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## Social justice in climate services: Engaging African American farmers in the American South

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## ABSTRACT

This article contributes to efforts to develop more inclusive climate services, understood as institutional arrangements and processes that generate and disseminate science-based climate information to promote improved preparedness to climate impacts. Discussion on equity in climate services tends to focus on the specific challenges of women and the poor in developing countries. We seek to broaden this scope by considering a farming population in the southern United States, whose particular circumstances are shaped by rural poverty as well as by racial discrimination, namely African American farmers. The research is based on a phone survey, in-depth interviews, and a workshop, and was conducted in collaboration with a civil right organization that helped the research team gain trust and entry to this community. The findings show that farmers in this study are vulnerable to drought given their relatively limited access to resources and risk management mechanisms. Climate forecasts can help these farmers move from coping strategies to deal with the effects of climate anomalies to proactive planning to anticipate and mitigate those effects. Research participants were able to identify a range of options for using such information in risk management decisions. Provision of climate services to African American farmers, however, must be consistent with existing patterns of knowledge management. These patterns are shaped by major trends stemming from the transformation of rural Southern life. Social networks of mutual assistance and knowledge transmission have been eroded by the outmigration of African American farmers from rural areas. Additionally, their relationship with public agencies is marred by a legacy of racial inequities, which makes it difficult for well-meaning projects involving the same agencies to establish legitimacy in this community. We discuss how insights from research findings and research process have guided programmatic efforts to involve African American

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farmers in climate services and outline lessons that can inform similar initiatives seeking to work with under-represented groups. In the conclusions we propose that engagement of this community challenges climate services to fully embrace a “social justice” perspective and an understanding of science as transformative of society.

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## Introduction

This article contributes to efforts to develop more inclusive climate services, understood as institutional arrangements and processes to generate and disseminate science-based climate information to support decision-making, promote adaptive management, and improve preparedness to climate impacts (Miles et al., 2006). We do so by focusing on a social group that has been neglected in the literature on climate vulnerability and adaptation, namely African American farmers in the American South. This study elucidates the distinctive historical experience and social position of African American farmers, bringing to light how social exclusion and inequality can hamper the development and dissemination of climate knowledge. It also informs programmatic efforts to engage under-represented users in climate services.

User participation is now widely recognized as essential to ensuring that climate information is salient to decision-making and applicable in real-life contexts (Romsdahl and Pyke, 2009). Beyond salience goals, collaboration between stakeholders and scientists has shown to foster trust, thereby enhancing credibility and legitimacy of climate services (Bartels et al., 2012; Dilling and Lemos, 2011). This realization has spurred a shift from a conventional “loading dock” model – whereby information and technologies were produced by scientists and then transferred unaltered to intended users – to a “co-production of knowledge” approach, which involves users in iterative processes of assessment and translation of scientific information (Cash et al., 2006).

This approach results from a growing movement within climate services that emphasizes science’s accountability to society (Agrawala et al., 2001) and tangible return for public investments in research (Dilling and Lemos, 2011). Such an approach reflects a commitment for making science not only more “usable” but also more “equitable”. This focus on user engagement begs the question of which and how users are to be engaged. Since the early years of climate services development, concerns have been raised as to whether and how such information and tools would benefit resource-poor and socially disadvantaged groups (Lemos et al., 2002; Archer, 2003; Blench, 1999). Research has shown that such groups are more vulnerable to climate shocks and lack the necessary material and social resources to prepare for and recover from them (Adger et al., 2009; Cutter et al., 2003; Whyte, 2013). They are also less able to get climate information in due time and in the right form and language (Pfaff et al., 1999; Broad et al., 2002; Lemos and Dilling, 2007; Roncoli et al., 2009). Furthermore, they lack access and clout to ensure that their concerns are taken into account in research agendas.

These findings have moved the topic of equity closer to the center of discussion concerning the development and assessment of climate services (Tall et al., 2013). For the most part, however, equity considerations have focused on the rural poor in developing countries (Moser, 2009), with gender dimensions given more attention than other kinds of social exclusions. For example, the Climate Change, Agriculture, and Food Security (CCAFS), a 10-year research initiative of the Consortium of International Agricultural Research Centers (CGIAR) promotes the use of climate information as a key factor in agricultural risk management, with an explicit commitment to address equity. However, the latter tends to be framed in terms of the challenges faced by women farmers, a focus that overshadows other aspects of their social diversity (McOmber et al., 2013).

Power imbalances in developed countries have received less emphasis, as recognized in a recent review of the literature on uses of climate information in agricultural decision making (Mase and Prokopy, 2014). In particular, the role of race has rarely been addressed. The case of African American farmers in the American South is emblematic of how, coupled with rural poverty, race shapes distinct experiences of climate vulnerability, through specific ways of engaging with land and locality. Race equally mediates the way farmers relate to institutions that provide information, technologies, and services to agricultural producers, including federal and state agencies, land-grant universities, credit and insurance companies, and commodity organizations. These historical legacies can mar the relationship between African American farmers and climate service providers, undermining trust and perceptions of legitimacy, which in turn influence the willingness to rely on climate information for making decisions.

A combination of environmental and economic forces has entrenched marginalities and disparities among rural producers in the American South. Since the droughts of the 1980s and subsequent structural changes in U.S. agriculture, availability of irrigation has become vital to business viability (Barlett, 1993). This trend has deepened in the last 10 years, with frequent droughts prompting an even greater expansion of irrigation in the Southern states (NASS, 2005). Since 2007, irrigated acres in Georgia have increased by one-third (Jonsson, 2013). As a result, for those farmers who can afford irrigation, droughts no longer result in financial liabilities. Even with an inevitable rise in irrigation costs, these expenses are offset by higher crop prices, reduced harvesting costs, and lower incidence of pests and diseases (Charles, 2012). On the other hand, farmers who have most of their holdings as “dry land”, remain vulnerable to drought and less competitive than those who have irrigation. It is reasonable to assume that many African American farmers are among those who lack irrigation given their small land-holding size and poor access to capital or credit (though this assumption cannot statistically be tested given that Agricultural Census does not cross reference irrigation with ethnicity).

We postulate that provision of appropriate and legitimate climate services can benefit these farmers, by enabling them to protect their operations against the negative impacts of drought and other climate extremes. As demonstrated by research conducted among African smallholders, dearth of resources does not equate with absence of options (Roncoli et al., 2009). Even poor farmers have knowledge and practices, developed through accumulated experience in particular localities, which enable them to adjust their crop management strategies to anticipated climate conditions. Scientific climate predictions can complement these farmers' repertoire of adaptive mechanisms, and when used in the context of known landscapes and available resources it can help mitigate risk and build preparedness (Roncoli, 2006).

This article draws on a study aimed to assess how climate information can be used by African American farmers in the Southeast U.S. and how they can be better served by and engaged in climate services. The findings are contextually framed by an overview of the historical and current realities faced by African American farmers and by a brief discussion of climate services for agriculture in the region. We then describe the study methodology and participant profile, stressing how, as in the case of climate services, involving this population in research activities requires specific and sensitive approaches. The presentation of research results is articulated in three sections, beginning with an example of farmers' vulnerability to drought, moving to examine how they access and may use weather and climate information, and ending with an broader perspective on the role of knowledge and community in risk management. We subsequently discuss how insights that emerged from both research findings and research process have guided programmatic efforts to involve African American farmers in climate services and outline lessons that can inform similar initiatives seeking to work with under-represented groups. In the conclusions we propose that engagement of this community challenges climate services to fully embrace a "social justice" perspective and an understanding of science as transformative of society.

## Research context

### *African American farmers in the Southeast U.S.*

A fundamental premise of human dimension research in support of climate adaptation is that the sociocultural context profoundly shapes the way climate information is accessed, processed, and integrated into decision-making (Roncoli, 2006). Historical influences configure not only the materiality of resource availability and technological options but also the meanings and attitudes that shape perceptions of salience, credibility, and legitimacy of climate information. This section elucidates this contextual backdrop to the current work and lives of African American farmers.

African American farmers are important actors in rural areas of the American South (de Jong, 2005; Gilbert et al., 2001). The states of Texas, Mississippi, Alabama, South Carolina, Louisiana, and Georgia together account for the majority (60%) of all African American farm operators (NASS, 2007). Most of them are family farmers, for whom farming is central to livelihood and community (Canizares, 2003). According to the 2007 Census of Agriculture (NASS, 2007) – over two thirds (69%) of African American operators own all of their land and almost half (44%) report farming as their primary occupation, even though a majority (69%) have also worked off the farm. These proportions are similar to those for all farm operators regardless of ethnicity (those percentages are respectively 69%, 45%, and 69%).

Compared to the general farming population, African American farmers have faced unique challenges due to racism, which have exercised a downward pressure on farm size and revenue base (Zabawa et al., 1990:107). A survey carried out in 2001 by the Federation of Southern Cooperatives/Land Assistance Fund (FSC/LAF), a civil rights organization, found that among a sample of 338 African American farmers in the southern U.S., over two thirds (69%) of respondents owned less than 100 acres (FSC/LAF, 2001). The 2007 USDA Census of Agriculture found that the average size of African American operated farms were 104 acres compared to 418 acres on all farms. Furthermore, almost all (93%) African American operators reported in the census that less than 50% of their income comes from agriculture, compared to 80% of all operators (NASS, 2007).

As with other small-scale farmers, African American farmers have declined in numbers over the last century (Conkin, 1929). But the numbers of African American farmers have fallen at a much faster rate than those of other farmers, particularly in the years leading up to and during the Civil Rights Era (1956–1971) (Wood and Gilbert, 2000). From 1900 through the 1940s African American farmers comprised about 14% of all farmers. By 1964 they made up 5.8% of all farmers and ten years later, in 1974, they had dropped to 2% (Merem, 2006; Reynolds, 2002). Overall, between 1940 and 1974, the number of African American farmers dropped by 93% (Daniel, 2013). Today only 1.3% of U.S. farmers are African Americans (NASS, 2007).

In a well-documented account of the plight of African American farmers in the 20th century, historian Pete Daniel (Daniel, 2013) examined the forces that precipitated this decline. As all other small-scale family farmers throughout the Southeast U.S., African American producers were deeply affected by the structural transformations of agriculture that occurred in the 1970s and 1980s and ushered in large-scale, capital-intensive, technology-driven production practices (Barlett, 1993; Conkin, 1929). But, in the case of African American farmers these challenges were compounded by barriers due to racial biases. Daniel's extensive archival research shows that civil rights gains obfuscated and even instigated a backlash campaign of intimidation and retaliation against African American farmers, especially those who were active in the civil rights struggle. Government institutions mandated to support agriculture, such as USDA agencies, land grant universities, cooperative agricultural extension services, etc. played key roles in this process, depriving African American farmers of access to assistance, technologies, and information that benefited white farmers in the region (Grim, 1996; Munoz, 1985; Jones, 1994). As re-

cently as 2001, respondents to the FSC/LAF survey reported having been discriminated against in accessing USDA services, because of age (43%), small landholding size (59%), but especially race (77%). Claims of racial discrimination were the basis for the successful *Pigford v. Glickman* class action lawsuit against the USDA. The lawsuit covers years well past the civil right era, between the early 1980s and the late 1990s, and claims that African American farmers failed to receive “fair treatment” when seeking representation on community and county committees, acreage allotments, farm loans, technical advice, and other services (Cowan and Feder, 2011; Glickman et al., 1997).

In addition to disparities in the provision of information and services by federal and state agencies, the historical segregation within the Southern land-grant university system had also sequestered resources away from the Historically Black Universities established in 1890 that serve African American farmers (Daniel, 2013; Hart, 2001; Whayne, 1998; Huffman, 1981; Harris, 2008). In several Southern states, the cooperative agricultural extension service actively resisted integration and opposed agent and farmer participation in the civil rights movement (Daniel, 2013, 2007). Though efforts have been made in recent years to rectify past inequalities, African American farmers continue to be overlooked by mainstream extension services due to the small-scale, part-time, diversified nature of their operations (Harris, 2008). Some of the crops commonly grown by African American farmers, such as turnip greens, collards, squash, etc., attract less research funding and institutional support (ex. crop insurance, subsidies, loans, etc.) compared to the major commodity crops. Inequalities are also reported in marketing, with African American farmers complaining that they are often paid less for their crops than their white counterparts (Gilbert et al., 2001; Wood and Gilbert, 2000).

The legacy of racism and dearth of resources has translated into more limited access to risk management mechanisms, such as crop insurance and irrigation (Grim, 2002). For example, only one third (38%) of the farmers polled by the FSC/LAF (2001) survey had crop insurance and still less (16%) reported having revenue insurance. While, over half (63%) of farmers reported having access to some irrigation, only 23% had the means to operate it. Access to information for risk management is also limited, due to the fact that African American farmers tend to live in remote rural counties, and are of advanced age, with an average of 60.3 years compared to 57.1 years for all farm operators, and more than one third (37%) of them are over 65 years of age. Additionally, the Agricultural Census shows internet access among African American farm businesses to be much lower (34%) than for all farm operators (57%) due in part to the age and location of these farmers (NASS, 2007). Therefore web-based information systems, such as those that are typically used by the SECC, NIDIS, and other climate services and early warning systems, are less likely to serve African American farmers.

Despite this backdrop, recent years have seen promising signs. The Agricultural Census data shows a 9% rise in numbers of African American farmers between 2002 and 2007 (NASS, 2007). This increase may reflect more accurate recording by the statistical services as well as greater willingness by this population to reveal information and be visible to government agents. In implementing the 2012 Agricultural Census (whose data is still being analyzed at the time of writing) the National Agricultural Statistics Service (NASS) has sought to improve counting of minority farmers by enlisting the help of organizations such as the FSC/LAF as well as others representing Native American and Latino farmers. Parallel to these efforts, positive developments in farm policy and civil rights under the Obama administration have created a more favorable policy environment for minority farmers. These include the creation of a Minority Farm Register to improve access to information on government services among underserved groups as well as training and hiring of USDA staff to address discrimination complaints and to expand outreach among these groups (see: [http://www.ascr.usda.gov/cr\\_at\\_usda.html](http://www.ascr.usda.gov/cr_at_usda.html)).

These reforms may further encourage the emerging upward trend reported by the Census and by other studies. Referring to Delta County, Mississippi in the late 1990s, Wood and Gilbert (2000:61) noted that there was “a substantial group of experienced and potential black farmers who are currently not farming but would like to re-enter agriculture if conditions improve, in particular if they can get their production loans from the USDA...” Statistical analysis of data from the second half of the 20th century also suggests that minority row-crop farmers are less likely to leave their farms if prices for key commodity crops (e.g., cotton, corn) increase (Barkley, 2011). Recent ethnographic research shows evidence of rising interest among African American youth to take up farming, prompted by a range of factors. These include more profitable opportunities created by urban demand for food that is produced by locally-based small-scale farmers as well as a social commitment to reconnect with their own communities and cultural roots (Bartels et al., 2012). Finally, agriculture continues to be a significant way of supplementing nutrition and incomes for African American families in rural areas where employment options are limited. Some of these “part-time” farmers may fall outside official counts, as they do not identify themselves as “farmers”, particularly if their production output is small or mostly for home consumption (Lewis, 2013).

In sum, the distinctive characteristics and collective experiences of African American farmers call for customized ways of reaching and engaging them in climate services programs. Customization means paying attention to how historical marginalization and institutional estrangement have shaped risk management options and as well as acknowledging the resourcefulness and potentialities inherent to a community that has such deep ties to agriculture in the American South.

#### *Climate services for agriculture in the Southeast U.S*

This section briefly outlines the scientific and institutional aspects of a climate-based decision support system for agriculture that has been operating for the last 10 years in the region. Originally targeting mostly larger-scale conventional growers, the program has recently broadened its scope and diversified its activities to reach out to smaller-scale underserved farmers. While not preponderant in terms of numbers, cultivated acreages, or farm output, these groups play key roles in maintaining vibrant, diverse farm communities that bridge the rural–urban divide (Bartels et al., 2012; Furman et al., 2011).

Though climate science has not conclusively determined whether future climate changes will bring about more frequent or severe droughts it is likely that farmers in the Southeast U.S. will continue to face considerable climate uncertainties (Kunkel and al, 2013). Global circulation anomalies forced by tropical sea surface temperatures (SST) remain among the most important drivers of climate variability in the southeastern U.S. (Seager, 2007). Climate scientists have come to recognize connections between SST in the equatorial Pacific and seasonal climate variability, the phenomenon known as the El Niño–Southern Oscillation (ENSO) (Goddard et al., 2001; Piechota and Thomas, 1996; Goddard and Dille, 2005; Thompson, 1992). For example, in the Southeast U.S., El Niño (high Pacific SSTs) typically brings more rainfall and cooler temperatures in the fall and winter months, while La Niña (low Pacific SSTs) brings warmer and much drier conditions during fall, winter, and spring.

Several information systems have been created to capitalize on these advances and to disseminate climate predictions to decision makers in a wide range of sectors. They include the National Drought Information System (NIDIS) and the Regional Integrated Science and Assessment programs (RISA), both of which are supported by The National Oceanic and Atmospheric Administration's (NOAA) Climate Program Office (Miles et al., 2006; McNie, 2013; DeGaetano et al., 2010). Among the RISAs, the Southeast Climate Consortium (SECC) is an interdisciplinary research consortium mandated to develop climate-based decision support systems for agriculture and natural resource management for Florida, Georgia, Alabama, and the Carolinas. The SECC approach to delivering information to farmers has centered on two mechanisms, including (a) an interactive website (<http://www.agroclimate.org>) that provides county and crop specific tools for agricultural decision making in different climate scenarios (Breuer et al., 2008) and (b) active collaboration with extension services based at the land-grant universities comprising the SECC (Crane et al., 2010; Bartels et al., 2011).

However, while internet and extension are effective in reaching the SECC established clientele of large conventional producers, exclusive reliance on them risk marginalizing underserved groups, such as African American farmers, who have low rates of internet use and rare contact with county agents. This realization prompted the SECC social science team to carry out research aimed to identify more appropriate ways of serving and involving these farmers. Beyond the regional focus on the Southeast U.S. the study also intended to contribute to improving the ability of national systems – such as NIDIS – to integrate alternative experiences and understandings of drought into monitoring and prediction efforts.

## Research design and study population

### Methodology

Research among historically disadvantaged groups requires mediation by institutions that are trusted by those communities. The SECC research team partnered with the Federation of Southern Cooperatives Land Assistance Fund (FSC/LAF), an organization with a 50-year history of promoting civil rights in the rural South. It currently supports about 100 cooperatives and 10,000 family farmers with programs focused on sustainable agriculture, economic development, and land ownership retention. The partnership was developed over the course of several years, during which SECC researchers participated in FSC/LAF events and the study was jointly designed and built on previous research by the FSC/LAF.

The research design combined quantitative and qualitative methods. In October–November 2009 a phone survey was conducted, with students from Morehouse College (a Historically Black institution) serving as enumerators. The sample frame consisted of 160 numbers on the FSC/LAF farmer-member roster. Among members who answered the phone call and responded affirmatively to the question of whether they identified themselves as African American and whether they currently farm or have farmed in the last two to three years, a sample of 98 farmers, located in Alabama, Arkansas, Georgia, Mississippi, South Carolina, and Tennessee, agreed to participate (see Fig. 1).

Face-to-face interviews were also conducted between July 2010 and December 2011 with 47 farmers in Alabama, Georgia, Kentucky, Mississippi, and South Carolina using the same selection criteria as the phone survey (self-identity as African American and engagement in farming at present or in recent years). The interviews were conducted by one or two members of the SECC team (both white women), often accompanied by an African American, FSC/LAF staff member (see Fig. 2).

Participants were purposely recruited among FSC/LAF members and consisted of individuals who were full-time or part-time farmers as well as willing to participate in the interview. The use of purposive sampling and open-ended interviewing is well-established in social science research among farmers (Crane et al., 2010; Kroma, 2006; Alkon, 2008; Ingram, 2008; Tar-noczi and Berkes, 2010). We recognize that recruitment through the FSC/LAF limits the sample's representativeness, as cooperative members (and those among them who agreed to participate) may have characteristics and orientations that are not shared by all African American farmers. But conventional sampling would have been unlikely to obtain cooperation and trust within a community that has suffered prejudice and injustice in the past (Boissin et al., 2009; Feldman and Ingram, 2009). The open-ended nature of interviews facilitated rapport and enabled sensitive issues to emerge, while also allowing for more nuanced understandings of perceptions and attitudes (Hayman et al., 2007). Interviews were audio-recorded (with participants' permission), transcribed, and coded by three research assistants, and transcripts were analyzed thematically by the research team.

Additional information was collected through complementary activities. They include a workshop, held in Albany, Georgia in November 2011 and attended by 45 participants. The workshop elicited farmers' experiences with past climate variability and stimulated discussion on whether and which climate information can support adaptive management (Bartels



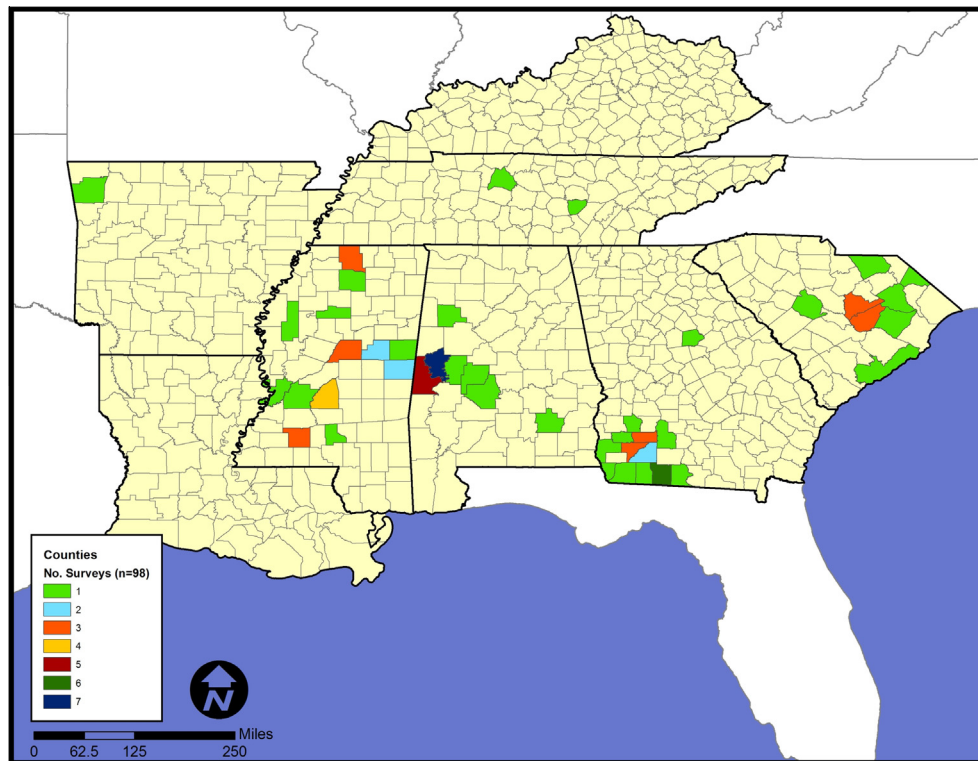


Fig. 1. Map of the Southeastern U.S. showing number of phone survey responses per county.

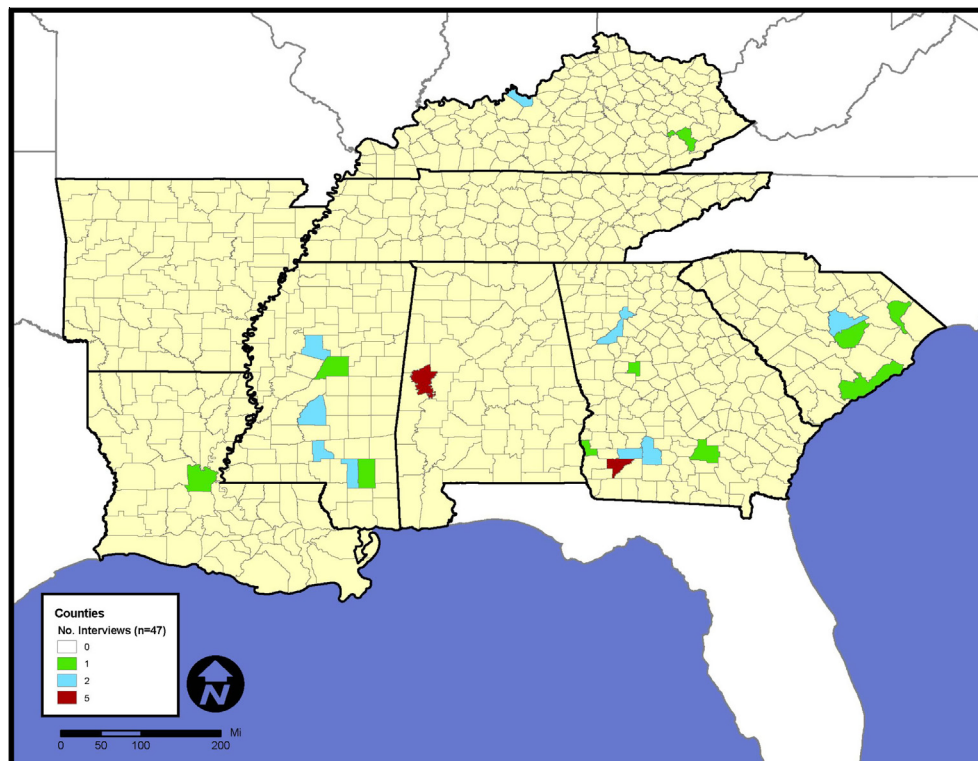


Fig. 2. Map of the Southeastern U.S. showing number of interviews per county.

et al., 2012). Phone interviews were also conducted with a purposive sample of 9 scientists from 4 RISA programs who work with underserved populations, including Native Americans, First Nation groups, and Latino farmers, to gather and compare lessons learned in working with these communities.

### Participants' profile

The study participants' profile reflects that of the general population of African American farmers (NASS, 2007), who are mostly male and elderly. Most of them are experienced farmers, with over half having been involved in agriculture for 16 years or more, even though some had left farming to work or study, before coming back to it after retirement (Fig. 3).

Most respondents engaged in diversified production systems, dominated by either row crops or produce, with a prevalence of the latter. Acreages were small and access to risk management mechanisms, such as insurance and irrigation, were limited. Farmers who grew mostly produce were more likely to lack insurance (77.3% of those interviewed and 87% of those surveyed) compared to those growing mostly row crops (46.7% of those interviewed and 44% of those surveyed), not surprisingly given that insurance is less available for produce. On the other hand, row crop farmers had more limited access to irrigation (46.7% of those interviewed and 83.3% of those surveyed) than produce growers (36.4% of those interviewed and 76.6% of those surveyed). The higher access to irrigation among interviewees may be due to the fact that interviews allow more nuanced responses (e.g., farmers with only partial irrigation, or with irrigation but no money to operate it, may have answered "no" to survey questions about irrigation). During interviews as well as the workshop, farmers pointed to several factors that account for their more limited access to irrigation, including the small size and fragmented nature of landholding, the prevalence of leasing (particularly among row crop growers), and racial discrimination in the provision loans and government assistance (Bartels et al., 2012).

As is the case with other family farmers in the region (Barlett, 1993), the risks, costs, and low returns associated with agriculture required diversifying into other sources of livelihood. Among farmers surveyed, only 11.2% relied on agriculture for most (75%) of their livelihood, and over half of them (56.1%) derived less than 25% of their income from farming. Reliance on off-farm earnings was especially prevalent among produce growers, with almost three fourths (72.4%) of them drawing less than 25% of their income from agriculture.

Regardless of production or livelihood profiles, interviewees expressed how farming constitutes an integral aspect of their sense of self. Whether they have been farming all their lives, returned to it after retiring from other jobs, or just recently taken it up, respondents talked about farming as a way of life, rather than a business. Similar sentiments were voiced by white family farmers in Georgia (Crane et al., 2010), but among African American farmers, relationship to (and ownership of) the land, as a source of sustenance and a nexus of community, has special meanings that are grounded in the historical experience of slavery (Byrnes, 2013). Land loss and exit from farming due to climate shocks may therefore have psychosocial effects that are far more severe than is measureable in economic terms.

## Research findings

### Vulnerability to drought

This section provides a succinct account, based on phone interviews with LSC/LAF members, on how climate extremes may affect African American farmers and the viability of their farm operations, using a recent drought as an example

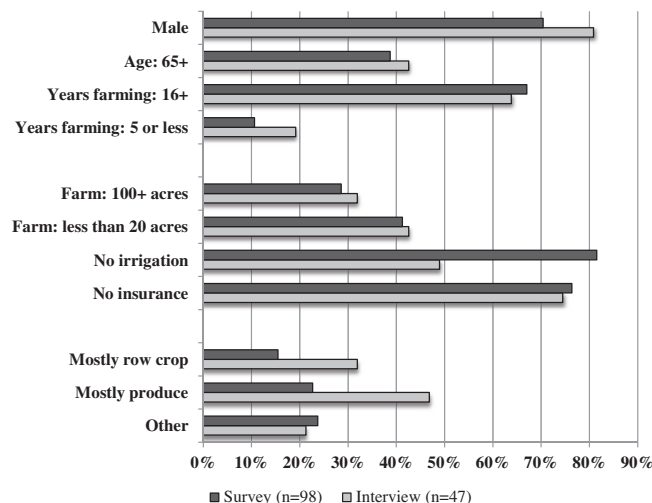


Fig. 3. Profile of African American farmers surveyed and interviewed.

(Furman et al., 2014). Even though the Southeast U.S. is among the wettest areas in the U.S. and records for the last century indicate an overall 10% increase in average rainfall (Asseng, 2013), the region experiences high levels of year-to-year variability, including hurricanes, late freezes, high temperatures, and droughts (SECC, 2008; Stooksbury, 2003; Barber and Stamey, 2000). Severe droughts occurred in the early 1900s, in the 1920s, 1930s, and 1950s. A drought in 1954 was the most severe in the 20th century, remaining a prominent reference point for farmers' perceptions of climate risk (Crane et al., 2010; Roncoli et al., 2006; Narisma et al., 2007). Droughts contributed to the 1980s farm crisis, during which many family farmers in the Southeast and elsewhere in the U.S. sold or lost their land (Barlett, 1993). Intermittent drought occurrences followed most notably between 1998 and 2002– their severity linked in part to the increase in population densities in the South (Seager et al., 2008).

According to the US Drought Monitor (see: <http://droughtmonitor.unl.edu/>), a severe drought began in the spring 2007 and, as it progressed, affected Georgia, Alabama, the Carolinas, and parts of Tennessee. The drought lasted, in different places and to varying degrees, until spring 2009. Most (78.6%) of the farmers surveyed reported living in a drought-affected area. Among these farmers, 75 answered an open-ended question about the effects of the drought on their operations. Many responses (46.7%) pertained to yield reduction for specific crops, including produce, corn, peanut, cotton, and to a lesser extent wheat and soybean, while a few (17.3%) referred to livestock impacts. Farmers who reported losses included most (91.7%) of the row crop farmers and two thirds (74.0%) of the produce farmers. The greater vulnerability of the former can be explained by the fact that row crops allow less flexibility in management strategies compared to produce farming, which is characterized by smaller acreages and greater crop diversity (Lin, 2011; Furman et al., 2014).

Among farmers who reported drought impacts, 67 responded to a question about how they coped with those impacts. Almost half of them (41.8%) did not do anything different and simply went on farming, hoping for better results the following year. The rest tried to deal with the aftermath of the drought in various ways, mostly related to management of financial resources and farm operations. Among farmers who did take measures to cope, over half (58.1%) employed financial strategies, such as diversifying income sources (including selling livestock), using savings, and borrowing money. Agricultural responses included changing or diversifying of cropping systems (16.13%), scaling back of the farm to reduce costs (22.58%), and replanting the same year (19.35%).

#### *Access to and uses of climate information*

In this section, we explore how African American farmers access weather and climate information and whether and how they can use it to manage risk when making agricultural decisions under conditions of climate uncertainty. Most interview participants (85.1%) expressed interest in information and technologies that can help them move from coping with losses after a drought to preventing or mitigating such losses prior to a drought. Their comments suggest an appreciation for anticipatory planning and an understanding of both the potential and the limitations of predictive information. As noted by a farmer from Attala County, Mississippi:

*Any projected weather data that you can get will better your chances of having a better crop. Sometime they get it right; sometimes they get it wrong. Chances are if you don't plan, you plan to fail (Farmer 5).*

As do other rural producers, African American farmers actively seek weather and climate information to guide their agricultural decisions. Most survey participants (83.2%) cited the television as their primary source, while one third relied on the radio (33.7%) and one fifth on newspapers (21.1%). Extension and internet – the SECC main outreach mechanisms – were less commonly used (by 11.6% and 14.7% of the respondents respectively). Notably, the second most prevalent source was the Farmer's Almanac, which publishes weather information, short-term forecasts, seasonal climate forecasts, and suggests planting dates based on the moon cycle (see: <http://www.farmersalmanac.com/>). It was mentioned by 38.9% of African American farmers surveyed, compared to a small minority of white farmers from southern Georgia queried on the same subject (Crane et al., 2010). The Almanac is a familiar reference among African American farmers, even among those who no longer use it. Many reported parents and grandparents habitually consulted it before making farming decisions. One farmer recalled how it always sat on the dashboard of her father's tractor. Some farmers reported consulting it, less for utilitarian reasons – to inform management strategies – than as a way to stay connected to the old folks and their ways of farming.

Similarly to other farming groups (Furman et al., 2011; Crane et al., 2010), African American farmers rely mostly on real-time information or short-term weather forecasts to make management decisions, such as when to plant or apply pesticides. Yet, when presented with a hypothetical seasonal climate forecast in the course of interviews, 31 of the 47 respondents were able to provide examples of how they could use such information (Fig. 4). The most common response, mentioned by almost half (44.1%) of interviewees, was changing crop type or crop variety to those that are more tolerant of either dry or wet conditions, depending on what was predicted as more likely. Not surprisingly, this response was more common among produce farmers (46.2%) than row crop farmers (11.1%), for whom switching crops is more difficult due to the specific infrastructural and equipment needed to plant and harvest them. Some farmers (23.5%) referred to adjusting land preparation, including amount and intensity of tillage or using bottomland or upland in anticipation of scarce or heavy rains. This option was again discussed by a greater proportion of produce farmers (30.8%) than row crop farmers (16.7%), as it is more feasible for the smaller holdings that characterize vegetable production (Furman et al., 2014; Wall and Smit, 2005). A few produce farmers also envisioned adjusting irrigation (14.7%) in anticipation of a drought.



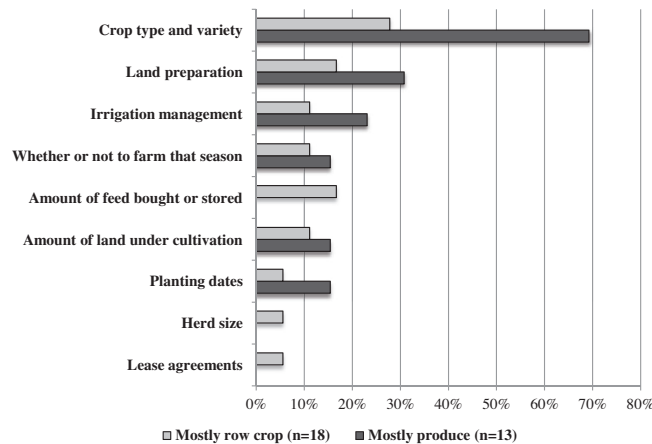


Fig. 4. Decisions potentially influenced by climate forecasts, by production type of interviewed farmers ( $n = 31$ ).

Seasonal climate forecasts were also discussed during a farmer workshop held in Albany, Georgia, and attended by African American producers of row crops (13), vegetables (14), pecans (3) and livestock (2). Participants included established farmers as well as individuals that had recently started farming after inheriting family land. During the workshop participants, working in small groups, were presented with different climate scenarios (e.g., wetter than normal season vs. a drying than normal season) and asked to develop and debate adaptive strategies. This discussion revealed that experienced farmers were better able to translate a climate forecasts into a potential strategy, while most newcomers had difficulties doing so (Bartels et al., 2012). This finding highlighted the possibility that farmer-to-farmer knowledge transmission and learning networks, where farmer knowledge is shared, may constitute key mechanisms for making climate services actionable and, more generally, for promoting preparedness in this farming community.

#### Knowledge acquisition and adaptation

This section presents insights on the role of cultural knowledge and social networks in risk management that emerged during interviews. While most study participants recognized the potential of climate forecasts, as with other farming groups (Furman et al., 2011; Crane et al., 2010), for such potential to be realized it is important that information is communicated in ways that fit how farming knowledge is habitually acquired and exchanged. These patterns center on established practices and networks that are honed through years of farming in local environments and communities. For example, a farmer from Green County, Alabama discusses how he knows when to plant:

*Well sometimes, you know, you listen to nature and environment around you and you know you pretty much get a general feeling when it's a good time... See they go by a scientific thing. I go by experience thing. And it works. It works. You got a bird out there he'll tell you when to plant... They sing to you (Farmer 20).*

The role of experiential learning was corroborated by elderly farmers interviewed, most of whom could not actually remember ever “learning” how to farm. Rather, they explained, knowledge was absorbed by working side-by-side their parents and by observing seasons unfolding and crops growing in specific settings.

When queried about sources of farming knowledge about two thirds (64.4%) of the survey participants mentioned personal experience and experimentation. Also important were social networks, including family members (57.8%) and other farmers (35.6%). One third (35.6%) of them cited workshops and a few (15.6%) referred to extension based at Historically Black institutions, like Tuskegee University in Alabama or Fort Valley State University in Georgia, which they considered as more responsive to small-scale, resource-poor farmer and less directly linked to “big business” and “big government” than the flagship “white” land-grant schools. Some farmers (17.8%) specifically cited cooperatives among sources of agricultural information (Fig. 5). These latter two responses may be biased by the fact that respondents were recruited through the FCS/LAF, which offers such opportunities and resources to their members.

Community ties provide not only information but also crucial mechanisms for coping with climatic, agricultural, or financial stress, as reported by almost a third (30.8%) of the interviewees. A row-crop farmer from Marion County, South Carolina explains how these social relations are grounded in a shared past and present life in close vicinity of other farmers:

*I have got really good neighbors... because the same folks that I deal with now used to work with my parents when I was younger. So I guess that just makes us closer because we have grown up together... And at the farm, when we need help, they come over and vice versa... that's why I would say I am really fortunate and blessed... We help the neighbors with something, like something they want done with a car, truck, tractor, that kind of equipment... So that's how we kind of stay in communication... I will just walk over to these guys' property and see what they are doing... how their crop looks... and one big thing, I don't have an irrigation system, but they do and I could tap into it (Farmer 37).*

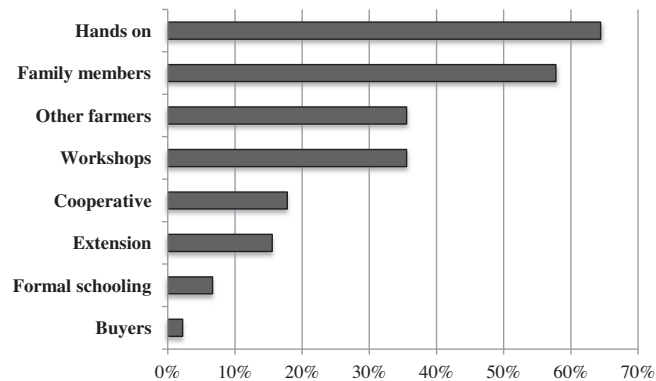


Fig. 5. Sources of agricultural information of interviewed farmers ( $n = 45$ ).

Other farmers similarly described how equipment, resources, and labor were pooled among farming families when weather conditions resulted in shortened timeframes for planting or harvesting.

The importance of social networks was further highlighted as farmers discussed how they coped with production and livelihood shocks, including those stemming from climate variability and weather hazards. Among those who addressed this question during interviews ( $n = 30$ ), almost half (43.3%) relied on assistance from family and community, the single most frequently mentioned strategy, over use of savings and insurance payments (each cited by 30.0% of the interviewees), institutional loans (20.0%); and scaling down operations (23.3%).

Yet while they remain key to the viability of farming operations and rural households, these social networks are far from static, they have been affected, as with many other aspects of Southern rural life, by the trends and transformations of the 20th century. Several elderly farmers qualified that community solidarity is no longer as strong as it used to be. A produce farmer from Green County Alabama comments;

*When I was young, we was on a plantation... 10 or 12 families. When we was done growing or pick'n cotton... we would go help the neighbors out. Then we would go and help the other neighbors out. We worked together that way. No one helps any-more. Too much drugs, television, computer... (Farmer 22).*

Similar sentiments were expressed by participants at the workshop. Farmers explicitly referred to the outmigration that depopulated African American rural communities in the 1950s and 1960s as the primary element that disrupted the agricultural knowledge flow between generations (Bartels et al., 2012). Because of this fracture, the participant stressed, those who are starting out to farm today can no longer rely on the vast suite of farming skills and familiarity with the Southern climate and environment that guided their grandparents. Furthermore, a whole new set of information technologies has replaced the experiential and inter-generational learning that constituted the old ways of knowing, eroding the social fabric and exposing young people to new risks.

While lamenting the erosion of community and its associated repertoire of knowledge, participants expressed misgivings towards public agencies mandated to provide technical and institutional support to farmers. Many farmers noted that while relationships with local extension agents and government employees of any race may be cordial, the system they operate in is still biased against African American farmers. Unlike the explicit discussion of social change within their community, racial discrimination was invariably referred to obliquely, hinted at rather than explicitly denounced, leaving it to the interviewer to “fill in the blanks” (a reticence possibly due to the fact that the researchers were white and associated with mainstream land-grant universities). For example a farmer from South Georgia elaborated on his relationship with a (white) county agent:

*We know he's all right, he's good, if you needed assistance he's there... but... Here is a prime example. At the Peanut Show they give door prizes. Three years ago I won 2<sup>nd</sup> place, which was a trip to Panama City for a two-day peanut conference-all expenses paid and... I haven't gotten it yet... (Farmer 13).*

The failure to deliver the prize may or may have not been intentional, but was interpreted negatively in the context of a lifetime of experiencing discrimination at the hand of government employees. In this book, Daniel (Daniel, 2013) reports similar incidents, whereby African American farmers were deprived of awards or honors they had earned without explanation. In response to a query on where he could get assistance, the same farmer expressed his skepticism about the chance of being treated fairly by government agencies, like the Farm Service Agency (FSA), despite progress on civil rights and the election of the country's first African American president:

Interviewer: Can you contact FSA?

Farmer 13: *Ha! (laugh)... it is sad... that we have come this far but... when programs come about... when stuff comes out like that, it is always given to others first but when I hear about it, [the time to apply] is almost over (Farmer 13).*

Comments, such as these point to the key role that the selective management of information – about funding opportunities, loan requirements, acreage allotment, technical advances, commodity prices, etc. – has played in discrimination against African American farmers by federal agencies, as reported by historical accounts (Daniel, 2013) and recognized by the *Pigford vs. Glickman* ruling. This precedent needs to be taken into account in approaches to enhance climate preparedness among African American farmers through the provision of information, particularly when such information is produced and delivered by the same agencies, universities, and extension services that discriminated against them in the past.

The risk that past injustices, or even unintended incidents of broken promises and unmet expectations, may hamper efforts to build rapport with the intended beneficiaries was emphasized during interviews with RISA researchers who are working with other underrepresented communities (Latino farmers, Native Americans, First Nation groups, etc.). Every one of them advised that efforts to provide these groups with credible and legitimate climate information should be guided by awareness that, as one interviewee put it, “*there is a lot of baggage that you kind of walk into...*” (Scientist 3). Regardless of the scientist personal responsibility or orientation, when this “baggage” implicates his/her institution, it must be acknowledged and addressed with humility and sensitivity.

## **Towards more inclusive, equitable climate services**

### *Current engagement*

The insights gained through the research – and particularly an understanding of the social context of knowledge management among African American farmers – informed the development of the SECC programmatic agenda and engagement efforts. In this section we outline these interactions between research and outreach activities.

An analysis of historical experience and population profile determined that the SECC established channels of information dissemination – its website and extension – was unlikely to reach the majority of African American farmers. Like many other farmers in the southern US (Crane et al., 2010), study participants reported using media outlets (TV and radio) as sources of weather and climate information. However, participants’ comments indicated that, in responding to this question, they mostly referred to short-term forecasts and real-time information (“weather”) – which is what most TV weathermen report on – rather than seasonal predictions or longer-term projections (“climate”). Using these media outlets is, however, outside the reach and means of modestly funded research projects such as the SECC. The Farmer Almanac, the second most frequently mentioned information source is equally out of range as a potential channel, as its predictions (including both short-term and long-term forecasts) are calculated according to an undisclosed formula and do not incorporate external input.

In-depth interviews and ethnographic observation highlighted the pivotal role that interpersonal communication and social interaction play in the way farmers exchange and gain information. These findings were used by the SECC team to develop a customized approach based on a double-pronged strategy, including face-to-face engagement at farmers’ meetings (through exhibits and demos), as well as regular news feeds and updates delivered through a trusted organizations, such as the FSC/LAF. Several workshops have been conducted with FSC/LAF farmers and staff as well as extension personnel at 1890 land-grant institutions, such as Fort Valley University, aimed at increasing basic climate literacy (e.g., ENSO effects in the region, long-term climate trends, potential impacts on relevant crops) and adaptive options (e.g., low-cost irrigation, soil and water conservation, etc.). Social learning activities during workshops, such as a timeline activity where farmers shared past experiences navigating difficult climatic events and breakout sessions on adaptive options for different production systems, helped foster farmer-to-farmer knowledge sharing and stimulate exchanges among farmers, extension, and scientists (Bartels et al., 2012).

In support of these outreach activities, the SECC team has developed information dissemination strategies that mirror the habitual ways the FSC/LAF communicates with its members, focusing on two kinds of products: (a) succinct climate outlooks – periodically updated – that discuss predictions for the upcoming season, designed to be easily integrated by the FSC/LAF and extension programs at 1890s institutions into printed newsletters and email messages regularly sent to members; (b) more detailed articles and fact sheets that provide in-depth information, meant to assist farmers and farm support personnel to interpret climate forecasts and devise management responses, to be distributed at conferences, workshops, meetings, and field offices (Boudreau et al., 1403) (<http://www.agroclimate.org/seclimate/extension-resources/>). Besides addressing constraints in internet access, the printed medium is well suited to longer-term climate information, enabling farmers to process and review it overtime, cross-checking it with their interpretations of the unfolding of the season.

Finally, in working with all stakeholder groups, but particularly with underserved populations, engagement and partnerships should be considered as more than a means to an end, a strategy for improving the production and delivery of information. Rather, it is also a way of redressing injustices of the past, as one of the RISA scientists interviewed emphasizes:

*At first you see [engagement] as a way to make the information more effective, but in the end you see that these groups are always falling through the cracks- so it is also a matter of equity (Scientist 2).*

Collaboration is an opportunity to restore trust and build credibility, particularly when government agencies and mainstream extension services are involved. But realizing this potential requires sensitivity to how these farmers may perceive information that is produced and provided by institutions which, in the past, did not have their interest at heart. A commitment – expressed through patience and persistence – to the sometimes challenging, time intensive process of listening and learning from the community is essential to overcoming this problematic legacy. As stated by another RISA scientist:

*"They have experienced great pains working with federal agencies; things that they have been promised and took forever to get accomplished or someone just dropped the ball and nothing ever happened . . . so many people burned in the past with scientists coming in showing up for a year and disappearing. That is the biggest challenge. It is something that we have struggled with for years. . . One of the biggest things you can do wrong in this kind of work is **stop showing up** (emphasis added)." (Scientist 3).*

Interviews with other RISA projects that seek to engage Native American and Latino communities showed considerable overlap in experiences with those of the SECC team working with African American farmers.

### *Moving forward*

In this section we outline lessons that emerged from the research findings as well as from the research process, proposing some ideas for more effectively engaging underserved populations into climate services.

#### *Partnership development*

Working with populations that have experienced prejudice and inequities such as African American farmers, requires collaboration with trusted organizations. However, there are often multiple groups that claim to represent these communities, each with its own history and agenda. The first step in the engagement process, therefore, should be an institutional assessment to determine which group has greatest legitimacy, institutional capacity, outreach potential, and interest in climate services, and how best to engage them. If several potential partners are identified, it is essential to understand the past history and current status of relationships among them to assess whether they are able to effectively work together. When collaborating with partner organizations on grant proposals, budgetary arrangements should be as transparent as possible and consistent with the key role partners play in obtaining access to and trust of their constituencies, as minority organizations are weary of being involved in collaborations for tokenism's sake.

#### *Long-term commitment*

Establishing trust among rural underserved communities requires a significant commitment of time, given the importance of inter-personal communication. Participation at meetings attended by these farmers or events organized by partner groups is important, not merely as opportunities to "disseminate information" but, especially, as a way of expressing scientists' willingness to listen to and learn from farmers' experience. Face-to-face and frequent interaction, including regular updates and follow up communications, are crucial for building credibility and showing accountability, as they enable farmers to ask questions and get clarifications when things do not go as expected. However, this kind of time-intensive, long-term engagement is often discouraged by short-term funding cycles and academic incentive structures. Hence, there is a need to educate funding agencies and university administrations about the time and personal investment required for developing demand-driven, equity-oriented climate services, so that it is taken into account in project evaluations and performance reviews.

#### *Constitution of learning communities*

The experiences reported by study participants illustrate the centrality of social relations and community solidarity in managing risk and coping with stresses. This existing base of social relations and situated knowledge provides a canvas for building regionally-focused learning communities to facilitate the sharing of information and experiences. Building blocks of these networks include initiatives that link together farmers of different communities or generations with farm support personnel (field agents, extension officers, etc.), and scientists involved in climate services development. An example of this is the climate learning network organized by the SECC in partnership with cooperative extension and row crop growers (Bartels et al., 2012), which creates interactive spaces for experience sharing and exploring adaptive options. Another example of a learning network is a mentorship program, which matches beginner and experienced farmers in mutual relationships. Mentors impart their agricultural knowledge to young farmers, while the latter use their greater internet and computer literacy to assist older farmers in accessing or managing information. Initiatives of this kind can support the recent upward trend in the numbers of African Americans among the US farming population.

#### *Actionable knowledge and policy advocacy*

While climate information can help enhance preparedness, it is rarely sufficient to attract and sustain farmers' attention, particularly given that most agricultural decisions occur within a timeframe that is much shorter than the seasonal or inter-annual scale of climate variability. Climate services, therefore, cannot be limited to dissemination of climate forecasts, but must incorporate opportunities to experiment with adaptive options. The partnership between the FSC/LAC and the SECC has broadened to include activities aimed to identify and test promising technologies, including low-cost (e.g., pond-based) irrigation and integrated systems for high value production (e.g., aquaculture providing water and nutrients to hoop house production). Efforts to develop adaptive technologies must consider the diversity of production systems (e.g., row crops, produce, livestock, trees, etc.) that characterizes African American farm operations, to target their specific vulnerabilities. Technical solutions alone, however, are not sufficient to enhance resilience among small-scale underrepresented farmers. Climate services partnerships should include organizations that engage in policy advocacy, such as the FSC/LAF, which address



underlying barriers, such as land loss and racial bias. This may entail a shift, whereby climate forecasts play supporting role rather than the lead role in climate services.

## Conclusion

In this paper we offer a novel perspective on equity in climate services for agriculture by focusing on a farming population that has a unique historical experience as well as specific knowledge management habits. Working with African American farmers in the Southeast U.S. compels us to adjust our conceptual and programmatic focus, from “equity” – ensuring parity in access to information – to “social justice” – considering how information has been or can be used to marginalize or to empower disadvantaged groups. This calls for climate services efforts to be infused with an understanding of the historical context (including not only the civil right struggles, but also government response to Katrina and other cases of environmental justice) that shape the way those communities relate to government institutions that are mandated to assist them. It also requires sensitivity to these farmers’ ambivalence towards white land-grant universities and extension services that have a past history of embattled resistance to integration.

African American farmers face the same risks and stresses as do other small-scale farmers in the United States, including climate change, rising land values, farming costs, fluctuating commodity prices, and policies that favor corporate farm operations. While endowed with a wealth of farming experience, knowledge and strong social connections to land and community, these farmers are vulnerable to drought and other climate anomalies due to their limited resource base, residence in remote countries, and advanced age. But, unlike small or poor white farmers in the U.S., African American farmers also struggle with disadvantages rooted in racism. Consequently, though they are capable and cautious decision makers, these farmers often find themselves to be a crop or a season away from production failure, financial ruin, land loss, and exit from farming. This has negative implications not only for their families but also for any prospects of sustaining viable communities and preserving cultural heritage in rural America.

Prudence and rootedness do not mean that African American farmers are resistant to change or uninterested in what science has to offer. Our research shows that they actively seek weather and climate information from a number of sources and they appreciate its potential role in facilitating planning and preparedness. While they face daunting resource constraints, these farmers can nonetheless envision a range of options for responding to anticipated climate scenarios. They can also amplify climate services by sharing useful information and adaptive learning through social networks. Though the latter have been partially eroded by outmigration from rural communities, there are positive signs of reversal and renewed interest in farming. Likewise, there is evidence of progress in the relationship of African American farmers with public agencies. The USDA is taking significant steps to redress past inequities and the partnerships between the SECC and the FSC/LAF – supported by USDA and NOAA – is testing new ways of bringing together civil rights advocates, university researchers, and extension personnel.

But the success and sustainability of these efforts will require that, in addition to the pursuit of “substantive” goals (e.g., providing actionable knowledge) and “instrumental” goals (e.g., improving decision outcomes), climate services fully embrace “normative” goals (e.g., promoting democracy and citizenship) (Moser, 2009). Attaining the latter will take more than good research and good intentions: it will need engagement in a reflexive science that is not only committed to serving the vulnerable but also willing to be challenged by them.

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