison of SASSY! results for UArizona Extension with those of Arizona residents. Comparing UArizona Extension results with the Arizona Public Opinion on Climate Change - 2021 data (Yale Climate Opinion Maps Public Opinion on Climate Change, 2023), a larger proportion of UArizona Extension respondents believe global warming will affect them personally, to either a moderate or great extent (77%), compared to Arizona residents (48%). Similarly, while 85% of UArizona Extension respondents indicated that global warming would harm future generations at least a moderate amount, only 69% of Arizona residents see global warming as harmful to future generations. While the differences in expected harm can be influenced by complex interactions between risk tolerance and knowledge level, these results highlight the need for outreach and education in Arizona. We further analyze results through the lens of the Six Americas classifications in the Discussion section, below.

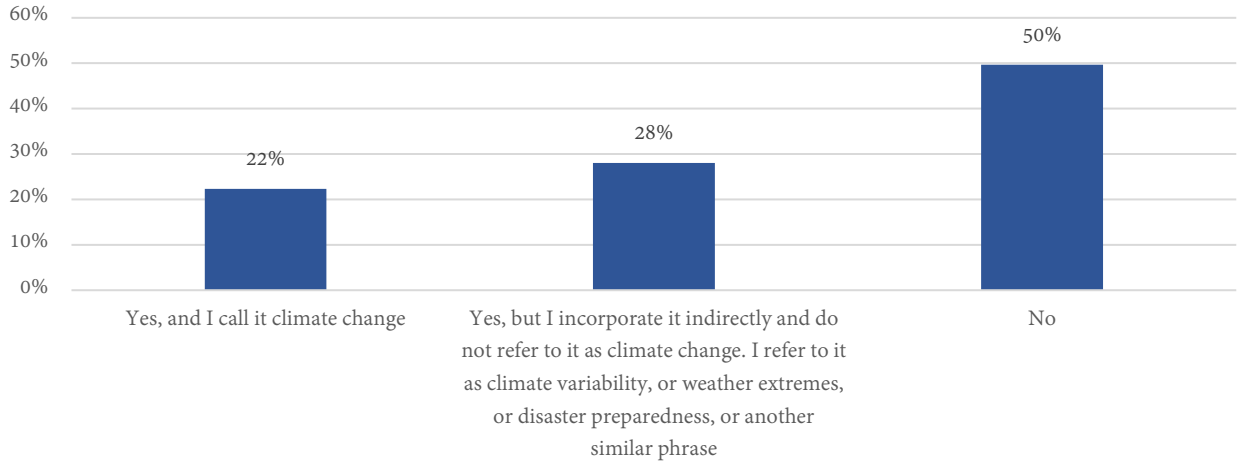
***Figure 1. Personal Views of Climate Change** (n=160)*



Climate Change in University of Arizona Extension Programming

Half of UArizona Extension respondents (50%) reported that they do not currently incorporate climate change into their Extension programming. Of the 50% of respondents who reported incorporating it, over half of them (28%) say that they do not refer to it as 'climate change'. Less than one-fourth (22%) incorporate climate change into programming and refer to it as 'climate change' (Figure 2). Prior work published by Grantham et al. (2017), surveying University of California Extension (UCal Extension), found fewer than half of respondents (43%) incorporated climate change in their Extension programming in some way, but changes in state and national policy over the last five years may have altered this percentage since the survey was administered.

Figure 2. Do you currently incorporate climate change into your extension programming (even if you call it something else)? (n = 157)



The most frequently reported ways that UArizona Extension faculty and staff currently incorporate climate change into their programming include referring clientele to University of Arizona websites or other websites on the topic (42%), presenting climate change-related talks within events focused on other issues (25%), or directly engaging in research that involves climate change components (18%) (Table 1).

Table 1. How do you currently incorporate climate change into your research and extension programming, even if you don't directly refer to it as climate change and use a related term or focus area (e.g., climate variability, extreme weather patterns, drought, or disaster preparedness)? (n = 100). Respondents could select more than one strategy.

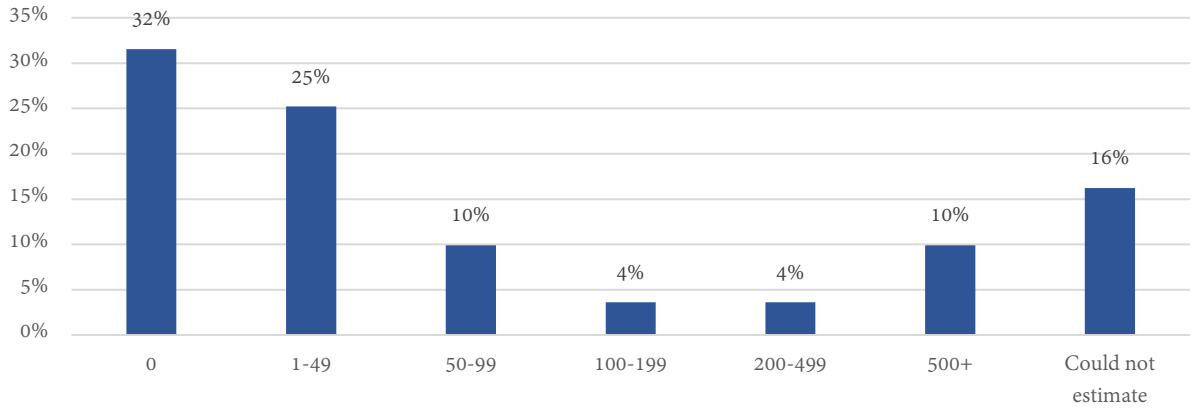
Response	Percent UArizona Extension
I point my clientele to UArizona or other websites on the topic	42%
Other (please specify)	37%
I present climate change related talks within events focused on other issues	25%
My research includes climate change related components: improving sustainability, reducing emissions, measuring climate impacts, or mitigation efficacy, etc.	18%
I create written articles and information for stakeholders	15%
I coordinate events focused specifically on climate change related issues	15%
I provide 1:1 stakeholder discussions or communications on climate change	9%
I contribute climate change content for Social Media Platforms	7%
My research explicitly focuses on climate change related ideas	4%

The UCal ANR program (Grantham et al., 2017), five years earlier, was incorporating climate change into their Extension programming using different strategies with far higher involvement of staff providing presentations

(70% for UCal Extension; 25% for UArizona Extension), written articles (30% for UCal Extension; 15% for UArizona Extension), and social media posts (12% for UCal Extension; 7% for UArizona Extension).

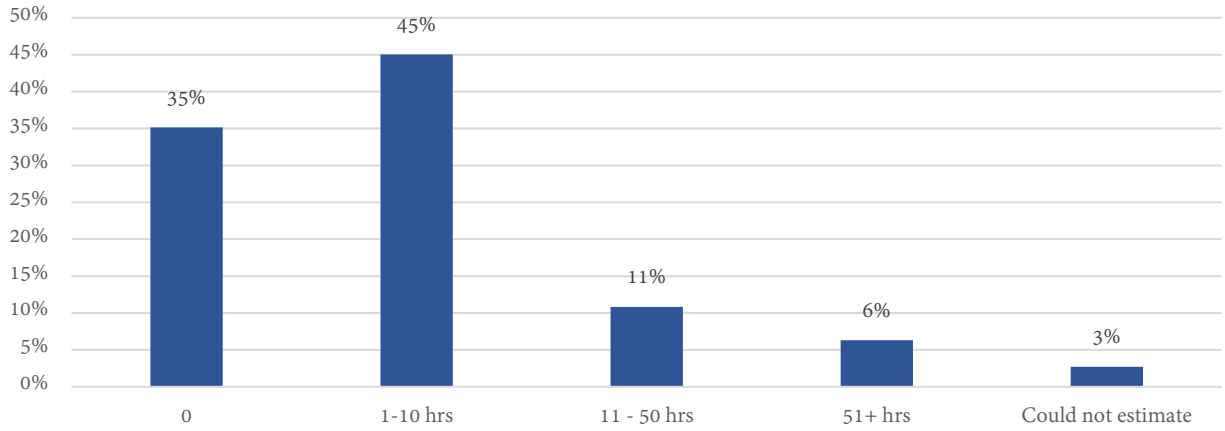
Roughly a third of UArizona Extension respondents (32%) reported that they do not reach any people with climate change information through their Extension activities. Even five years ago, UCal Extension had a greater proportion of personnel (43%) incorporating climate change in their Extension programming. (Grantham et al., 2017). A quarter of UArizona Extension respondents reported reaching 1 to 49 people annually. Lower proportions of UArizona Extension personnel reached greater numbers of stakeholders (Figure 3). Since survey responses were voluntary, they may not accurately reflect the demographics of UArizona Extension; the overall percentage of UArizona Extension respondents directly engaged in climate change programming is likely lower.

*Figure 3. **Approximately how many people do you estimate you reach on average each year with climate change information?** (n = 111)*



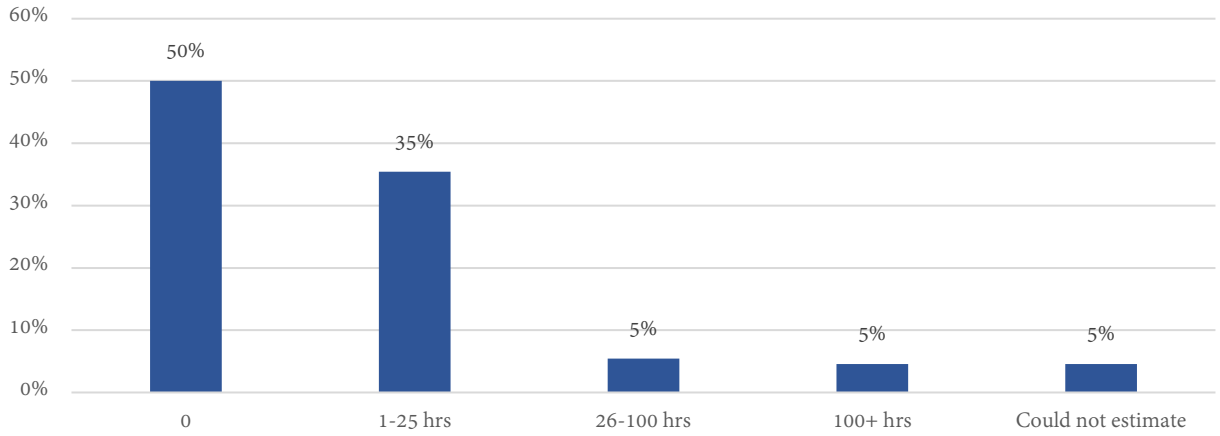
Roughly a third of UArizona Extension respondents (35%) reported spending no time on climate change-related professional development within the last year. Nearly half (45%) spent between 1 and 10 hours in the past year, and 6% spent 51 or more hours on climate change-related professional development (Figure 4).

Figure 4. Approximately how much time have you spent on professional development related to climate change within the last year? Including researching articles, attending professional development events, etc. (n = 111)



Within the last year, half of respondents (50%) spent no time addressing climate change with stakeholders, followed by 35% who spent between 1 and 25 hours, while 10% spent more than 26 hours. (Figure 5).

Figure 5. Approximately how much time have you spent addressing climate change with stakeholders within the last year? Including creating content, giving talks, preparing materials and presentations, or coordinating events.



Respondents were asked to characterize the frequency of their interactions with various internal UArizona partners regarding their research and extension programming related to climate change. For nearly all categories of internal partners, a bimodal distribution emerges, with the largest share of respondents indicating that they never interact with the internal partners, and the second largest share of respondents indicating that they interact weekly or more with UArizona partners. These results suggest that some respondents are heavily focused on programming around climate change while others are not (Table 2).

Table 2. For your research and extension programming related to climate change, please select the choice that best characterizes the frequency of your interactions with UArizona colleagues:

Internal Partner	Never	Less than once per year	About once per year	A few times per year	Several times per year	Monthly	Weekly, or more
UArizona Extension County Agents	27%	12%	6%	14%	9%	11%	21%
UArizona Extension Specialists	34%	7%	10%	14%	10%	13%	11%
UArizona Extension Programmatic Staff	32%	8%	8%	14%	7%	6%	23%
UArizona Extension Administration	40%	8%	6%	12%	7%	9%	18%
UArizona Extension Volunteers/DCCs*	41%	6%	7%	13%	9%	5%	20%
UArizona Non-Extension Faculty or Staff	39%	9%	7%	11%	12%	7%	14%
UArizona Students involved in climate change activities	65%	13%	6%	6%	5%	1%	5%
Other (please specify)	72%	10%	3%	0%	0%	0%	14%

*DCCs = Designated Campus Colleagues

Beyond those listed above, other internal partners that respondents reported interacting with on climate change efforts included tribal extension and respondents' own internal teams.

Survey results highlight an acute lack of UArizona Extension interconnection on climate change activities (Table 2)

In addition to the frequency of interaction, respondents were asked to report on the nature of the interactions they have with internal UArizona partners related to their research and programming on climate change. Beyond those who reported having no interactions with the partners, commonly reported interactions included informal sharing of information and ideas with County Agents, Extension Specialists, programmatic staff, administration, and Extension volunteers, as well as involvement of County Agents and Extension Specialists in teaching, training, and outreach efforts (Table 3).

Table 3. For your research and extension programming related to climate change, please select the types of interactions you have with UArizona colleagues:

Internal Partner	None	Informal sharing of information and ideas	Giving or attending research presentations	Involvement in research projects	Involvement in extension teaching, training, & outreach efforts
UArizona Extension County Agents	22%	32%	14%	8%	20%
UArizona Extension Specialists	26%	29%	13%	11%	15%
UArizona Extension Programmatic Staff	33%	32%	10%	6%	13%
UArizona Extension Administration	48%	30%	5%	3%	11%
UArizona Extension Volunteers	43%	31%	7%	2%	13%
UArizona Non-Extension Faculty or Staff	45%	24%	10%	6%	10%
UArizona Students involved in climate change activities	65%	13%	4%	5%	8%
Other (please specify)	48%	19%	7%	7%	11%
Other (please specify)	61%	17%	6%	6%	6%

Compared with interactions with partners within the University of Arizona, fewer respondents reported interacting with external partners related to their research and programming on climate change. Of those who do, they report less frequent interaction compared with internal partners (Table 4).

Table 4. For your research and extension programming related to climate change, please select the choice that best characterizes the frequency of your interactions with colleagues EXTERNAL to UArizona:

External Partner	Never	Less than once per year	About once per year	A few times per year	Several times per year	Monthly	Weekly, or more
Faculty at other institutions	52%	10%	8%	13%	3%	10%	4%
Staff at other institutions	57%	13%	8%	12%	4%	6%	2%
Students at other institutions	70%	10%	5%	9%	4%	0%	3%
Other state extension programs or groups (e.g., Extension Foundation, National Extension Climate Initiative)	50%	13%	12%	14%	6%	2%	2%
Climate hubs & centers (e.g., USDA SW Climate Hub)	66%	12%	7%	4%	7%	4%	1%
State governments	62%	12%	11%	10%	4%	2%	0%
Federal government	67%	13%	7%	5%	5%	3%	1%
Local governments	56%	11%	9%	14%	7%	4%	0%
Non-profits	49%	12%	9%	10%	13%	5%	2%
Professional organizations (e.g., National Association of County Agricultural Agents, National Renewable Energy Policy, etc.)	65%	8%	7%	10%	7%	3%	1%
Commodity or producer groups	58%	10%	9%	7%	6%	5%	7%
Other (please specify)	82%	4%	4%	0%	0%	7%	4%

Respondents who indicated working with 'other' partners not listed above (Table 4) specified that they work with local agricultural producers. For UArizona Extension respondents reporting contact with external partners several times a year or more, the most frequent interactions were with non-profit organizations, faculty at other institutions, climate hubs, professional organizations, commodity/producer groups, and local governments. Characterizing the nature of those interactions with external partners, respondents most commonly reported informal sharing of information and ideas, followed by giving or attending research presentations, and involvement in extension teaching, training, and outreach efforts (Table 5).

Table 5. For your research and extension programming related to climate change, please select the types of interactions you have with other colleagues EXTERNAL to UArizona:

External Partner	None	Informal sharing of information and ideas	Giving or attending research presentations	Involvement in research projects	Involvement in extension teaching, training, & outreach efforts	Collaborative policy projects
Faculty at other institutions	41%	22%	14%	9%	11%	4%
Staff at other institutions	57%	20%	8%	5%	9%	2%
Students at other institutions	70%	13%	5%	4%	6%	2%
Other state extension programs or groups (e.g., Extension Foundation, National Extension Climate Initiative)	48%	20%	14%	4%	11%	3%
Climate hubs & centers (e.g., USDA SW Climate Hub)	68%	16%	6%	4%	5%	1%
State governments	65%	19%	6%	2%	7%	2%
Federal government	71%	12%	5%	3%	6%	4%
Local governments	60%	22%	6%	1%	7%	4%
Non-profits	48%	25%	11%	3%	10%	3%
Professional Organizations (e.g., National Association of County Agricultural Agents, National Renewable Energy Policy, etc.)	62%	17%	8%	3%	8%	2%
Commodity or producer groups	64%	21%	4%	3%	6%	3%
Other (please specify)	88%	6%	0%	6%	0%	0%
Other (please specify)	100%	0%	0%	0%	0%	0%

Extension Support for Climate Change Programming

Respondents were asked to report what concerns they have about incorporating climate change into their Extension programming. The top concerns reported were feeling unsure about their ability to present complex climate change information accurately (27%), not having access to climate change curriculum specific to their field (27%), and concerns about the reaction of their clientele to the information (21%) (Table 6). The concerns reported by the greatest number of respondents were focused on access to appropriate information and curriculum; in contrast fewer respondents noted concerns related to the level of support from Extension (12%) and negative effects on respondents' jobs from presenting climate change information (9%).

Table 6. What concerns do you have about incorporating climate change into your extension programming? (n = 157)

Response	% of Respondents
I am not sure that I can present complex climate change information accurately	27%
I do not have access to climate change curriculum specific to my field	27%
I have no concerns	22%
I am concerned about the reaction of my clientele to climate change information	21%
I do not have good sources of climate change information to share	18%
Climate change is not relevant to my program	14%
Other (please specify)	13%
I am not comfortable presenting on a contentious topic to my clientele	13%
I don't feel I have adequate support from Extension to work on this topic	12%
I am not sure that climate change science is solid enough to base decisions on	11%
I am concerned that presenting climate information would negatively affect my job	9%

Among the most frequent concerns of respondents, regardless of whether they currently incorporate climate change into their programming, were lack of confidence in their ability to present complex climate change information, and a lack of curriculum specific to their field (Table 7). In contrast, 33% of those currently incorporating climate change into their extension programming expressed no concerns, whereas 26% of those who do not currently incorporate climate change into programming responded that climate change is not relevant to their program.

*Table 7. **Most Common Concerns Expressed Regarding Incorporating Climate Change into Extension Programming by Whether or not the Respondent Currently Incorporates Climate Change into Extension Programming***

Concerns expressed by respondents who currently incorporate climate change into their extension programming	Concerns expressed by respondents who *do not* currently incorporate climate change into their extension programming
1. I have no concerns **33%**	1. I do not have access to climate change curriculum specific to my field **35%**
2. I am not sure that I can present complex climate information accurately **23%**	2. I am not sure that I can present complex climate change information accurately **32%**
3. I do not have access to climate change curriculum specific to my field **20%**	3. Climate change is not relevant to my program **26%**
4. I am concerned about the reaction of my clientele to climate change information **19%**	4. I do not have good sources of climate change information to share **24%**

Respondents were also asked to respond to a series of statements about access to information, training, and support from Extension by noting their level of agreement or disagreement (Table 8). There was a mixture of agreement and disagreement about having sufficient access to information and expertise to incorporate climate change into respondents' programming. Generally, respondents disagreed with the statement that they had sufficient training to incorporate climate change into their extension programming and supported a need for training opportunities in areas. Just over half of respondents (53% to 55%) indicated that they have sufficient networks of colleagues, access to infrastructure, leadership, coordination, and support from UArizona Extension to incorporate climate change into programming (Table 8). This indicates that while these connections and infrastructure do exist, there is an opportunity to bolster engagement with networking, infrastructure, leadership, coordination, and support.

*Table 8. **Please indicate your level of agreement with the following statements:***

Statement	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
I have sufficient **CONFIDENCE** to incorporate climate change into my extension programming.	10%	13%	19%	25%	14%	19%
I have sufficient **ACCESS TO INFORMATION/EXPERTISE** to incorporate climate change into my extension programming.	11%	14%	22%	18%	22%	12%
I have sufficient **TRAINING** to incorporate climate change into my extension programming.	19%	21%	22%	19%	9%	9%
I have sufficient **NETWORKS WITH COLLEAGUES** to incorporate climate change into my extension programming.	8%	18%	18%	29%	14%	12%
I have sufficient access to **infrastructure / leadership / coordination** within UArizona extension to incorporate climate change into my extension programming.	12%	17%	18%	27%	17%	9%
I have sufficient **SUPPORT FROM UArizona Extension** to incorporate climate change into my extension programming.	8%	8%	18%	34%	21%	10%

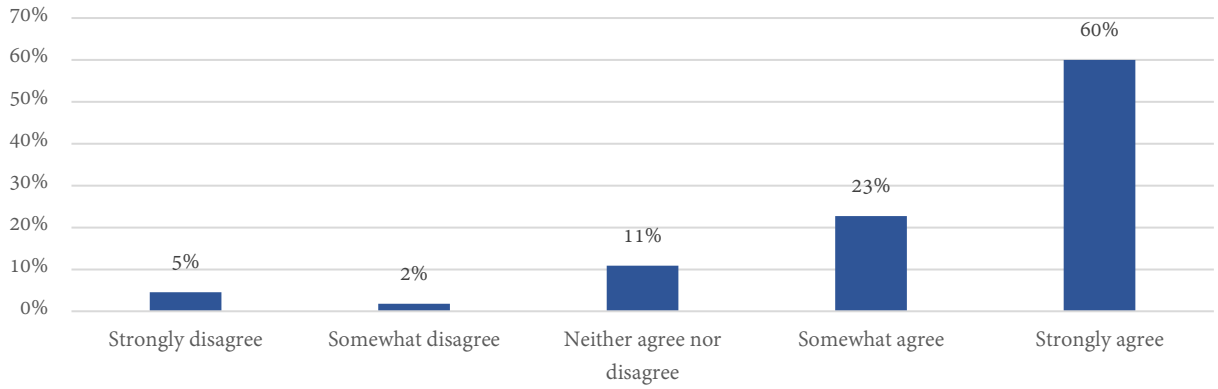
Respondents indicated their level of agreement with a series of statements regarding the utility to them and their program of training on a series of climate change-related topics (Table 9). The majority of respondents indicated various levels of agreement with all statements, indicating strong support for additional training on climate change related topics; this includes training on basic climate science and the effects of climate change on Arizona, climate change information sources and resources, how to present controversial subjects to clientele, working within an environment of political polarization, developing climate change networks, and effective climate change mitigation and adaptation strategies (Table 9).

Table 9. Please indicate your level of agreement with the following statements:

Statement	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
Training on **BASIC CLIMATE SCIENCE AND EFFECTS ON Arizona** would be useful for me and my extension program.	3%	4%	0%	22%	28%	44%
Training on **CLIMATE CHANGE INFORMATION SOURCES AND RESOURCES** would be useful to me and my extension program.	5%	1%	1%	22%	28%	43%
Training on **HOW TO EFFECTIVELY PRESENT CONTROVERSIAL SUBJECTS TO CLIENTELE** would be useful to me and my extension program.	5%	1%	4%	16%	24%	51%
Training on **SOCIAL SCIENCE AND PSYCHOLOGY ON HOW TO WORK WITHIN POLITICAL POLARIZATION ON CLIMATE CHANGE** would be useful to me and my extension program.	5%	1%	5%	21%	25%	43%
Training on **DEVELOPING CLIMATE CHANGE NETWORKS** would be useful to me and my extension program.	5%	3%	9%	22%	30%	32%
Training on **EFFECTIVE CLIMATE ADAPTATION AND MITIGATION STRATEGIES** applicable to my field of expertise would be useful to me and my extension program.	5%	1%	1%	22%	31%	41%

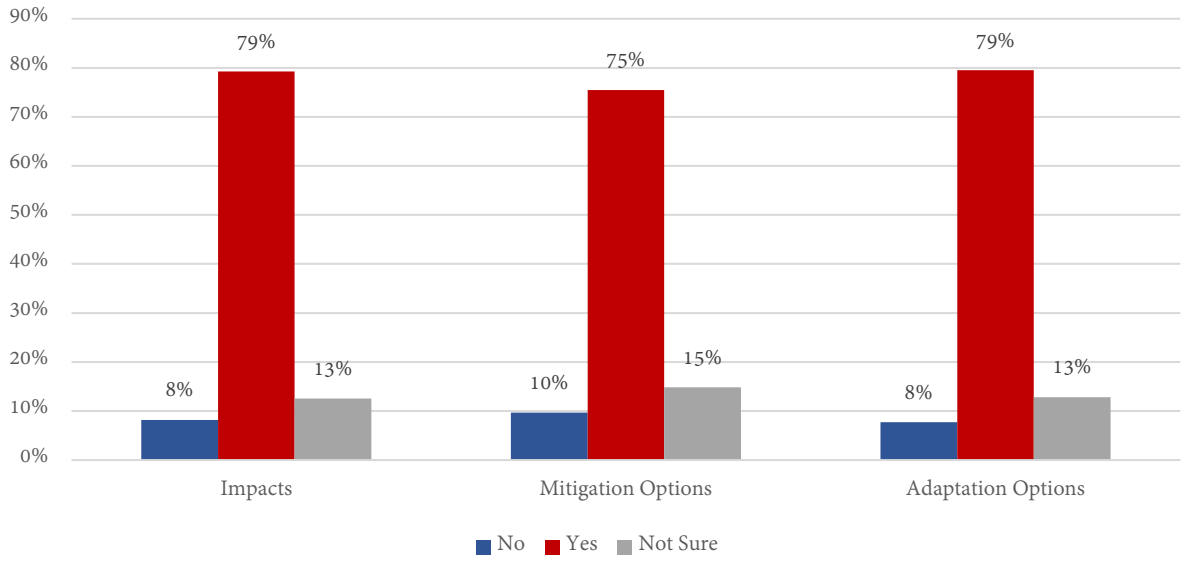
Much like the distribution of individual attitudes towards climate change, survey respondents overwhelmingly agree that climate change programming should be included in the University of Arizona Extension Strategic Plan, with 83% either somewhat or strongly agreeing (Figure 6). This suggests a significant opportunity for a workforce that supports investments to deliver climate change outreach, training, and applied research in Arizona. Respondents clearly noted that professional development would be utilized in a myriad of forms (Table 9) from program/area specific climate change information to skills-based learning, such as effectively presenting controversial topics to UArizona Cooperative Extension clientele.

Figure 6. Should climate change programming be included in our UArizona Extension Strategic Plan? (n = 110)



Roughly three-quarters of respondents believe it is important to incorporate information about the impacts of climate change, mitigation of climate change, and options for adaptation to climate change in their research and extension programming (Figure 7).

Figure 7. In your view, is it important to incorporate information about the following aspects of climate change into your research and extension programming? (n = 159, 155, 156 respectively)



When asked why they think it is important to incorporate climate change into their research and extension programming, respondents provided a series of responses (Table 10). Roughly three-quarters (74%) indicated it is important because of the impact of climate change now or in the future. Two-thirds (68%) responded that it is important to help prepare for change and two-thirds (65%) because it is the proper role of the extension network to share science-based information. Twenty-two percent (22%) responded that their clientele is looking for

information (a separate analysis of this information is presented later in the report). Nine percent responded that they do not think it is important to incorporate climate change into their research and extension programming.

Table 10. Why do you think it is important to incorporate climate change into your research and extension program? (n = 158)

Response	Percent
Because of the impacts of climate change now or in the future	74%
To help prepare for change	68%
Because it is the proper role of the extension network to share science-based information	65%
To help clientele learn about changes	55%
Because my clientele is looking for this information	22%
I don't think it's important	9%
N/A	9%
Other (please specify)	6%

For those respondents that provided other reasons why it is important to incorporate climate change into their research and Extension program (Table 10), responses included:

- ✓ *The importance of households learning about their role in mitigating the effects of climate change*
- ✓ *The importance of people making changes in their everyday lives to have an impact*
- ✓ *A need to spark community action*
- ✓ *The importance of educating youth on the science*
- ✓ *Generally to reduce the effects of climate change at the community level*

For respondents that provided write-in reasons as to why it is important to incorporate climate change into their research and extension program, responses included the importance of households learning about their role in mitigating the effects of climate change, the importance of people making changes in their everyday lives to have an impact, a need to spark community action, the importance of educating youth on the science, and generally to reduce the effects of climate change at the community level (Table 11).

Respondents were asked to list training or resources they thought would be helpful to them or others for incorporating climate change into their programming. Table 11 summarizes the responses.

Table 11. Summary of Suggested Training & Resources for Incorporating Climate Change into Programming

Topic	Ideas	
Information Needed (Internal)	▪ Climate change basics / general information ▪ Community barriers ▪ Current impacts ▪ Effects of climate change relevant to extension program areas ▪ Effects on local and national food systems ▪ Effects on plants and animals ▪ Food system impacts ▪ Health & safety impacts ▪ How to increase awareness ▪ Infectious disease impacts ▪ Information about implications	▪ Information about using native plants ▪ Inventory of current efforts by extension program area to identify areas of need ▪ Long term impacts ▪ Mitigation strategies ▪ Near future impacts ▪ Resilient crops & landscape plants ▪ Solutions ▪ Role of different industries in climate change
Training (Internal)	▪ Engaging with tribal communities on topic of climate change ▪ General training and deep dive for each program area ▪ How to incorporate into all areas of extension ▪ Presentations by climate specialists ▪ Professional development ▪ Resources for independent study	▪ Tours of areas doing climate research ▪ Training on communication around controversial topics ▪ Training on communication of climate science ▪ Working with people who do not believe in climate change ▪ Workshops
Tools	▪ Digital resources ▪ Climate simulators	▪ List of verified resources ▪ Newsletter
Curriculum (External)	▪ Consumer-focused information on how people can make a difference ▪ Education about local waste management and utilities ▪ "Growing Greener" ▪ Resources and information for homeowners	▪ Training for clientele ▪ Understanding how to identify disinformation ▪ Visuals ▪ Youth curriculum
Methods	▪ Collective impact	
Leadership & Internal Communication	▪ Communication about current and upcoming projects, grants, etc. to get involved ▪ Guidance from university on rules / policies around engaging clientele on contentious topics	▪ Information funneled down for us to disseminate ▪ Newsletter
Funding	▪ Funding for youth and family programming	

When asked whether they see value in joining a working group within Extension to build capacity for incorporating climate change into extension programs, 71% responded 'yes', while 29% responded 'no' (n = 107).

Respondents interested in a working group hoped to derive the values reported in Table 12 either as a member or as a user of the information and resources generated.

Table 12. Summary of Perceived Benefits of a Climate Change Working Group

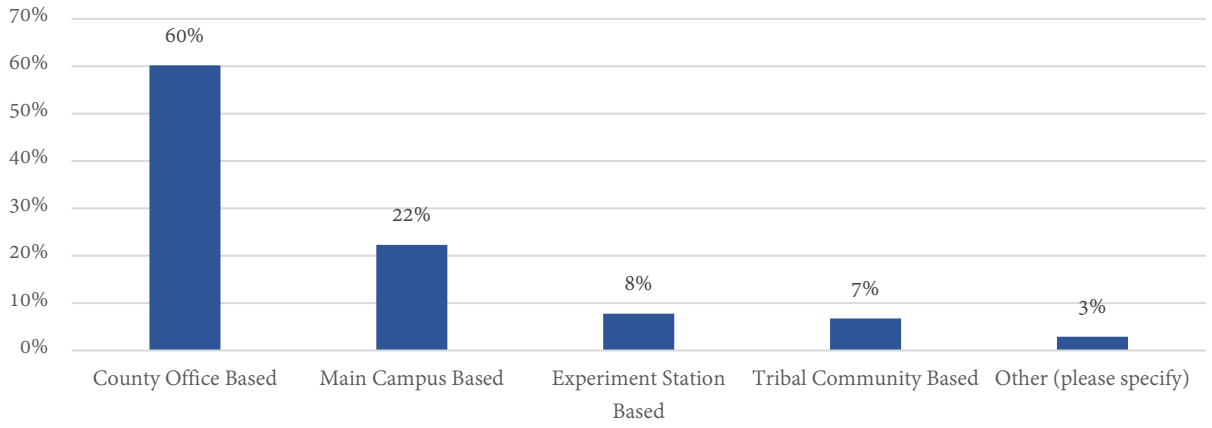
Topic	Ideas	
Information Needed (Internal)	▪ Gain confidence around the topic area ▪ Gain knowledge	
Training (Internal)	▪ Develop information resources to share (fact sheets, presentations, curricula, etc.) ▪ Learn how to disseminate climate change information	▪ Gain program-specific information ▪ Gain knowledge around the topic area ▪ Involve groups that have previously been less involved
Tools	▪ Have up-to-date information	▪ Gain resources
Curriculum (External)	▪ Improve program reach ▪ Find new ideas for incorporating climate change into programming	▪ Share knowledge with clientele ▪ Better connect with stakeholders ▪ Learn about credible resources I can share
Methods	▪ Build a plan around positioning	▪ Develop metrics around climate change programming
Leadership & Internal Communication	▪ Build awareness of what is happening on the topic within Extension ▪ Collaborate across units & disciplines ▪ Develop contacts/network ▪ Develop Extension policies around climate change research & programming	▪ Develop metrics around climate change programming ▪ Disseminate information ▪ Inform advisory boards ▪ Learn how to disseminate climate change information
Funding	▪ Develop funding strategies for climate change- research and programming.	

Responses regarding the benefits of having a working group closely mirror responses in Table 11 but with more emphasis on Leadership and Internal Communication, suggesting interest in creating internal infrastructure such as funding, metrics, and standards for climate change programming.

Respondent Demographics

Sixty percent of respondents were county office-based, followed by 22% which were main campus-based. Eighteen percent of respondents were either Experiment Station-based, tribal community-based, or some other arrangement (Figure 8).

Figure 8. Respondent Main Office Location



Forty-three percent (43%) of respondents serve in programmatic staff roles such as program coordinators, assistants in Extension, etc. Extension Agents comprise 18% of respondents and Extension Specialist / Professor roles comprise 14%, and the remaining 25% of respondents include administrative staff, Extension Administration, non-Extension faculty or staff, or other roles (Figure 9).

Figure 9. Respondent Position

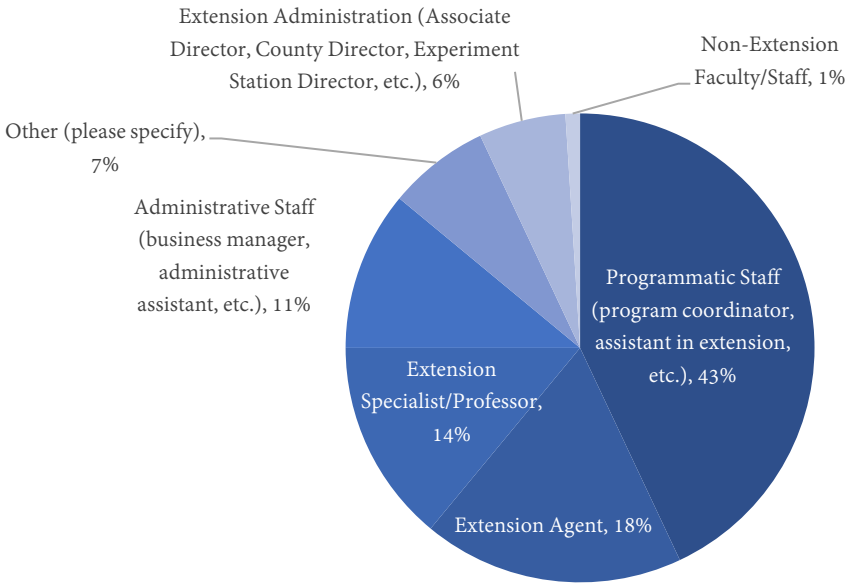


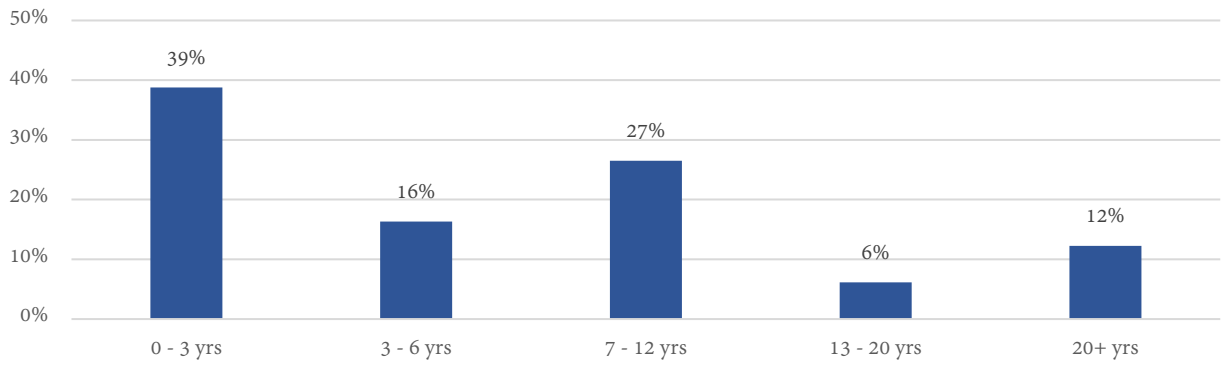
Table 13 compares the breakdown of respondents by their role in Extension with the distribution of the population of Extension personnel by role. Agents and specialists are over-represented in the sample relative to their share of the population, while administrative staff are underrepresented. The response of programmatic staff, administration, and other roles is closely proportional to their overall share of the population. This study sample, while not fully representative of Extension personnel, effectively captures the responses of individuals who work directly with extension stakeholders, including programmatic staff, agents, and specialists.

Table 13. Survey Sample by Extension Role vs. Population of Extension Personnel by Role

Role	Percent of Respondents	Percent of Extension Personnel
Programmatic Staff (program coordinator, assistant in extension, etc.)	43%	46%
Extension Agent	18%	5%
Extension Specialist/Professor	14%	6%
Administrative Staff (business manager, administrative assistant, etc.)	11%	30%
Other (please specify)	7%	7%
Extension Administration (Associate Director, County Director, Experiment Station Director, etc.)	6%	6%
Non-Extension Faculty/Staff	1%	1%

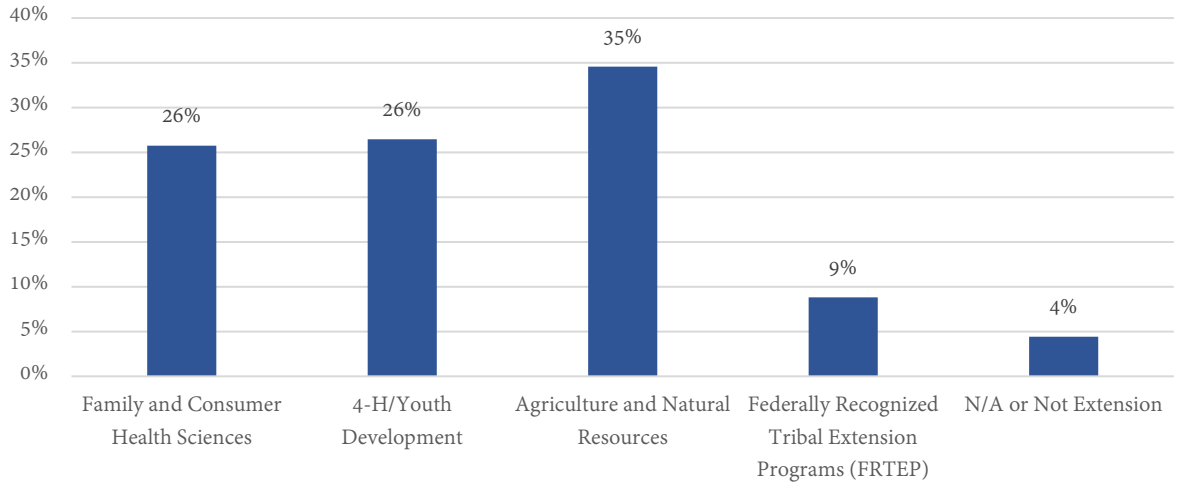
Thirty-nine percent (39%) of respondents have been in their positions for between 0 and 3 years, 26% between 3 and 6 years, 17% between 7 and 12 years, and 12% of respondents have been in their position for 20 years or more. (Figure 10).

Figure 10. Respondent Years in Current Position (n = 98)



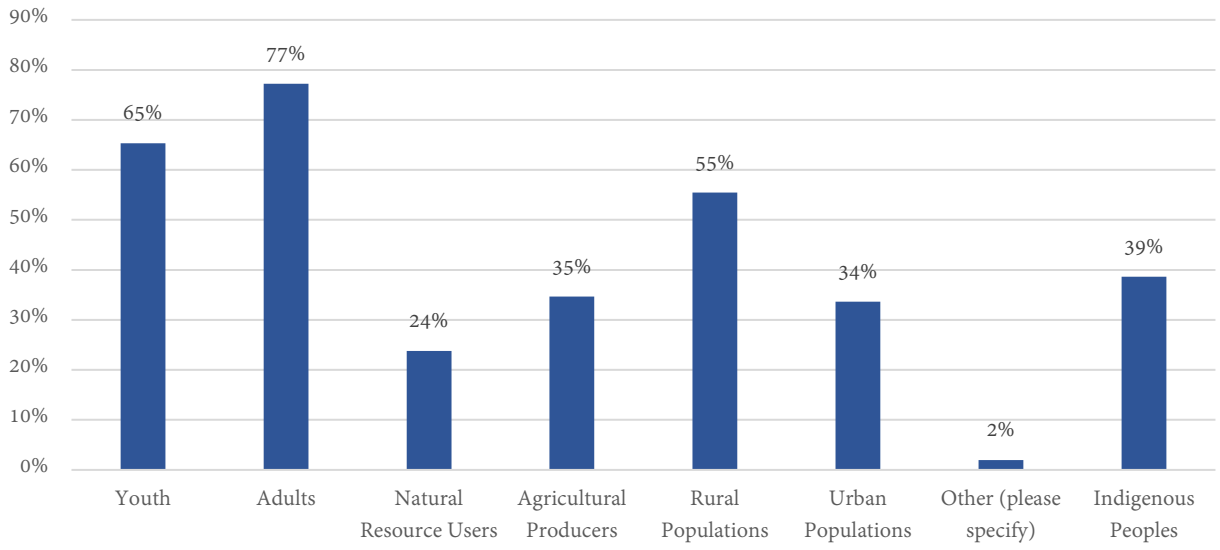
Most commonly, respondents work in Agriculture and Natural Resources (35%), followed by Family and Consumer Health Sciences (26%) and 4-H / Youth Development (26%). Nine percent (9%) of respondents work in the Federally Recognized Tribal Extension Program (FRTEP) funded positions (Figure 11).

Figure 11. In what area(s) of extension do you work? (n = 136)



Respondents serve a variety of clientele, including adults (77%), youth (65%), rural populations (55%), indigenous peoples (39%), agricultural producers (35%), urban populations (34%), and natural resource users (24%) (Figure 12).

Figure 12. What clientele do you primarily serve? (n = 101)



Survey Analysis

The following section provides more detailed analysis and cross-tabulations addressing questions of interest. An analysis of the data using the Six Americas classifications is included in Appendix C.

Climate Change in University of Arizona Cooperative Extension Programming

Table 14 provides a cross-tabulation of whether respondents currently incorporate climate change into their Extension programming and whether they call it "climate change" according to the Extension program area(s) that they work in. Respondents were able to indicate more than one area of work, therefore the percentages reflect some respondents with multiple observations. Climate change is most strongly incorporated into Agriculture and Natural Resources programming, followed by 4-H/Youth Development and Federally Recognized Tribal Extension Programs (FRTEP). A portion of respondents across all program areas report incorporating climate change into their programming using terminology other than 'climate change'.

Table 14. Current Incorporation of Climate Change into Programming by Extension Program Area (N = 128)

	Do you currently incorporate climate change into your Extension programming (even if you call it something else)?		
In what area(s) of Extension do you work?	*Yes, and I call it climate change*	*Yes, but I incorporate it indirectly and do not refer to it as climate change. I refer to it as climate variability, or weather extremes, or disaster preparedness, or another similar phrase*	*No*
Agriculture and Natural Resources	45%	30%	25%
Family and Consumer Health Sciences	6%	12%	82%
4-H/Youth Development	24%	24%	53%
Federally Recognized Tribal Extension Programs (FRTEP)	30%	10%	60%
N/A or Not Extension	0%	33%	67%

Table 15 presents a cross-tabulation of the personal importance of climate change to the respondent versus their level of agreement, with climate change programming being included in University of Arizona Cooperative Extension's Strategic Plan. Nearly half (45%) of respondents report that global warming is extremely important to them personally and they strongly agree that climate change programming should be included in the University of Arizona Extension Strategic plan.

Table 15. Personal Importance of Climate Change vs. Agreement with Climate Change Being Included in Extension's Strategic Plan (n = 110)

	Should climate change programming be included in our UArizona Extension Strategic Plan?				
How important is the issue of global warming to you personally?	*Strongly disagree*	*Somewhat disagree*	*Neither agree nor disagree*	*Somewhat agree*	*Strongly agree*
Not at all important	4%	2%	1%	0%	0%
Not too important	1%	0%	2%	1%	1%
Somewhat Important	0%	0%	3%	5%	4%
Very Important	0%	0%	4%	13%	10%
Extremely Important	0%	0%	2%	4%	45%

Overall, 22% of respondents reported that their clientele is looking for climate change information. This is an important reason why climate change should be incorporated into Extension programming (Table 10) and indicates a receptive audience. Table 16 presents the share of respondents working in each Extension program area who reported that their clientele is looking for climate change information. The clientele in the Agriculture and Natural Resources area and the Federally Recognized Tribal Extension Programs have greater demand for information about climate change than other program areas.

Table 16. Percent of Respondents Indicating Their Clientele Are Looking for Information on Climate Change by Extension Area (n = 100)

Extension Area	Percent
Agriculture and Natural Resources	34%
Federally Recognized Tribal Extension Programs (FRTEP)	25%
4-H/Youth Development	19%
N/A or Not Extension	17%
Family and Consumer Health Sciences	11%

Table 17 shows the number of respondents expressing various concerns about incorporating climate change into their Extension programming by whether they currently incorporate it. The concerns are ranked by the difference in the percent of respondents expressing the concern. The two statements with the largest difference in the share of respondents expressing that particular concern were '*I have no concerns*' and '*Climate change is not relevant to my program*'. Following those, concerns with large differences between groups include not having access to climate change curriculum specific to the respondent's field, not having good sources of climate change information to share, uncertainty about presenting complex climate change information accurately, and concerns around the reaction of their clientele to the information or a contentious topic.

Table 17. Concerns Expressed by Respondents by Whether They Currently Incorporate Climate Change into Their Extension Programming

Respondent Incorporates Climate Change into Extension Programming → Concern Expressed ↓	Yes	No	Difference
I have no concerns	33%	10%	23%
Climate change is not relevant to my program	3%	25%	23%
I do not have access to climate change curriculum specific to my field	21%	34%	14%
I do not have good sources of climate change information to share	12%	24%	13%
I am not sure that I can present complex climate change information accurately	23%	32%	9%
I am not comfortable presenting on a contentious topic to my clientele	9%	16%	7%
I am concerned about the reaction of my clientele to climate change information	19%	23%	4%
I am concerned that presenting climate information would negatively affect my job	8%	10%	2%
I am not sure that climate change science is solid enough to base decisions on	9%	11%	2%
Other (please specify)	14%	13%	1%
I don't feel I have adequate support from Extension to work on this topic	12%	13%	1%

Conclusions and Recommendations

Extension is Taking Some Action

Extension invests in three Specialist/Professors actively involved in climate science, climate adaptation and sustainability. Numerous others within Extension incorporate climate science elements into their own programming. To provide a sense of ways that UArizona Extension could organize and further develop programs that incorporate climate change information, we examined examples from the University's Center for Climate Adaptation Science and Solutions (CCASS) website (https://ccass.arizona.edu/). Similar to UArizona Extension, CCASS works in partnership with communities, organizations, and agencies in the southwestern U.S. CCASS aims to strengthen and support climate adaptation, risk management and resilience efforts at multiple scales. By initially collaborating with existing CCASS infrastructure and expertise, UArizona Extension can amplify its efforts to fulfill the Extension mission to improve lives, families, communities, the environment, and economies in Arizona and beyond through applied climate change research and education programming.

Below are some examples of UArizona Extension programs that incorporate climate change information:

- ✓ **Arizona Project WET** (Water Education for Teachers): Project WET focuses on developing and providing teacher professional development that deepens water-related content knowledge and evolves instructional practice. Arizona Project WET learners grapple with the intricacies of interconnected surface water, groundwater, the hydrologic cycle, as well as climate change, water management, and conservation. https://projectwet.arizona.edu/
- ✓ **Climate Master Extension Outreach Scoping Project**: Scoping project conducted in 2020 with funding from USDA to increase climate change literacy and to determine best practices and methods in supporting both climate adaptation and mitigation activities for diverse groups and communities. https://extension.arizona.edu/climate-master-extension-outreach-research-project
- ✓ **Climate Viticulture Newsletter**: Climatic conditions are important to the siting of orchards and vineyards as well as to the selection of cultivated varieties. Since these plantings often last for decades, knowing, for instance, how recent warming has affected and how further anticipated warming might affect perennial fruit and nut crops is critical. This newsletter provides updates on recent climate conditions as well updates on longer-term trends and other climate-viticulture related applied research findings. https://cales.arizona.edu/research/climategem/content/climate-viticulture-newsletter
- ✓ **Climate Science Applications Program**: CSAP is an extension program focused on bringing climate science research and applications to the people of the SW US. This program works with ranchers, farmers and natural resource managers across Arizona to integrate climate information in their planning and decision making and assisting them in developing strategies to adapt to a changing climate. https://cales.arizona.edu/climate/
- ✓ **Ecological Restoration in Natural and Working Landscapes**: Extension program focused on restoration & weed management strategies that mitigate effects of climate change (particularly warming & decreasing precipitation). https://www.gornishlab.com/
- ✓ **Soil Health Extension Program**: Extension soil health program focused developing soil management tools to improve soil health with an aim to create climate-resilient, sustainable and healthy agro-environments for human welfare. https://environmentalscience.cales.arizona.edu/person/debankur-sanyal
- ✓ **MyRAINge Log**: A platform designed to help make it easier for ranchers and land managers to collect, manage, and use precipitation observations to support management decisions. https://myraingelog.arizona.edu/

The Extension Workforce Needs Administrative Support, Enhanced Collaboration, and Training on Climate Change in Extension Programming

The most important and readily actionable finding from this survey is that Extension personnel care about climate change, yet do not incorporate it into their programming due to several obstacles. We find that many in Extension:

- Are either concerned or alarmed about human-caused climate change;
- Need more support for accessing information on climate change to be incorporated into programming;
- Want opportunities to bolster networking, infrastructure, leadership, coordination, and support;
- Need training to support incorporating climate change into programming; demonstrating the relevance of climate variability and climate change to all Extension programs could provide an opportunity for addressing concerns of Doubtful and Disengaged Extension personnel;
- Strongly support additional training on climate change-related topics, including basic climate science and effects on Arizona, climate change information sources and resources, presenting controversial subjects to clientele, working within an environment of political polarization, developing climate change networks, and effective climate change mitigation and adaptation strategies;
- Want to support clientele in the Agriculture and Natural Resources area and in the Federally Recognized Tribal Extension Programs who are looking for information about climate change, more so than in other program areas;
- Would benefit from a comprehensive inventory of current efforts by extension program area to identify areas of need.

The 27% of Extension personnel who identify as either Cautious or Concerned about human-caused climate change are well distributed among Extension home and clientele bases. This opens an opportunity for the UArizona Cooperative Extension Administration to make headway on climate change, because people in these categories seek information and they seek training to deliver climate change programming and/or feel confident in conversations about climate change. By normalizing climate change as a regular part of doing the business of Extension, UArizona Cooperative Extension Administration can reassure Cautious or Concerned personnel—they "have their backs" so to speak—so they do not fear the reactions of their clientele.

While there is clearly room for increased involvement of all internal UArizona groups listed in Table 2, university volunteers (Designated Campus Colleagues), and Administrators have the fewest interactions to report. Clearly there is an opportunity to engage more of the 3,500 Designated Campus Colleagues (official UArizona Extension volunteers) in climate related interactions to a greater extent, and efforts should be made to communicate with administrators more directly. The involvement of students in existing programming, although desirable, is likely limited by the practicalities of off-campus project work and the limited time students have. Nevertheless, opportunities to involve students in extension programs could be incentivized in numerous ways through internships, lab rotations, and independent study credits.

Extension Is Well-Positioned to Educate on Climate Change

The very purpose of land-grant universities across the U.S. is to provide accessible, research-based programs and educational resources that functionally improve the lives of the individuals, families, and communities within the state they serve. Ten years ago, Garfin et al. (2013) published Assessment of Climate Change in the Southwest United States. The report was prepared for the National Climate Assessment and included Arizona, California, Colorado, Nevada, New Mexico, Utah, adjacent US-Mexico border region, and 182 federally recognized Native Nations (Federal Register, 2010). The group declared that due to rapid increases in human population, alterations in land use and land cover, limits on water supply, long-term drought, and other climatic changes, the Southwest is one of the most "climate-challenged" regions of North America. It is incumbent upon land-grant institutions to provide climate adaptation solutions to the citizens in the region. But even more urgent is the need to provide leadership towards advancing a sustainable and resilient future by addressing human-caused climate change.

University of Arizona Cooperative Extension Mission and Vision

We have offices in all 15 counties and on 5 Native nations, connecting them to University of Arizona research and resources. This connection to research-backed knowledge helps people solve problems, adapt to change, develop new skills, and carry innovations forward into practice.

Mission: To engage with people through applied research and education to improve lives, families, communities, the environment and economies in Arizona and beyond.

Vision: To be a vital national leader in creating and applying knowledge to help people build thriving, sustainable lives, communities and economies

UArizona Extension is uniquely positioned to support climate change mitigation and adaptation efforts (Brugger and Crimmins, 2015). As a 'boundary organization' it sits at the nexus between science and society and specializes in the co-production of usable, scale-relevant strategies to manage numerous different types of agricultural and natural resource management challenges. It lacks organizational and institutional structure, though, to effectively and strategically address the challenges that climate change poses to the region. Climate change cuts across all disciplines, with respect to impacts, and requires an inter-disciplinary approach to pose effective, equitable and just adaptation and mitigation strategies. This requires leadership to organize across all facets of UArizona Extension to efficiently guide cross-cutting climate change programming efforts. Specific recommendations include:

- Develop and support a program manager position within Extension Administration that coordinates UArizona climate change programming efforts; identifies opportunities to leverage climate change adaptation and mitigation efforts within existing programs; identifies and supports the development of inter-disciplinary funding opportunities.
- Develop a UArizona Extension climate advisory board consisting of stakeholders representing all programmatic areas that can guide existing and future climate change programming efforts.
- Identify, develop and support new Extension faculty positions to support inter-disciplinary climate change programming. These could include positions like: Renewable energy extension specialist, carbon sequestration/management specialist, etc.

- Explore partnerships with other aligned efforts like the nascent American Climate Corps (American Climate Corps, 2024).

UArizona Extension programming currently lacks dedicated faculty and staff able to help the citizens of Arizona to reduce fossil fuel dependence and reduce transportation, industry, and agriculturally produced methane and carbon-dioxide emissions. Support is needed to inform stakeholders motivated to utilize renewable energy sources, carbon sequestration, and energy efficient buildings. Scientists are needed to facilitate fledgling industries, test operational systems, and provide stakeholders with awareness and understanding so informed choices can be made. University Extension systems are the ideal platform to provide the service. Consistent with the mission and vision of University of Arizona Cooperative Extension, research, teaching, and Extension programming must address climate change as a fundamental threat to human health and wellbeing as well as an opportunity to create a more sustainable future for all those living and working in the southwest U.S. Documentation of effects in Arizona, and strategies for adaptation and mitigation are critical for improving the well-being and sustainability of individuals, families, communities, the environment, agriculture, and the state economy.

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Appendices

Appendix A. Survey Instrument

UArizona Extension Climate Change

Study Title: Evaluating UArizona Extension Climate Science Programming Needs
Principal Investigators: This survey is being conducted by the UArizona Climate Science Working Group - Chris Jones (Gila County, Arizona Cooperative Extension Agent), Mike Crimmins (Environmental Science, Specialist & Professor), Dawn H. Gouge (Entomology, Specialist & Professor), Alex Kosmider (Cochise County, Community Outreach Professional), Ashley Wright (Cochise, Pima & Santa Cruz Counties, Arizona Cooperative Extension Agent), Ethan Orr (Associate Director, Ag and Natural Resources and Economic Development) and Gregg Garfin (School of Natural Resources and the Environment, Specialist & Professor).

You are being asked to participate in a needs assessment survey that is an information gathering effort. Your participation in this study is voluntary and anonymous, and you do not have to participate. While the survey is anonymous, some individuals might be identifiable based on their combination of demographic responses. No attempt will be made to do this, and providing demographic information is optional. This document contains important information about this study and what to expect if you decide to participate. Please consider the information carefully. Feel free to ask questions before making your decision whether or not to participate.

What is this survey about? The purpose of this survey is to share your insights with the UArizona Extension Climate Science Working Group. There are 27 quick and simple questions that should take 10 to 15 minutes to complete. No advanced preparation is needed, and we have only included questions that will be most useful and informative. You must be 18 years of age or older and read English. The information gathered will be shared with University of Arizona administrators, faculty, staff, and students as well as external entities. The primary reason for gathering this information is to inform Extension Administrators about the current level of interest and involvement in climate change-related training, programming, and collaboration. The information will also help the UArizona Extension Climate Science Working Group leverage resources and opportunities to better serve Extension and Arizona stakeholders. This data may at a later point be aggregated with responses from other university Extension data. There are no expected risks to you as a result of participating in this study, and neither your name nor specific identifying information is required to be included in the survey. There are no ramifications if you decline to participate.

What will happen to my responses? The UArizona Extension Climate Science Working Group will keep digital responses on-line within the university Qualtrics and Box applications. Only the Working Group members will have access to the raw data. Downloaded raw data will be stored securely in a locked office on a password protected computer for exactly six years (2029) before being destroyed. Within this time, the data may be used within a larger study that would aggregate data from multiple universities to produce a more generalized understanding of climate change topics in Cooperative Extension programs. However, further efforts are dependent upon successfully leveraging collaborators and grant funds.
Analyzed aggregate data findings will be communicated widely both within and external to the University of Arizona. Findings may be published in professional journals or presented at scientific conferences as general

findings. No names or identifying information will be collected or disclosed in any way. The information that you provide in the study will be handled confidentially. However, there may be circumstances where this information must be released or shared as required by law. The University of Arizona Institutional Review Board may review the records for monitoring purposes.

What if I have questions, concerns, or complaints about the study? Please contact Dr. Dawn Gouge at dhgouge@arizona.edu or 602-418-5202.
For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the survey team, you may contact the Human Subjects Protection Program Director at 520-626-8630 or online at http://research.arizona.edu/compliance/human-subjects-protection-program. An Institutional Review Board responsible for human subjects research at The University of Arizona reviewed this project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.
By taking part in the survey, you are allowing your responses to be used to guide climate change program development and a better integration of climate change information across Extension programs.

Qu. Please choose one:

I agree, please take me to the survey (2)

I do not agree, selecting this will immediately exit the survey and no response will be recorded (1)

Thank you Thank you for sharing your insights with the UArizona Extension Climate Science Working Group.

For the purposes of this survey: **Climate Change** refers to persistent changes in average weather conditions, features of the climate system, and the changing risk of certain types of severe weather events as a result of increased emissions of heat-trapping gases resulting from human activities. **Global Warming** refers to the increase in the Earth's average temperature that has occurred as a result of increased emissions of heat-trapping gases resulting from human activities. **Climate Variability** refers to natural changes in climate that fall within the observed range of extremes for a particular region, as measured by temperature, precipitation, and frequency of events. Drivers of climate variability include El Niño and other phenomena. **Adaptation** refers to the adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or which moderates negative effects. Adaptations include for example, (1) increases in preparedness in anticipation of risk, such as developing a drought plan or flood warning plan, or (2) improving roadway drainage and runoff to reduce anticipated flood risks associated with increased numbers of intense precipitation events. **Mitigation measures** reduce the amount and speed of future climate change by reducing emissions of heat-trapping gases or removing carbon dioxide from the atmosphere.

Section 1: Your perceptions related to climate change and climate change programming

Q1. How important is the issue of global warming to you personally?

Extremely Important (1)
Very Important (2)
Somewhat Important (3)
Not too important (4)
Not at all important (5)

Q2. How worried are you about global warming?

Very Worried (1)
Somewhat worried (2)
Not very worried (3)
Not at all worried (4)

Q3. How much do you think global warming will harm you personally?

A great deal (1)
A moderate amount (2)
Only a little (3)
Not at all (4)
Don't know (5)

Q4. How much do you think global warming will harm future generations of people?

A great deal (1)
A moderate amount (2)
Only a little (3)
Not at all (4)
Don't know (5)

Q5. In your view, is it important to incorporate information about the following aspects of climate change into your research and extension programming? (please choose one option for each statement)

	Yes (1)	No (2)	Not Sure (3)
Impacts (1)			
Mitigation Options (2)			
Adaptation Options (3)			

Q6. Why do you think it is important to incorporate climate change into your research and extension program? (choose all that apply)

N/A, I don't think it's important (1)
Because of the impacts of climate change now or in the future (2)
To help prepare for change (3)
To help clientele learn about changes (4)
Because it is the proper role of the extension network to share science-based information (5)
Because my clientele are looking for this information (6)
Other (please specify) (7) _____

Q7. Do you currently incorporate climate change into your extension programming (even if you call it something else)?

Yes, and I call it climate change (1)
Yes, but I incorporate it indirectly and do not refer to it as climate change. I refer to it as climate variability, or weather extremes, or disaster preparedness, or another similar phrase (2)
No (3)

Q8. What concerns do you have about incorporating climate change into your extension programming? (choose all that apply)

I am not sure that climate change science is solid enough to base decisions on (1)
I do not have good sources of climate change information to share (2)
I do not have access to climate change curriculum specific to my field (3)
Climate change is not relevant to my program (4)
I am not sure that I can present complex climate change information accurately (5)
I am not comfortable presenting on a contentious topic to my clientele (6)
I am concerned about the reaction of my clientele to climate change information (7)
I don't feel I have adequate support from Extension to work on this topic (8)
I am concerned that presenting climate information would negatively affect my job (9)
Other (please specify) (10) _____
I have no concerns (11)

Section 2: Providing climate change training and education

Q9. Please indicate your level of agreement with the following statements:

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Somewhat disagree (4)	Disagree (5)	Strongly disagree (6)
I have sufficient CONFIDENCE to incorporate climate change into my extension programming. (1)						
I have sufficient ACCESS TO INFORMATION/EXPERTISE to incorporate climate change into my extension programming. (2)						
I have sufficient TRAINING to incorporate climate change into my extension programming. (3)						
I have sufficient NETWORKS WITH COLLEAGUES to incorporate climate change into my extension programming. (4)						
I have sufficient access to infrastructure/leadership/coordination within UArizona extension to incorporate climate change into my extension programming. (5)						
I have sufficient SUPPORT FROM UArizona extension to incorporate climate change into my extension programming. (6)						

Q10. Please indicate your level of agreement with the following statements:

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Somewhat disagree (4)	Disagree (5)	Strongly disagree (6)
Training on BASIC CLIMATE SCIENCE AND EFFECTS ON Arizona would be useful for me and my extension program. (1)						
Training on CLIMATE CHANGE INFORMATION SOURCES AND RESOURCES would be useful to me and my extension program. (2)						
Training on HOW TO EFFECTIVELY PRESENT CONTROVERSIAL SUBJECTS TO CLIENTELE would be useful to me and my extension program. (3)						
Training on SOCIAL SCIENCE AND PSYCHOLOGY ON HOW TO WORK WITHIN POLITICAL POLARIZATION ON CLIMATE CHANGE would be useful to me and my extension program. (4)						
Training on DEVELOPING CLIMATE CHANGE NETWORKS would be useful to me and my extension program. (5)						
Training on EFFECTIVE CLIMATE ADAPTATION AND MITIGATION STRATEGIES applicable to my field of expertise would be useful to me and my extension program. (7)						

Q11. How do you currently incorporate climate change into your research and extension programming, even if you don't directly refer to it as climate change and use a related term or focus area (e.g., climate variability, extreme weather patterns, drought, or disaster preparedness?)

I create written articles and information for stakeholders (1)
I present climate change related talks within events focused on other issues (2)
I coordinate events focused specifically on climate change related issues (3)
I provide 1:1 stakeholder discussions or communications on climate change (4)
I contribute climate change content for Social Media Platforms (5)
My research explicitly focuses on climate change related ideas (6)
My research includes climate change related components: improving sustainability, reducing emissions, measuring climate impacts, or mitigation efficacy, etc. (7)
I point my clientele to University of Arizona or other websites on the topic (8)
Other (please specify) (9) _____

Q12. Approximately how many people do you estimate you reach on average each year with climate change information?

0 (1)
1-49 (2)
50-99 (3)
100-199 (4)
200-499 (5)
500+ (6)
Could not estimate (7)

Q13. Approximately how much time have you spent on **professional development related to climate change** within the last year? Including researching articles, attending professional development events, etc.

0 (1)
1-10 hrs (2)
11 - 50 hrs (3)
51+ hrs (4)
Could not estimate (5)

Q14. Approximately how much time have you spent **addressing climate change with stakeholders** within the last year? Including creating content, giving talks, preparing materials and presentations or coordinating events, etc.

0 (1)
1-25 hrs (2)
26-100 hrs (3)
100+ hrs (4)
Could not estimate (5)

Q15. For your research and extension programming related to climate change, please select the choice that best characterizes the **frequency of your interactions with UArizona colleagues:**

	Weekly, or more (1)	Monthly (2)	Several times per year (3)	A few times per year (4)	About once per year (5)	Less than once per year (6)	Never (7)
UArizona Extension County Agents (1)							
UArizona Extension Specialists (2)							
UArizona Extension Programmatic Staff (3)							
UArizona Extension Administration (4)							
UArizona Extension Volunteers/DCCs (5)							
UArizona Non-Extension Faculty or Staff (9)							
UArizona Students involved in climate change activities (8)							
Other (please specify) (6)							
Other (please specify) (7)							

Q16. Next, for your research and extension programming related to climate change, please select the **types of interactions you have with UArizona colleagues:**

	None (1)	Informal sharing of information and ideas (2)	Giving or attending research presentations (3)	Involvement in research projects (4)	Involvement in extension teaching, training, & outreach efforts (5)	Collaborative policy projects (6)
UArizona Extension County Agents (1)						
UArizona Extension Specialists (2)						
UArizona Extension Programmatic Staff (3)						
UArizona Extension Administration (4)						
UArizona Extension Volunteers (5)						
UArizona Non-Extension Faculty or Staff (9)						
UArizona Students involved in climate change activities (8)						
Other (please specify) (6)						
Other (please specify) (7)						

Q17. For your research and extension programming related to climate change, please select the choice that best characterizes the **frequency of your interactions with colleagues EXTERNAL to UArizona:**

	Weekly, or more (1)	Monthly (2)	Several times per year (3)	A few times per year (4)	About once per year (5)	Less than once per year (6)	Never (7)
Faculty at other institutions (1)							
Staff at other institutions (2)							
Students at other institutions (3)							
Other state extension programs or groups (e.g., Extension foundation, the National Extension Climate Initiative - NECI) (4)							
Climate hubs and centers (e.g., USDA SW Climate Hub) (5)							
State governments (6)							
Federal government (7)							
Local governments (8)							
Non-profits (9)							
Professional organizations (e.g., the National Association of County Agricultural Agents - NACAA, the National Renewable Energy Policy - ANREP, etc.) (10)							
Commodity or producer groups (11)							
Other (please specify) (12)							
Other (please specify) (13)							

Q18. Next, for your research and extension programming related to climate change, please select the **types of interactions you have with other colleagues EXTERNAL to UArizona:**

	None (1)	Informal sharing of information and ideas (2)	Giving or attending research presentations (3)	Involvement in research projects (4)	Involvement in extension teaching, training, & outreach efforts (5)	Collaborative policy projects (6)
Faculty at other institutions (1)						
Staff at other institutions (2)						
Students at other institutions (3)						
Other state extension programs or groups (e.g., Extension foundation, the National Extension Climate Initiative - NECI) (4)						
Climate hubs and centers (e.g., USDA SW Climate Hub) (5)						
State governments (6)						
Federal government (7)						
Local governments (8)						
Non-profits (9)						
Professional Organizations (e.g., the National Association of County Agricultural Agents - NACAA, the National Renewable Energy Policy - ANREP, etc.) (10)						
Commodity or producer groups (11)						
Other (please specify) (12)						
Other (please specify) (13)						

Section 3: Wrap up and future needs

Q19. Should climate change programming be included in our UArizona Extension Strategic Plan?

Strongly agree (1)
Somewhat agree (2)
Neither agree nor disagree (3)
Somewhat disagree (4)
Strongly disagree (5)

Q20. Do you see value in joining a working group within UArizona Extension to help build our capacity to incorporate climate change into research and extension programming?

Yes (1)
No (2)

Q23 Please briefly describe the value you hope to derive from this working group, either as a member or a user of the information and resources generated.

_____
_____
_____
_____
_____

Q21. Please list any training or resources you think would help you or others to better incorporate climate change into extension programming:

_____
_____
_____
_____
_____

Section 4: Demographics. We are interested in where climate change programming is currently happening around the state, or where there is interest. Your responses will not be used to attempt to identify you and this data will only be shared in a way that does not potentially reveal personal data or tie an individual to specific answers.

If you choose to leave this section unanswered, your responses previous to this will still be included in the survey results.

Q22. Please choose your main office location (choose one):

Main Campus Based (1)
County Office Based (2)
Tribal Community Based (5)
Experiment Station Based (3)
Other (please specify) (4) _____

Q28 Which Experiment Station are you most closely associated with?

Tucson Area (Red Rock, Campus Farm, Santa Rita Experimental Range, etc.) (1)
Maricopa Agricultural Center (2)
Safford Agricultural Center (3)
V-V Ranch (4)
Yuma Agricultural Center (5)

Q29 Which ALVSCE Unit are you most closely associated with?

Q30 Which counties do you work in? (Choose all that apply)

Apache County (1)
Cochise County (2)
Coconino County (3)
Gila County (4)
Graham County (5)
Greenlee County (6)
La Paz County (7)
Maricopa County (8)
Mohave County (9)
Navajo County (10)
Pima County (11)
Pinal County (12)
Santa Cruz County (13)
Yavapai County (14)
Yuma County (15)

Q23. What is your position? (choose all that apply)

Extension Administration (Associate Director, County Director, Experiment Station Director, etc.) (1)
Extension Specialist/Professor (2)
Extension Agent (3)
Programmatic Staff (program coordinator, assistant in extension, etc.) (4)
Administrative Staff (business manager, administrative assistant, etc.) (5)
Non-Extension Faculty/Staff (6)
Other (please specify) (7) _____

Q24. How many years have you been at your current position?

0 - 3 yrs (4)
3 - 6 yrs (5)
7 - 12 yrs (6)
13 - 20 yrs (7)
20+ yrs (8)

Q25. In what area(s) of extension do you work? (choose all that apply)

Family and Consumer Health Sciences (1)
4-H/Youth Development (2)
Agriculture and Natural Resources (3)
Federally Recognized Tribal Extension Programs (FRTEP) (4)
N/A or Not Extension (5)

Q26. What clientele do you primarily serve? (choose all that apply)

Youth (1)
Adults (2)
Natural Resource Users (3)
Agricultural Producers (4)
Rural Populations (5)
Urban Populations (6)
Indigenous Peoples (8)
Other (please specify) (7) _____

Q27. Within your field, please list up to three topics/issues you specialize in. For example, nutrition, livestock production, pecan production, urban horticulture, financial literacy.

Topic/Issue 1 (1) _____
Topic/Issue 2 (2) _____
Topic/Issue 3 (3) _____

Appendix B. In-Person Discussion Prompts

How does climate change affect your communities and stakeholders?

What are we already doing?

What could we do: low or no cost

What resources or information do you need?

What would you do if we had a blank check and a magic wand?

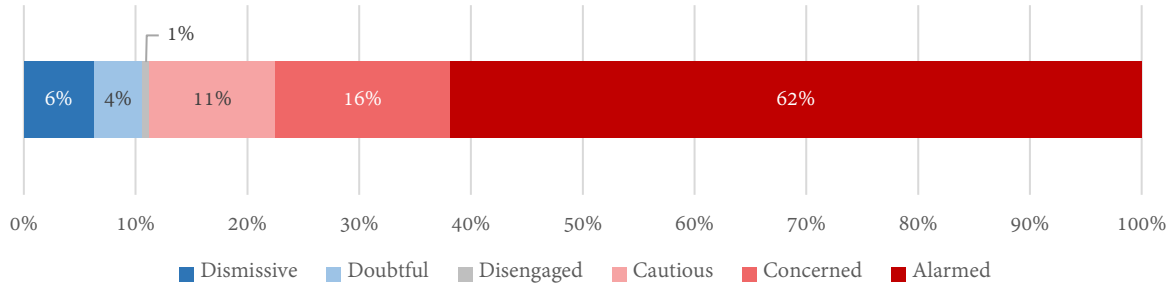
Appendix C. Six Americas Classifications

The following section examines survey results through the lens of the Six Americas classifications. These classifications are based on the first four questions of the survey, known as the Six Americas Super Short Survey (SASSY!) (Chryst et al., 2018) which is used to categorize respondents into six subgroups according to their personal beliefs towards climate change (Yale Program on Climate Change Communication, 2023). These groups are (directly citing the Yale Program on Climate Change Communication, 2023):

- **Dismissive** – The Dismissive believe global warming is not happening, human-caused, or a threat, and most endorse conspiracy theories (e.g., "global warming is a hoax").
- **Doubtful** – The Doubtful do not think global warming is happening or they believe it is just a natural cycle. They do not think much about the issue or consider it a serious risk.
- **Disengaged** – The Disengaged know little about global warming. They rarely or never hear about it in the media.
- **Cautious** – The Cautious haven't yet made up their minds: Is global warming happening? Is it human-caused? Is it serious?
- **Concerned** – The Concerned think human-caused global warming is happening, is a serious threat, and support climate policies. However, they tend to believe that climate impacts are still distant in time and space, thus climate change remains a lower priority issue.
- **Alarmed** – The Alarmed are convinced global warming is happening, human-caused, an urgent threat, and they strongly support climate policies. Most, however, do not know what they or others can do to solve the problem.

Based upon individual responses to the SASSY! questions, the UArizona breakdown by group shows an overwhelming number of respondents (62%) fall into the Alarmed group (Figure 13) and an additional 16% were categorized as Concerned. A total of 10% of respondents were either Dismissive or Doubtful regarding climate change. The remaining 12% were Cautious or Disengaged.

Figure 13. Survey Respondents Six Americas Classifications



Compared with the national average, University of Arizona Cooperative Extension survey respondents were much more commonly categorized as Alarmed, under the Six Americas classification (Yale Program on Climate Change Communication, 2023). They were less frequently categorized under all other classifications compared to the national average (Figures 14 and 15).

Figure 14. Survey Respondents Six Americas Classifications - results from US national data December 2022 (n = 1,085) compared to the UArizona Extension employee survey data October 2023 (n=160)

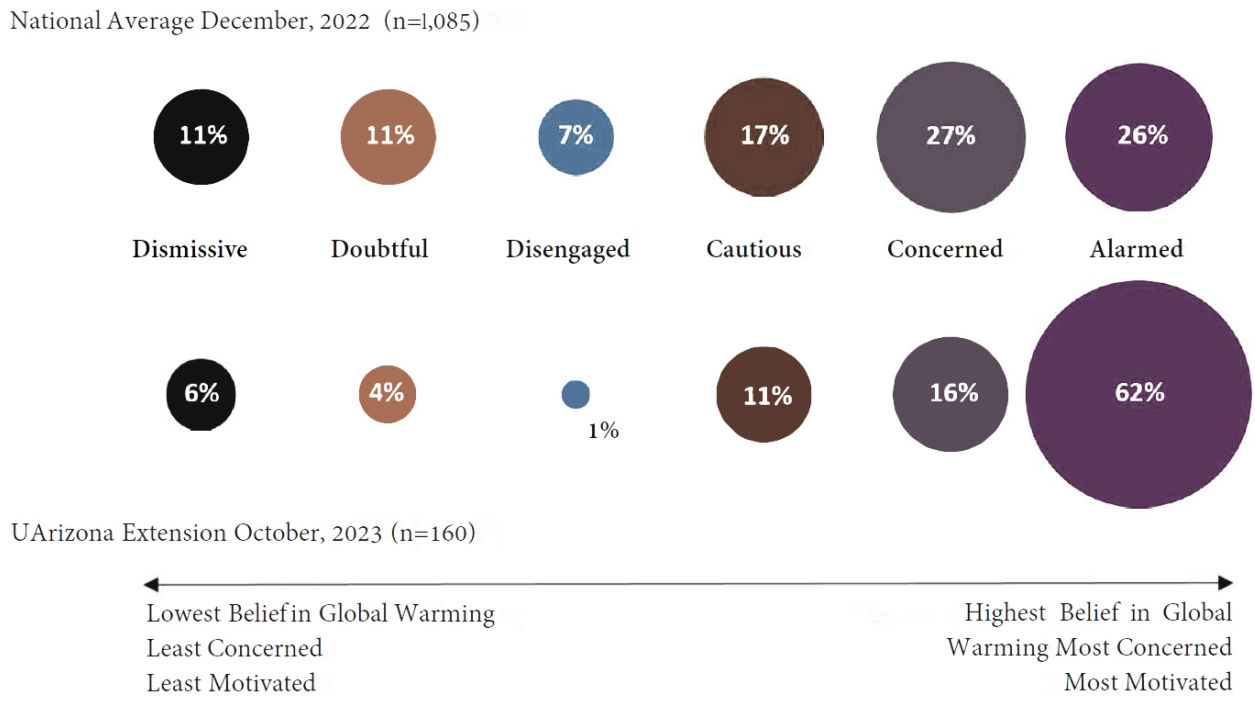
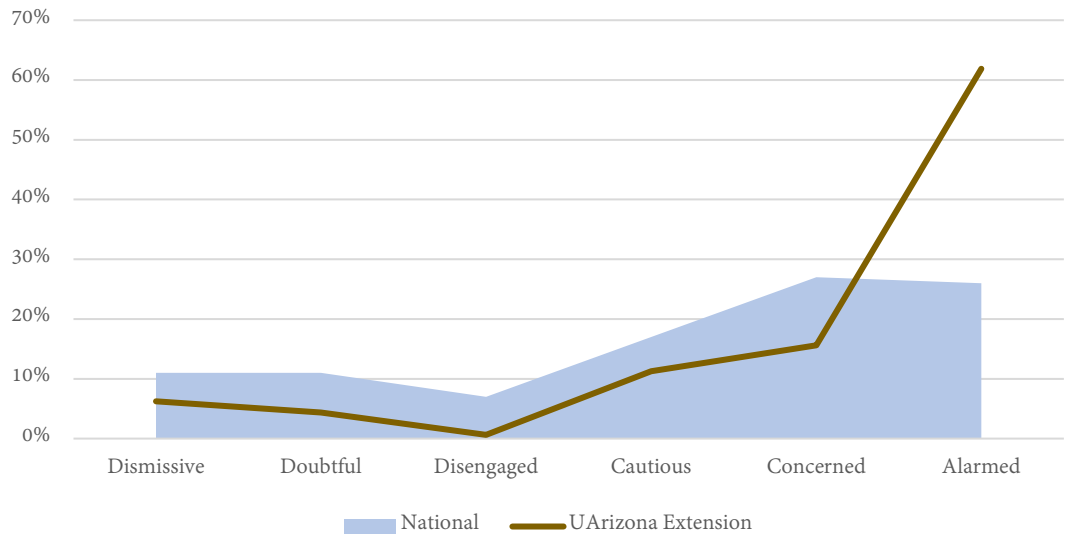


Figure 15. Six Americas Classifications for University of Arizona Cooperative Extension Survey Respondents vs. National Average



Within Extension, most respondents fall under the Cautious, Concerned, or Alarmed classifications, with the majority under the Alarmed category across all program areas (Table 18).

Table 18. Six Americas Classification vs. Extension Area of Respondent (n = 131)

	Dismissive	Doubtful	Disengaged	Cautious	Concerned	Alarmed
Agriculture and Natural Resources	2%	6%	0%	17%	11%	64%
Family and Consumer Health Sciences	0%	3%	3%	6%	20%	69%
4-H/Youth Development	6%	0%	0%	6%	25%	64%
Federally Recognized Tribal Extension Programs (FRTEP)	0%	0%	0%	25%	17%	58%
N/A or Not Extension	17%	0%	0%	17%	0%	67%

When segmented by job role within Extension, we see more diversity of Six Americas classifications across individuals in Extension Agent and Extension Specialist/Professorial roles, while a large majority of respondents in programmatic staff, administrative staff, Extension administration, and individuals in other roles identify themselves in the Alarmed category (Table 19).

Table 19. Six Americas Classifications by Job Role in Extension (n=100)

Six Americas Classification → / Job Role ↓	Dismissive	Doubtful	Disengaged	Cautious	Concerned	Alarmed
Extension Agent	11%	6%	0%	17%	28%	39%
Extension Specialist/Professor	7%	7%	0%	14%	36%	36%
Programmatic Staff (program coordinator, assistant in extension, etc.)	0%	5%	0%	12%	16%	67%
Administrative Staff (business manager, administrative assistant, etc.)	0%	0%	0%	0%	9%	91%
Extension Administration (Associate Director, County Director, Experiment Station Director, etc.)	0%	0%	0%	17%	17%	67%
Other (please specify)	0%	0%	0%	0%	0%	100%
Non-Extension Faculty/Staff	0%	0%	0%	0%	0%	100%

When analyzed by respondents' home base of operations, again, most respondents fall into the Alarmed classification across all but one location, Tribal Community Based (Table 20).

Table 20. Six Americas Classification by Home Base of Respondent (n = 98)

Six Americas Classification → / Respondent Home Base ↓	Dismissive	Doubtful	Disengaged	Cautious	Concerned	Alarmed
County Office Based	5%	3%	2%	11%	19%	60%
Main Campus Based	0%	0%	0%	4%	17%	78%
Experiment Station Based	0%	25%	0%	13%	0%	63%
Tribal Community Based	0%	0%	0%	14%	43%	43%
Other (please specify)	33%	0%	0%	0%	0%	67%

To better understand Extension faculty and staff concerns about incorporating climate change into programming, we categorize those reported concerns within the Six Americas classification of respondents. Thirty-three percent (33%) of those respondents who are categorized as Dismissive and 25% of those categorized as Doubtful reported that they are not sure if climate change science is solid enough to base decisions on. Another common response among the Dismissive, Doubtful, and Disengaged is that climate change is not relevant to their program. Among individuals categorized as Cautious, Concerned, or Alarmed, the most common concerns regard access to information and curriculum, ability to present climate change information, and clientele reactions to contentious information (Table 21).

Table 21. Concerns About Incorporating Climate Change into Programming by Respondent Six Americas Classification (Percentages by Column)

Concern About Incorporating Climate Change ↓ / Six Americas Classification →	Dismissive	Doubtful	Disengaged	Cautious	Concerned	Alarmed
I am not sure that I can present complex climate change information accurately	5%	0%	0%	6%	21%	16%
I do not have access to climate change curriculum specific to my field	0%	25%	0%	13%	15%	16%
I have no concerns	10%	8%	0%	13%	4%	15%
I am concerned about the reaction of my clientele to climate change information	10%	0%	0%	6%	12%	13%
I do not have good sources of climate change information to share	0%	17%	0%	16%	17%	7%
Climate change is not relevant to my program	14%	25%	50%	10%	0%	7%
Other (please specify)	14%	0%	0%	10%	12%	5%
I am not comfortable presenting on a contentious topic to my clientele	5%	0%	50%	6%	12%	6%
I don't feel I have adequate support from Extension to work on this topic	0%	0%	0%	3%	4%	9%
I am not sure that climate change science is solid enough to base decisions on	33%	25%	0%	13%	2%	1%
I am concerned that presenting climate information would negatively affect my job	10%	0%	0%	3%	2%	5%
TOTAL	100%	100%	100%	100%	100%	100%

Across different clientele groups served by Extension, the distribution of respondents' Six Americas classification was similar, with most respondents classified as Alarmed (Table 22).

Table 22. Respondent Six Americas Group Classification by Respondent's Extension Clientele (n = 101)

Six Americas Classification → Clientele Group ↓	Dismissive	Doubtful	Disengaged	Cautious	Concerned	Alarmed
Youth	5%	2%	2%	8%	23%	62%
Adults	4%	3%	1%	10%	19%	63%
Natural Resource Users	4%	0%	0%	13%	8%	75%
Agricultural Producers	3%	6%	0%	11%	20%	60%
Rural Populations	4%	4%	2%	13%	25%	54%
Urban Populations	3%	3%	0%	6%	18%	71%
Other (please specify)	0%	0%	0%	0%	0%	100%
Indigenous Peoples	3%	0%	0%	8%	28%	62%

Relative to the national population, UArizona respondents are more than twice as likely to be Alarmed and less likely to be in all other groups. Just 11 percent of UArizona respondents are Disengaged, Doubtful, or Dismissive toward Climate Change. A smaller but still sizeable proportion of respondents are Concerned or Cautious (27%) compared to the national population (44%). These findings again present a clear interest among UArizona Extension personnel in addressing climate change. This suggests that there is opportunity to learn more about the perspectives of audiences less receptive to messaging around climate change and helping UArizona Cooperative Extension personnel deliver effective messaging to these groups while respecting their varied viewpoints and why they might hold them.

Our research also emulates the findings of the Six Americas research in that the Alarmed, while fully aware of the need for action, "do not know what they or others can do to solve the problem" which might partially explain why only 50% of Extension employees currently incorporate Climate Change in their programming (Figure 2), 35% (Figure 4) spend no time on climate-related professional development, and 50% (Figure 5) spend no time addressing climate change with stakeholders.

We believe that congruent with the findings of the Six Americas research, Extension would benefit from audience segmentation strategies for engaging the distinct categories of current and desired engagement with climate change. For example, while Doubtful and Dismissive groups oppose many climate-related policies, they are neutral-to-positive about rebates for solar panels and fuel-efficient vehicles (Leiserowitz et al., 2009 Figure 21) and agree with energy-efficiency improvements to homes (Leiserowitz et al., 2009 Figure 26), suggesting that there are mutually beneficial activities for both Alarmed and Dismissive alike.

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