

# Understanding farmer decision making in the face of rapid change in Columbia and Suwannee counties, Florida

Peter E. Hildebrand<sup>a</sup>, David S. Wilsey<sup>b</sup>

<sup>a</sup>University of Florida, Food and Resource Economics and Interdisciplinary Ecology, Gainesville, USA;

<sup>b</sup>University of Florida, Interdisciplinary Ecology, Gainesville, USA - [peh@ufl.edu](mailto:peh@ufl.edu)

**Abstract:** This paper addresses farmers' decision-making within a rapidly transforming regional context. It emerges from a report to the South East Climate Consortium (SECC), which is involved in seasonal climate forecasting based on the El Niño Southern Oscillation phenomenon. Postgraduate student research teams used the Sondeo methodology to visit 14 farms ranging from 28 to 1,600 managed (owned and rented) hectares. The principal system encountered was a cow-calf beef operation. In most cases beef operations represented one component of a more diversified system including groundnuts, maize (sweet, grain, or silage), potatoes, and watermelons. Teams also encountered dairy cattle, greenhouse production of fresh herbs, intensive broiler chicken production, and grass seed production and processing. Several farmers had slash (*Pinus elliottii*) and/or longleaf (*Pinus palustris*) pine planted on marginal land and, of those, some harvested pine needle straw. Nearly all farmers characterized their operations as dynamic and constantly evolving. Most were linked to regional and national markets, but some were linked to local markets or were becoming local niche market oriented. Farmers' flexibility was limited by several factors. First, market conditions leave little room for adaptive production systems. Second, labor contracting and overall labor supply, particularly during peak demand periods, limit farmers' ability to respond to climate, market signals and new opportunities. The regional context, which envelops each of the above production system factors, also played an important role in the decision-making processes. Growing urbanization on farm landscapes in north-central Florida has impacted the economics of agriculture as well as residents' conceptions of "rural" and "farming." At the most basic level, development pressure, through increased property taxes and higher land prices, push or pull farmers toward selling land. On the other hand, rural development and market/consumer preference dynamics have provided flexible farmers with ever-changing production and marketing opportunities.

**Keywords:** climate forecast, decision making, farm, adaptive systems, flexibility

## Introduction

*Climate* refers to weather conditions in a region over an extended period (Zaitseva 2005). The veracity of the assertion that economic benefits to farmers can be achieved through the use of seasonal climate forecasts (Jagtap et al. 2002) depends, in large part, on a more profound understanding of the farmer decision-making process. Mjelde et al. (1998) have suggested that forecasts provide value to farmers if they permit *ex ante* action. Similarly, Breuer et al. (2007) concluded from a series of farmer interviews that the "timing of forecast availability may be more important than forecast accuracy." These conclusions allude to the possibility that the pursuit of more accurate and technological climate forecasting models may represent a novel variant of the timeless theme of (in)appropriate technology (Miles 1982). In the end, if farmer's decision-making processes are unable to incorporate climate forecasts, for one reason or another, the accuracy of the forecasting becomes moot. It is within this theoretical context that we set out to assess farmer decision-making in the face of a rapidly changing production environment in Columbia and Suwannee counties in Florida.

In 2005, graduate students of AEE 5232, *Farming Systems Research and Extension Methods*, undertook a Sondeo (Canales et al. 2005) with small-scale market farmers in and around Gainesville, the site of the University of Florida. The objective of the 2005 Sondeo was a better understanding of the perceptions of those farmers regarding the potential utility of seasonal climate forecasts. Based on farmer comments and practices, the 2005 Sondeo concluded that there were at least two important factors that may affect the potential benefits of seasonal climate forecasting (SCF) information for farmers. One was the frequency of farmer-market interaction and the other was the frequency of planting or breeding (Fig.1). Given these factors, they concluded that cropping and livestock systems

characterized by intermediate frequency of cycle initiation and low frequency of market interaction would most likely benefit from SCF.

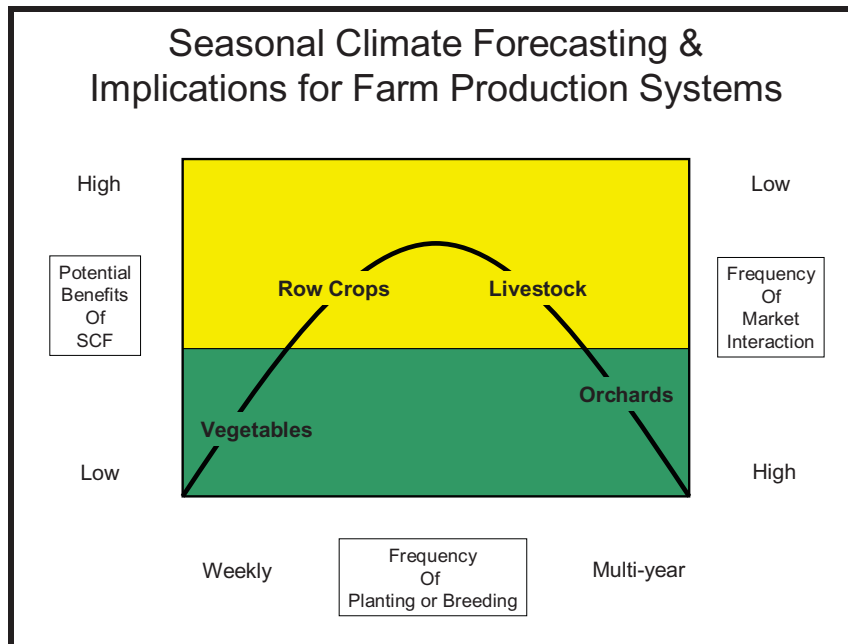


Figure 1. Graphic representation of conclusions from 2005 Sondeo report. (Source: Canales et al. 2005)

This present paper is also based on an assignment in the class AEE 5232, *Farming Systems Research and Extension Methods*, taught by the first author at the University of Florida. The original report (Alderman et al., 2007) built upon the 2005 Sondeo (Canales 2005), with the objective to provide a basis for understanding when and how farmers make decisions regarding crops and livestock so that the SECC can better provide the information that would be useful to the farmers. The original course report was a contribution to the South East Climate Consortium (SECC), a multi-institutional collaboration involved in seasonal climate forecasting based on the El Niño Southern Oscillation (ENSO) phenomenon.

## Method

The graduate students used the Sondeo methodology developed at the Institute of Agricultural Science and Technology (ICTA, in Spanish) in Guatemala (Hildebrand, 1981). A Sondeo is a multi-disciplinary methodology for rapid assessment. It is performed without taking notes during the interview. This provides an informal atmosphere and flexibility regarding the topics discussed. The Sondeo method is conversational and is not intended to provide statistical information. The team directs the conversation to elicit the desired information, but does not follow a dogmatic line of questioning nor impose a formal agenda on the interaction beyond a broad area of interest (in this case, farm systems and farmer decision making). Further, the informality of the conversation provides space to explore specific concerns of the farmer. Through conversation and experience drawn from multiple perspectives the Sondeo team is capable of obtaining important and diverse data from the informants.

Although developed nearly 30 years ago for use in the “development agriculture” context, the Sondeo and subsequent variants of the method have been used to assess “modern” farming systems (Canales et al. 2005, Alderman et al. 2006), to characterize natural resource value chains (Marshall et al. 2006), and to better understand niche agricultural markets (Moulton 1989). More recently, a Sondeo was undertaken in Ecuador to facilitate a change in the focus of the research conducted at an agricultural research station from themes important to large-scale commercial farmers to those of interest to the small-scale farmers within the station’s sphere of influence (Anzules et al., 2005).

With a team of sufficient size (12 is optimum), and depending on local situations of accessibility, a Sondeo is designed to be completed in one-week’s time. For the present Sondeo, sub teams of two to

three students conversed with each of the participating farmers. Sub team members individually made notes following, but not during, each conversation. All team members then regrouped in class to discuss their notes to ascertain validity and inclusiveness, and to elicit additional information that may have been overlooked by individuals. After each round of conversations, the sub teams were reconfigured to provide a variety of group dynamics throughout the study. The final Sondeo report integrated the results of all the conversations and the sharing and processing of information among team members. Owing to the conversational nature of the Sondeo, it is not quantitative because all informants are not necessarily asked the same questions during the conversations. Course-imposed limitations on students' time restricted the number of interviews possible during the period in the semester dedicated to the exercise.

## Study Area and Sample

The Sondeo was conducted in Suwannee and Columbia counties (Fig.2), for two main reasons. First, while both counties are considered to be part of "north Florida" they are located within reasonable proximity to the University of Florida in Gainesville, permitting day trips for student researchers. In addition, the extension agents for these counties responded favorably to our initial inquiries.

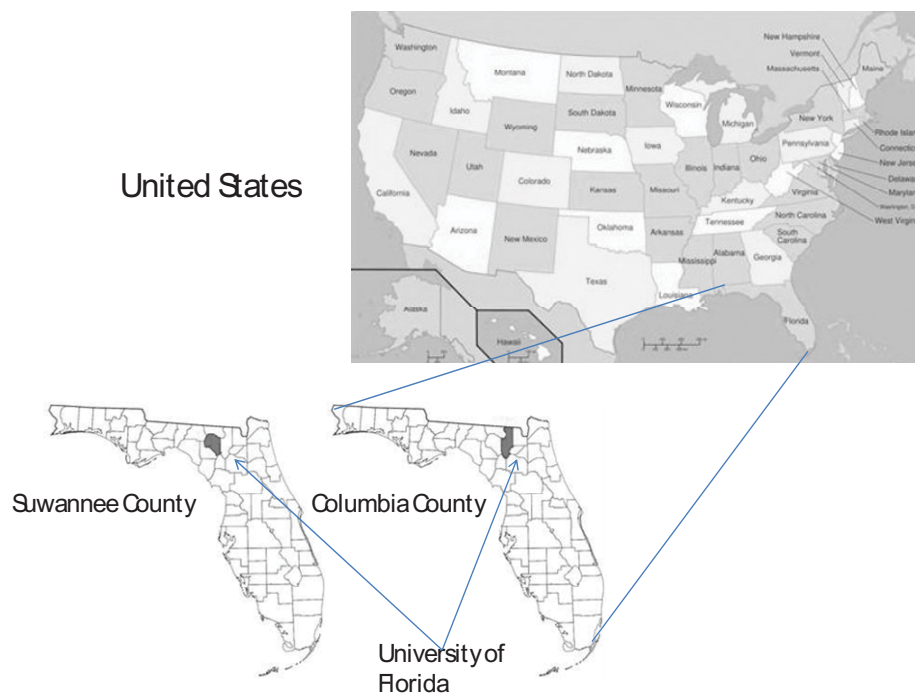


Figure 2. Locations of Suwannee and Columbia counties and the University of Florida.

Before meeting with farmers, students met with the county extension agents to gain a better understanding of the historical and present context for farming in the county. At these meetings, county extension agents also provided lists of farmers who represented diverse production systems in the counties and who the agents believed to be most willing to participate in the Sondeo. Although all of the farmers contacted were open to participation, scheduling limitations factored into the timing of interviews and the representation of farmers in the two counties. Ultimately, the students conversed with 14 farmers: 9 in Suwannee County and 5 in Columbia County. The sample size was limited by two factors: farmer availability and course-imposed time constraints. Conversations with extension agents and the selection of farmers through agent recommendations provided a broad information base regarding the major trends affecting agriculture in North Florida. This approach, however, might have biased our sample to those farmers with whom the agents felt most comfortable.

Most of the farmers with whom we conversed in Suwannee County had ties to their land and farming operations that extended back for decades and generations. In contrast, we were told that in Columbia County, the majority currently could be better described as lifestyle farmers - individuals or families

who have recently moved into the area, who rely on off-farm work for the majority of their income, and are part of the urbanization that is taking place. According to extension agents, for many lifestyle farmers maintaining agricultural property tax exemptions may be more important economically than making a profit from farming. Some may also be working towards developing profitable operations, but many have not yet succeeded in doing so.

## Results

### Production Systems

For the present Sondeo it was decided to obtain more elaborate information on when and how farmers make decisions regarding their production systems so that the SECC can better provide the information that would be useful to them. We visited farms ranging from 28 to 1,600 ha. Larger land holders were more engaged in extensive cattle grazing, while smaller operations were involved in more intensive operations. Many of the participating farmers had grown tobacco in the past (as recently as 2004), but had ceased production as the structure of the market changed with the elimination of the tobacco allotment system.

Almost all of the farmers interviewed in 2007 characterized their operations as dynamic and constantly evolving. Changes in the tobacco allotment program two years ago precipitated major change as some farmers strove to get big and others dropped out of production. Moreover, speculation about consistently increasing prices for biofuel crops (e.g. maize and soya) was in the forefront of most farmers' considerations. Many farmers also expressed tentative plans for new crops that were under consideration or that were currently being tested on small farm parcels. New ideas with regard to crop timing and marketing were also mentioned. Many of the farms were linked into larger regional and national markets while a minority were involved exclusively in local markets or were moving in that direction as a niche marketing strategy.

The three main production activities observed in Suwannee and Columbia counties can be broadly classified as 1) row crops (maize, peanuts, melons and tobacco); 2) pasture, hay, and grasses; and 3) livestock (beef cattle and dairy cattle). During conversations with the farmers it became apparent that their decisions relating to the above production activities are strongly influenced by market demands and the crops that other farmers are planning, and are less influenced by climate forecasts.

Market trends limit farmers' flexibility in terms of what they grow. Production for the major crops appeared to be relatively stable on larger farms as many were contracted by larger commercial ventures. Tobacco, however, while seemingly consistent with regard to annual demand and price, had become less profitable since the recent end of the allotment system and is now only profitable for those producing with significant economies of scale. Increasing demand for ethanol had also begun to enter into farmers' considerations regarding the production of maize silage and grain. Many farmers were transitioning productive land to maize production, or at least were considering their options. Those who already produced maize silage conveyed a likelihood that they would instead grow for grain. Changes in maize production are likely to extend to other cropping decisions as well.

Maize production decisions may ultimately affect peanut production: as some peanut growers transition to maize others will likely increase production to meet existing demand and to benefit from higher prices. Dairy farms are shifting from maize silage to maize grain. Overall, higher prices directly and indirectly drive the need for irrigation and other capital investments, which make factors such as weather and climate less relevant.

Markets can also impact flexibility with regard to the timing of when to plant and harvest. General climate trends influence the length and timing of the windows for farm activities; however, weather forecasts had a greater influence on the risk that farmers might take by planting a bit earlier with the hopes of getting a slight edge on competitors.

Overall, the majority of the farmers interviewed said they did not find seasonal climate forecasts useful on a regular basis due to their inaccuracy. It is useful to consider the example of 2006: the dry weather conditions necessary for hay production did not arrive until late in the season, and then quickly transitioned into this year's wetter winter; the combination dramatically affecting farming practices and hay production. In practice, many farmers perceive that there are greater benefits from short-term weather forecasts.

### **Row crops (maize, peanuts, melons, and tobacco)**

Most of the farmers interviewed talked about windows of time in which certain procedures are followed in order to take advantage of short-term, seasonal weather (fertilizing, planting, irrigating, etc.), fuel prices and selling. Some farmers used no till, some used aeration, and others used conventional till. For irrigation, some used boom sprayers, some drip and pipe irrigation, and some used no irrigation at all. Cost was sometimes a limiting factor as the price of fuel has been high for the last few years, which had a direct impact on the use of irrigation. The majority of the farmers interviewed used traditional tilling and irrigation on at least one of their cash crops. According to farmers, irrigation serves two purposes: it is a means to provide crops with water as well as a risk management strategy for mitigating frost damage during hard freezes.

### **Pasture, hay, and grasses**

Pasture and hay production was primarily for either on-farm use or for the horse hay market (Marion County, south of Gainesville, has a large horse population), with only a small proportion being sold as cattle feed. Every cattle producer (beef or dairy) had some form of pasture on which the cattle grazed. In many cases, producers also cut hay. In general, higher quality hay was sold as horse hay (specifically 'Tifton 85' bermudagrass and alfalfa) and lesser quality hay was used on farm as cattle feed (bahia). The primary pasture crops were bahia grass ('pensacola') and bermuda grass ('coastal' and 'Tifton 85'), though one producer also used crabgrass as a perennial forage. A small amount of alfalfa was being grown specifically as horse hay. In addition, ryegrass, oat and clover were planted as winter forages primarily for grazing. One farmer also produced ryegrass seed to sell to livestock and hay producers to plant as winter forage.

Larger producers appeared more concerned with having good weather for planting, cutting, and baling hay than about how much rain would come in a season. This is in part due to the option of applying irrigation as needed and in part due to the need for labor to be spaced out in order to manage the whole farm. General times for planting winter forage are primarily driven by seasonal changes [cues], but there was not much flexibility with these especially for large-scale producers. Medium to large-scale producers tended to have irrigation equipment available for irrigating their pastures. This was especially true of farmers who were highly specialized. Fertilization and herbicide weed control is done primarily by using a boom sprayer or incorporating fertilization with irrigation (so-called "fertigation").

### **Beef cattle**

Farming of beef cattle ranged from smaller operations of 48 head of cattle to more than 500 head of cattle. Breeds seen were Brangus, Angus, and some Florida Cracker cattle. The biggest concern for beef operations largely tied into forage or hay for the cattle. Shortage of hay has resulted in elevated prices, and while some farmers were able to grow their own hay, others had to buy what they did not cut. Cattle were rotated on pastures and depending upon the farm, the pastures could be irrigated or rain fed.

Many farmers were trying to limit their production of cattle to the amount of hay they could cut from their land. This decision was made to establish the most cost effective system due in large part to the increased price of hay and the whole process of either reducing herd size or having enough forage was a balancing act for many of the smaller farms. Larger production systems simply depended on buying what hay they could not produce.

One problem across the board for farmers was the coyote. Many farmers shoot coyotes on sight because they experience loss of their calves from predation. Some had unconventional methods of control by placing a donkey in the pasture to sound an alarm or having dogs fight them off the property.

### **Dairy cattle**

Dairy operations had many of the same issues as beef production systems. There was a large difference between low production systems and high production, varying from 100 to 5500 head of cattle. Breeds consisted of Jersey crosses and Holstein.

A farmer on a larger dairy was very fixed in his decision-making process. Production was maintained on an extremely tight schedule, with pasture or maize for silage replanted almost immediately after harvest. He also could not change acreage dedicated to each crop type. With such inflexibility in farming system management, he expressed that seasonal climate forecasts would not be helpful. In contrast for the smaller operation the farmer had more flexibility in his decision-making processes and

for that reason could vary times and types of seed planted for forage in his pastures. Therefore, climate forecasts may have been useful in his decisions about pasture planting and herd size.

## Labor

Scarce is perhaps the best overall description of the rural labor supply in north Florida. This scarcity is most acute with respect to formal, documented employees, but it characterizes all components of the labor supply. All farmers expressed a preference for hiring any available immediate and extended family members.

Finding legal, hard-working laborers (immigrant and otherwise) who are willing to be paid “on the books” was a major concern for some farmers who needed to be able to account for labor expenses in their farm bookkeeping. One farmer commented that, “Migrant workers are willing to do the work local Americans are not interested in doing anymore and for wages that farmers can actually afford.” For those who manage to find immigrant labor and develop working relationships, the uncertain availability can be damaging as guest workers have to deal with extensive and time consuming paperwork for themselves and for families that often remain in their home countries for extended periods. Another problem with labor is the significant language barrier that can prevent farmers from properly communicating with these workers.

Labor availability and costs can affect decisions about what to produce. In general, livestock owners seemed less affected by labor considerations than crop farmers, as cattle and pasture are less labor intensive.

## Material input costs and product prices

Farmers discussed increasing costs of inputs and how these costs affected their production decisions. Land (owned and rented), fuel, fertilizer (especially nitrogen-based), and feed costs have all increased drastically in recent years and affected overall profit margins and particular production activities.

Encroaching development on farmland in northern Florida has led to increases in property values and taxes, and a decrease in available land. Land prices have skyrocketed within the past five, and especially two years. In Suwannee County the price of land has gone from \$6,250 to \$25-37,500/hectare. Farmers who cannot afford to buy more land have to lease from their neighbors, a resource that also is rapidly diminishing.

New interest in maize to produce ethanol has altered the production landscape as well. Dairy farms in particular are affected by higher overall prices for maize and maize silage. While some farmers see increasing maize prices as a potential profit opportunity, the market has yet to provide sufficient incentive for the farmers participating in this study to increase existing production levels.

## Flexibility

Being “flexible” means that farmers have the option to adapt to a changing production environment through modifications in the specific crops and varieties they produce, as well as the overall product mix. They can also adapt through the timing of their production-related activities. Falling prices will tend to lead a flexible farmer to produce less of a product. However, a less flexible farmer may need to produce more in the event of falling prices, to compensate for lower margins by increasing volume. It is important to note that as used in this discussion, flexibility does not describe farmers’ attitudes; rather it refers to a condition that is defined in large part by the combined effects of numerous factors: farm size and farm household composition, other labor availability, capital investments, outstanding contracts, regional climate, weather, input costs, and market conditions, to name several.

Two examples provide insight into the type of flexibility observed in the Sondeo.

A relatively flexible farm was a small dairy farm. This farmer found a niche in the market due to the increasing demand and willingness of his customers to pay a premium for unpasteurized milk. The farmer adapted to this market opportunity by reducing the number of dairy cows in his operation, opening an on-farm retail operation, and selling to local “green” stores and farmers’ markets. On-site processing and packaging and the ability to select end consumers led to a more profitable business.

Another flexible farm produced herbs, vegetables, peanuts, and cleaned and packaged grass seed. Flexibility was due to constant experimentation with new crop types and growing methods. This farmer

had constructed greenhouses, grown herbs hydroponically, created an irrigation system, and experimented with different planting and harvesting methods. The farm could be described as an "outdoor laboratory." The farmer has also noticed increased demand for fresh, local produce related to residential development in the area and he was planning to grow more vegetables on a small parcel of his land to sell in an on-farm storefront.

Production for the major crops appeared to be relatively stable on larger farms as many were contracted by larger commercial ventures. Tobacco had become less profitable since the recent end of the allotment system and is now only profitable for those producing with significant economies of scale. Increasing demand for ethanol had also begun to enter into farmers' considerations regarding the production of maize silage and grain. Many farmers were considering transitioning productive land to maize production. Changes in maize production are likely to extend to other cropping decisions as well. Maize production decisions may ultimately affect peanut production as some peanut growers transition to maize, others will likely increase peanut production to meet existing demand and to benefit from higher prices.

## Conclusions

All of the farmers we interviewed indicated that seasonal climate forecasts were currently less useful than weather forecasts for most of their management decisions. Typically, farmers spoke more about weather than climate as being an issue they concern themselves with on a more frequent basis. There were two primary reasons for this. First, flexibility in most of the systems we examined is found more in weather-based, rather than seasonal climate-based decisions. Second, given the risk involved in making climate-based decisions, farmers tend not to trust seasonal climate forecasts at their current levels of accuracy. Several farmers mentioned the forecast of El Niño conditions in the winter of 2006-2007, which did not prove to be accurate. Cattle farmers noted that the region experienced dry conditions, rather than the wet conditions forecasted. This led to poor production on pastures, and a subsequent hay shortage. Thus, if they had followed the recommendations for that year, they would have increased their livestock by 10 to 12%, which, given the rise in hay prices, would have caused substantial profit losses.

Many larger farmers mentioned minimizing risk via increases in capital investment, for example, by purchasing irrigation systems. These capital investments reduced their vulnerability to seasonal climatic fluctuation. However, any capital investment would tend to require higher or more stable production to compensate for a lower profit margin. Thus, farmers with high fixed costs, through large capital investment, had less flexibility in deciding what and how much to produce.

Market factors, such as specific windows for the sale of certain products and contracts with wholesale buyers, often dominated the decision-making process, leaving little room for adjustment on the basis of seasonal climate variation.

Limits on and instability of labor supply affected availability during peak times, which can dictate cropping decisions and limit flexibility. This can also limit the potential for expansion of production and development of new enterprises.

Growing population and development in Suwannee and Columbia counties are drastically altering the economics of agriculture in these areas. Development pressure can encourage farmers to sell off parts of their land, because of increases in land value and property taxes. Many farmers are unable to afford increases in property taxes, and must downsize as a result. Also, land sales in today's market represent an opportunity for short-term income that could not be matched by any agricultural activity. However, this same development activity also provides opportunities to sell to emergent local niche markets.

Regarding the overall importance or utility of seasonal climate forecasting, institutions promoting technological interventions, such as the Southeast Climate Consortium, must recognize the existing and emerging constraints on farmer decision-making. In the context of Columbia and Suwannee counties, farmers are constrained by classic factors of production such as labor and land availability as well as prices for agricultural inputs and outputs. These factors are heavily impacted by dynamic regional conditions, which are influenced by local demographic shifts and broader global trends, most notably demand for energy crops. Furthermore, past decisions about capitalization of production systems leave farmers less flexible with regard to their present production choices. In Columbia and Suwannee counties, the end result was that farmers were more responsive to short-term weather

conditions than to medium- to long-term climate forecasts, regardless of the potential for improved economic benefits to be achieved through the use of climate forecasting.

## Acknowledgements

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