Climate Information System for Agriculture and Water Resource Management in the Southeast USA

Plan of Work for SECC within the NOAA RISA Program
January – December 2009

Introduction

The Southeastern Climate Consortium (SECC) conducts research to reduce climate and weather risks to agriculture and natural resources in Alabama, Georgia, and Florida, and is transferring existing and developing new agricultural tools for North and South Carolina. All SECC research is done in cooperation with the Extension Service and other agencies to provide relevant, useful climate information to stakeholders in agriculture, forestry, and water resource management.

This work plan for Jan – Dec 2009 is being submitted by the Univ. Miami, which manages the cooperative agreement with NOAA for the SECC members (Univ. Miami, Univ. Florida, Florida State Univ., Univ. Georgia and Univ. Alabama-Huntsville). Auburn Univ. is also members of the SECC and will be receiving funds this year for the first time through a coping with drought proposal. In addition, North Carolina State University has joined the Southeast Climate Consortium and will be shown as collaborators for some activities although they do not receive RISA funds and avoid research topics that are being conducted by the Carolinas RISA. For completeness, we also include the work plan for SECC member Florida State Univ., although they now receive their RISA grant funds administratively through their NOAA-sponsored Applied Research Center.

The overarching goal of the SECC is to develop a climate information and decision support system for the southeastern USA that will contribute to an improved quality of life, increased profitability, decreased economic risks, and more ecologically sustainable management of agriculture, forestry and water resources.

CIMAS Research Theme: Theme 4: Human Interactions with the Environment

Link to NOAA Strategic Plan Goals: NOAA Mission Goal 2: Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond. NOAA Mission Goal 3: Serve Society's Needs for Weather and Water Information. Strategy: To develop generic tools for the production and dissemination of relevant climate diagnostic and forecast information; to strengthen decision making in agriculture.

Toward our overarching goal we have established six objectives. As a multi-institutional consortium, different member institutions of the SECC emphasize project objectives that build on the strengths of each institution.

1. To develop downscaled ENSO climate information and forecasts for the Southeastern USA. (Florida State Univ. and Univ. of Florida)
2. To enhance and extend agricultural applications of climate forecasts in the Southeastern USA. (Univ. Miami, Univ. Florida, Univ. Georgia, Univ. Alabama-Huntsville)

3. To develop and refine methods to incorporate climate forecast in water resource management in the Southeastern USA. (Univ. Florida, Florida State Univ., Univ. Georgia, Auburn Univ., and Univ. of Alabama-Huntsville)
4. To develop new and improved methods for integrating models from different disciplines for application of climate forecast information in agricultural and water resource decision making. (Univ. Miami, Univ. Florida)
5. To foster effective use of climate information and predictions in forestry and wildfire management. (Florida State Univ.)
6. To document and assess the utility and impact of climate forecast information provided to stakeholders in agriculture and water resource management. (Univ. Miami, Univ. Georgia)

The Strategic Plan of the SECC is designed so that activities toward meeting these objectives complement activities funded through other sources. For example, with funding from the USDA, SECC scientists at the Univ. Georgia work closely with Univ. Miami scientists to evaluate stakeholder information needs and to assess SECC products, thereby complementing RISA supported activities toward objective 6.

Our activities continue to emphasize collaboration among research in the SECC and partnership with Extension. Such partnerships ensure that our findings and products are relevant in different states, and to the extent possible, in different agricultural systems.

Since the establishment *AgClimate* in the fall 2004 as an internet-based prototype decision support system for the application of climate information to agriculture, we have devoted a major part of our research and extension effort toward developing and providing more climate information through *AgClimate*. In 2008, as part of our effort to transfer *AgClimate* to Extension, we changed the name to *Agro*Climate [http://AgroClimate.org]. The transition is nearly complete, though the SECC continues to provide new information and tools as well as updating databases and otherwise helping to keep the website fresh.

In 2006 we began to strengthen our efforts in our Water Resources Management and plan to continue this effort in 2008. Based on the lessons learned in the development of *Agro*Climate we have begun development of a new prototype web site, Southeast Water Climate, which will provide a decision support system for water resource managers.

With additional funding through the NOAA program on “Coping with Drought,” in 2008 we conducted a project in collaboration with CLIMAS to implement a version of *Agro*Climate in New Mexico. The initial phase of this project is complete. This program also provided support to a symposium that SECC is co-hosted with the Univ. Florida in June 2008, CIMR – Climate Information for Managing Risks, Partnerships and Solutions for Agriculture and Natural Resources Managers.

The current work plan includes two new projects funded through the “Coping with Drought” program, namely the development of a open-source *Agro*Climate (UF, FSU, UGA) and the development of drought management tools for municipal water managers (AU, UGA, UF).

What follows is an integrated plan of work, based on our strategic plan. Collaboration among institutions is paramount to the success of the SECC so we require all activities to be conducted in collaboration though a single institution generally leads each of the activities.

Coordination

Activity C.1 Communication and liaison

The Coordinator organized regular meetings of the SECC Executive Committee, generally through tele-video conference. The Coordinator will organize two annual meetings of SECC scientists, a program review meeting in the spring and a program planning meeting in the fall. In addition, the Coordinator will serve as the liaison for communications with federal and state agencies through compilation of reports, participation in conferences, and organizing exchange visits with federal agencies.

Activity C.2 Partnerships

The Coordinator will continue to assist SECC members in the establishment of new partnerships. Our emphasis will be on partnerships with other RISA Centers, Sea grant, NGOs in the southeast USA having an outreach mission to underserved communities, and others.

Activity C.3 Managing complementary activities with different funding sources

In addition to NOAA funds, the SECC receives funding from diverse sources, including USDA RMA, USDA CSREES, and various other competitive grants programs. With the addition of climate change research and extension to our portfolio of activities, and with the pending re-bid of the RISA programs, in 2009 we will develop a new strategic plan to ensure that we avoid redundancy among programs and maximize leveraging of funds.

Activity C.4 Coordination of extension activities

Clyde Fraisse, a climate extension specialist, has led the SECC extension effort since 2003. The SECC Extension Team includes: two climate extension specialists, one extension agronomist, and four state climatologists, with evaluation and assessment support from three anthropologists and one natural resources economist, and overall support from the SECC Coordinator.

Activity C.5 Climate Information for Managing Risk

In June 2008 the SECC and UF co-hosted a symposium entitled Climate Information for Managing Risks – Partnerships and Solutions for Agriculture and Natural Resources Managers. In 2009 we will begin planning a second CIMR, tentatively scheduled for February 2011, which will continue to emphasize application of climate information at the local and regional level, but will aim for an audience with wider geographic representation and increased emphasis on information needs for climate change.

Research

Objective 1: Develop downscaled ENSO climate information and forecasts for the southeast USA

Activity 1.1 Dynamical drop modeling

We will to examine the intra-seasonal characteristics of the precipitation as simulated by the CFS model. In addition, we will develop a 1-way/2-way crop-atmospheric coupling using the COAPS regional model and the DSSAT crop model over the southeast USA. Until recently, the DSSAT crop models were only applied to specific locations to determine crop yields. The crop model is now being expanded and assigned to each of the 20 km downscaled grid points in the southeast USA. Feedbacks will initially be only one way, that is, the atmosphere forces the crop and the crop doesn't feed back to the atmosphere. Within this year, 2-way full coupling will be available. (FSU, UF)

Activity 1.2 Statistical downscaling using the CFS model data

CFS seasonally predicted precipitation at a resolution of 2.5 degrees is statistically downscaled to a fine spatial scale of ~20 km over the southeast United States. This study is motivated by the need for regional climate information for crop growing seasons in the southeastern U.S. The downscaling is, therefore, conducted for March through August, when localized precipitation prediction has been very challenging. The present work is part of ongoing downscaling research preceded by Lim et al. (2007), which dealt with surface temperature under the support by NOAA/ARC. The downscaling research in COAPS is now expanding to the real-time seasonal forecasts (precipitation and temperature) for the entire season and they are provided through COAPS web page [www.coaps.fsu.edu/cmo]. (FSU)

Activity 1.3 Update, expand, and automate climate database operations

An automated climate database update process is needed to provide the most current information and to refine some climate and crop-related products to include near-real time climate events and processes.

In conjunction with automating the database updates, we find it beneficial to include weather observations from our partners with the agricultural weather networks in the Southeast, specifically the Florida Automated Weather Network (FAWN) and the Georgia Automated Environmental Monitoring Network (GAEMN). The inclusion of these networks will be instrumental in the development of products that rely on near-real time observations and in filling in gaps that exist in the current NWS Coop network.

With the NWS cooperative observer network deteriorating and dozens of stations falling out in the last two years, we will explore the use of high-resolution climate data sets such as PRISM and NCEP mesoscale reanalysis for the study of climate variability on local scales and as the data base driving future decision support tools. (FSU, UGA, NCSU)

Activity 1.5 Modified JMA ENSO index

In previous landmark studies on ENSO variability in the Southeast, COAPS used a sea surface temperature based index developed by the Japanese Meteorological Agency (JMA Index) to classify historic weather observations by ENSO phase. In these studies, the concept of an "ENSO year" was developed where October through the following September would all be designated as one phase, depending on the phase during the northern hemisphere winter season (Sittel, 1994). Until recently, this same approach has been used in most ENSO related climate studies undertaken by the SECC.

A closer examination of individual ENSO events showed some similarities in seasonality (peak SST anomalies in the winter months), but often striking differences in the timing of onset or cessation of warm and cold events. In particular, ENSO phase would often change as early as the spring or summer months. The concept of the "ENSO year" did not fit well with observations and severely limited the ability to identify ENSO related climate impacts at these times of year.

In an effort to rectify these problems in the timing of ENSO events and to glean more information on potential climate impacts during the warm or growing season, COAPS modified out approach to ENSO phase classification using the JMA index. In this new approach, called "modified JMA", we keep the criteria that the index must remain above the 0.5 degree threshold for at least 6 consecutive months to classify as an El Niño even (-0.5 for La Niña). However, instead of using the concept of an "ENSO year", phase is classified on a month by month basis with a warm or cold event beginning only when the index reaches the 0.5 degree threshold and ending as soon as the anomalies fall back below 0.5 degrees. (FSU, UGA, UF)

Activity 1.6 Variability of extremes and extreme events

Studies have shown that very limited benefit exists in climate forecasts focused on shifts of temperature or precipitation near the mean or climatological average. The greatest benefit of climate information lies in the forecast of extremes, events near the tails of the historical probability distribution. Research in this activity will address the likelihood of such extremes, whether it is torrential rainfall, drought, freezes, or severe weather. (FSU)

Activity 1.7 Climate data preparation the southeast USA

We will continue with the assembly of climate data bases for Georgia, Florida, and Alabama. We will estimate solar radiation for each data set using the WGENR utility program for 2008 and 2008. WGENR has been tested with local weather station data and has been shown to be accurate in estimating solar radiation when only measured temperature and precipitation are available. (UGA, FSU, UAH)

Objective 2: Enhance and extend agricultural applications of climate forecasts in the southeast USA

Activity 2.1 Climate change

Extension activities 2009 will have a strong component related to climate change impacts, adaptation and mitigation strategies. In addition to fact sheets published in *Agro*Climate, we will conduct training programs for extension agents to increase their capacity to provide information on climate change to producers and other clients.

Because the stakeholders for climate change information are much more diverse than the agricultural and water resource communities that the SECC has served to date, we also plan to conduct a stakeholder assessment to assure that we develop information products that will meet our clients' needs in Activity 6.3. (UF, UGA, FSU, UM)

Activity 2.2 Agro*Climate *enhancement

*Agro*Climate activities will emphasize the following topics in 2009:

- Publication and enhancement of climate and agricultural outlooks
- Update of climate database: Incorporation of 2008 data from the COOP network
- Development of additional automated in-season updates for decision support tools similar to the efforts that have been conducted for the chilling tool and growing degree-days tools.

(UF, UGA, FSU, NCSU)

***Activity 2.3 Development of open-source Agro*Climate**

From our experience in transferring *Agro*Climate to New Mexico and North Carolina, it has become evident that we need an open-source *Agro*Climate if we are to provide access to all who want to implement this system. In 2009 we will establish a leadership group that will guide development of open source *Agro*Climate in cooperation with CLIMAS, NCDC, and other interested parties. (UF, UGA, FSU, CLIMAS, NCDC)

Activity 2.4 Use of Atlantic and Pacific sea surface temperatures to forecast crop yields in the southeast USA

This continuing activity will work use multiple climate indices to forecast corn yields in the southeast USA and will be beta-tested for operational forecasting and possible deployment on agroclimate.org. Forecasts for the coming growing season will be generated using climate observations prior to the growing season and will be evaluated using 2009 county yield reports from the National Agricultural Statistics Service.

We have obtained historical agricultural statistics at the county level across the state of Georgia for peanut. We have analyzed the long-term yield variability to determine the effects of the ENSO phases on peanut, and we will apply the same methodology to cotton, corn, and soybean, to characterize how these effects vary over space across Georgia. We will also use crop simulation models to refine these estimated impacts and to characterize how each climate factor contributes to impacts on yield, water user, and other agronomic factors. (UF, UGA)

Activity 2.5 Economic modeling of climate information use in the context of farm programs

This set of activities uses farm-level economic models to explore relationships among climate prediction, farm programs, and decision making under risk. Farm programs are constantly reviewed and changed (e.g., the next Farm Bill), which makes this type of research even more relevant. We will continue these studies by incorporating the impacts of climate in crop insurance selections from the point of view of the insurer as well as evaluations of all these decisions with a spatial component. Also, we will continue to explore new ways to assess uncertainty in these decisions using our simulation framework to study internal uncertainties of crop simulation models and their impacts over climate prediction technologies under farm program influences. (UM)

Activity 2.5.a. Climate-sensitive economic models in agriculture: An overview of the literature. The main goal of this paper is to review empirical efforts in developing weather/climate-based economic models in agriculture. To reach our goal, a review of major academic databases and a complementary search was performed in most important scientific journals. Observations on the general state-of-the-art of economic modeling in agriculture are discerned based on a comparative analysis of work in the field, with specific reference to climate evaluation. In addition, we present different strategies to account for climate risk in the development of optimum farm-plans. Some thoughts on the usefulness of climatic information on policy making are also depicted. (UM)

Activity 2.5.b. Agricultural productivity growth and climate variability: Evidence from Florida. The goal of this activity is to analyze the link between agricultural productivity growth and climate variability in Florida. To do so, we will evaluate the impacts of climate policies on the State of Florida by analyzing the economics effects of CO_2 emissions reduction in an applied general equilibrium framework with specific attention to environment-energy-economy interactions. The instrument used to implement environmental policy is a tradable emission permit system. (UM)

Activity 2.5.c. Optimal climate crop insurance strategy: Contrasting insurer and farmer interests. The main aim of this study is to analyze insurer's impacts because of ENSO-based crop insurance selection and contrast those with farmer's best options. We hypothesize that synergies between farmer and insurer regarding crop insurance contracts exist and are impacted by climate variability. Our analysis does not include a spatial dimension because we have chosen to study on-farm decisions more closely and give emphasis to farm-level details and farmer's incentives. (UM)

Activity 2.6 Agricultural outlooks

We will continue to issue agricultural outlooks quarterly and will issue additional outlooks if ENOS phase changes within a quarter. (UF, UGS, FSU, NCSU, AU)

Activity 2.7 Development of improved lawn and garden moisture index

We are pursuing the improvement of the lawn and garden moisture index by including satellite mearued insolation as an input to estimation of the index and by the incorporation of crop simulation models In the coming year we shall generate the new crop-specific (corn) moisture analysis in real-time. The scripts are written and have been tested, however the key now is to produce real time results in the context of real-time assimilation data which often contains missing and/or erroneous values. The temperature data from the Rapid Update Cycle (RUC) will be processed with the locally-produced GOES solar insolation product for the calculation of the potential evapotranspiration in high resolution. From this and the Stage 4 Precipitation Analysis (4 km resolution, also ingested) the net moisture flux will be calculated which then leads to determining the state of the corn plants via the DSSAT model. The real-time testing to be done in the crop season of 2009 will focus on the robustness of the data ingestion and assimilation processes to account for non-perfect data and non-perfect downloading situations so that a reliable product may be produced daily. (UAH, UGA)

Activity 2.8 Incorporate climate forecast information into recommendations for best management practices

We will continue with detailed studies on the use of climate forecasts for peanut, cotton, corn, and soybean production in Georgia. This includes the use of crop simulation models to predict peanut, cotton, corn and soybean yield for each county as a function of historical weather data, planting date and irrigation strategies. In addition, we will also conduct crop simulation studies for the main cotton and corn producing counties in Georgia, Florida, and Alabama. (UGA)

Activity 2.9 Adapt an existing crop model for simulating cotton responses to climate and management variations

Cotton is the main row crop grown in Georgia. A prototype model for cotton has been developed adapting the DSSAT-Cropping System Model for simulating climate effects on cotton growth and yield. In collaboration with Florida, we are planning to continue with the evaluation of this model under farmers' field conditions, using their management practices, as well as under different irrigation management strategies with data collected at experimental stations. (UGA)

Objective 3: Develop and refine methods to incorporate climate forecasts in water resource management in the southeast USA

Activity 3.1 Use of seasonal climate forecasts to reduce risk in regional water supply management

Our work adapting the analog and logistic regression algorithms provided by NOAA will continue. The skill of resulting re-forecasts for the Tampa Bay region will be evaluated for the two methods. This evaluation will include analyses of skill vs. forecast horizon and skill vs. length of data record available for statistical correction. Other similar rainfall forecast products will be evaluated using the same techniques. The results of these analyses will be incorporated into the hydrologic models used by Tampa Bay Water which operate on the 1-week to 1-month time scale. In early spring of this year a post-doctoral research associate will join this project and will focus primarily on scenario development and multi-criteria decision analysis to determine the usefulness and risk-reduction of incorporating weather and climate forecasts into the operational decision making and long-term planning of Tampa Bay Water.

Using the results of the soon to be completed exploratory analysis between hydrologic variables in the Tampa Bay region and gridded oceanic/atmospheric variables, forecast models used by Tampa Bay Water will be adapted to take advantage of the linkages found. These forecast models will include, but will not be limited to models of streamflow and demand. The results of this work are expected to influence the decision making process used by Tampa Bay Water in making optimal choices in their rotation between surface water, groundwater, and reservoir storage sources. We will continue our work evaluating the potential to use the MM5 model to produce regional climate forecasts in the Tampa Bay region. Various downscaling methodologies will be explored and the sensitivity analysis of model results to land use representation by the model will continue. (UF, FSU, FL Climate Institute)

Activity 3.2 Use of seasonal climate forecasts to reduce risk in regional water supply management

Activity 3.3 Land use change effects on climate conditions in west-central Florida

The sensitivity analysis of the MM5 model to land use and land use change will be continued. This work will focus primarily on changes in land-air energy exchange and lower atmospheric circulation as influenced by land cover in west-central Florida. (UF)

Activity 3.1 Factors influencing the incorporation of climate into water resource management in Florida

Stakeholder driven integrated assessment tools, have been used to link hydro-climate research to water resource management. Though there are a number of case studies where these tools have been tested, the use of integrated assessments in resource management and in policy making is still not understood. This is especially true for hydro-climate research where improvements from large-scale research programs have not translated into changes in water resource management or policy. A contextual understanding of the complex regional factors that influence the integration of climate information into resource management may provide insight into this issue area. This thesis presents an analysis of the complex socio-political factors affecting the incorporation of climate in water resource management in Florida. (UM)

Activity 3.5 Identification of stakeholder needs

Hydrologists and other water resources specialists will collaborate with the assessment team (Activity 6.1.c) to identify stakeholder needs for climate information and potential applications of that information. (AU, UF, UGA)

Activity 3.6 Website development for water managers needs

After the initial content for the web site was determined, a template for the home page was developed in a style consistent with the home pages for *Agro*Climate (agroclimate.org) and the Southeast Climate Consortium (seclimate.org).

Additional web pages were developed for the climate outlook and water outlook, including information for precipitation and temperature impacts on water supplies, evaporation potential, and flood and drought outlooks. The web page is continuing to evolve as additional links and data needs are identified and software problems are resolved. (UGA, AU, UF)

Activity 3.7 Development of improved Lawn and Garden Moisture Index (LGMI)

Drought can develop on a relatively short time scale in lawn and agricultural systems, so UAH developed a Lawn and Garden Moisture Index based on high-resolution radar derived precipitation data. In order to retain the high spatial resolution and daily updates, we are testing the incorporation of insolation measured NOAA geostationary satellites. We were successfully in tests of scripts to access the GOES data for ingestion into DSSAT crop models and are now ready for a real-time test during the 2009 growing season.

Objective 4: To develop improved methods for integrating models from different disciplines for application of climate forecast information in agricultural and water resource decision making

Activity 4.1 Exploring associations between a new water deficit index and crop yields

In continuation to the previous year's work on testing the hypothesis that an agricultural drought index can be used to predict yield loss due to drought and that the performance of a drought index can be evaluated based on the accuracy of the index to make yield predictions, ARID will be evaluated by comparing the index-predicted yields with actual yields through exploring relationships between ARID and yields of several crops such as soybean, cotton, peanut, and hay, using the data from various locations in the SECC region collected over a number of years. (UF, UGA, UAH)

Activity 4.2 Support development of regional drought information system for the southeast USA

The US NIDIS program plans to develop a pilot effort for the southeast USA that will help meet the needs for the region. We will support that effort through the provision of drought monitoring and drought forecasting tools and by contributing to organizational and planning efforts. (UF, UM, AU, UGA, UAH, NCSU)

Activity 4.3 Reducing drought risks for small municipalities in the southeast USA through development of municipal water deficit index

The goal of the project, which is led by Auburn and has cooperators from UF and UGA, is to reduce drought risks for small- to mid-sized communities in the southeast. The specific objectives of the project are:

- Identify key stakeholders, assess drought-related climate information needs of these communities, identify current and promising new policies for drought mitigation, and elicit data to refine hydrologic and economic modeling;
- Quantify value of drought information, and evaluate cost-effectiveness of alternative policies for drought risk reduction; and
- Develop municipal water deficit index (MWDI) and prototype visualization tool for disseminating drought information.

(AU, UF, UGA)

Activity 4.4 Climate data analysis across Georgia

We will continue with the analysis of station-by-station information on historical ENSO effects, especially as it relates to water resources management. (UGA)

Objective 5: Foster effective use of climate information and predictions in forestry and wildfire management

Activity 5.1 Enhance the wildfire potential forecast system and extend to other forestry applications

In response to the wildfire threat forecast assessment, the KBDI forecast tool will be expanded and enhanced for greater utility. A tool will be developed that can display historical, current, or forecasted KBDI values for the Southeast in the same web interface. A KBDI real-time monitoring system will be established that utilizes high-resolution rainfall data such as the NWS stage III radar estimates. The forecast will also be expanded to all 12 months of the year, rather than just the wildfire season. (FSU, UGA)

Objective 6: Document and assess the utility and impact of climate forecast information provided to stakeholders in agriculture and water resource management

Activity 6.1 Gather feedback from farmers, extension agents, and other climate information users

Activity 6.1.a. Assessment of Agro*Climate *tools and information. This activity aims to assess operational, communication, application aspects of *AgroClimate* from a diverse range of user perspectives in order to inform efforts to improve *Agro*Climate and to develop demand-driven tools. *Agro*Climate assessment will focus on hands-on sessions for farmers and extension agents in FL, GA, and AL. A protocol is being developed to elicit critical feedback within the relatively limited time available for the activity. Assessment researchers will also collaborate with SECC extension specialists to conduct evaluations at workshops and other farmer or extension agent meetings. (UM, UGA)

Activity 6.1.b. Stakeholder interviews. This study aims to deepen our understanding of farmer perceptions of climate variability, their knowledge of ENSO tele-connections and local effects, attitudes towards climate forecasts, different types of farming systems, vulnerabilities and resilience, crop management strategies and decisions, and their information needs. We will focus on selected counties in North Central Florida, where we can capitalize on existing contacts with extension and other intermediaries. We will seek to include different types of producers, e.g. large vs. small or full-time vs. part-time. We will pursue entry points for research among socially-disadvantaged by working through extension service specialists or NGOs. Data collection will center on in-depth open-ended interviews, which will follow a flexible interview guide. We may also explore cognitive dimensions of farm and water management decision making, in order to integrate consideration of such aspects in impact assessment. (UM, UGA, AU)

Activity 6.1.c. Water resources stakeholder assessment. Development of relevant, useful predictive climate information for water management will require close interaction with stakeholders in the region. Given the impact of urban centers, such as Tampa and Atlanta, stakeholder assessment must consider multifunctional uses beyond agricultural production. Initial stakeholder assessments will emphasize larger-scale decision makers, including relevant federal, state, and local agencies, reservoir managers, and utility companies. On a state-by-state basis, SECC members will decide the appropriate balance between rural and urban concerns regarding water stakeholder assessment. Assessments will be structured according to a conceptual framework based on the decision hierarchy, that is, who makes what decisions, when and how decisions are made, and who is affected by those decisions. Exploratory research will build upon work that is already underway and issues that are important to the region or locality. N. Breuer will coordinate stakeholder analysis frameworks in the three states. (AU, UM, UGA)

Activity 6.2 Training courses and workshops

We will collaborate with agricultural and water resources extension specialists in the conduct of training courses workshops for boundary groups and end users on the applications of climate information. In addition to helping present information during these events, we will also conduct pre- and post-event surveys to evaluate the efficacy of the event. (UM, UGA)

Activity 6.3 Assessing stakeholder interests and needs for climate change information

While there is much information available about global climate change, there is far less information available on the probably local impacts of climate change. Rational adaptation strategies require local or regional information. Moreover, the stakeholders for climate change information appear to come from many more sectors than the agricultural and water resource managers that the SECC has targeted to date. In this activity, we will focus on the needs for climate information and tools for local governments, business, such as environmental engineering firms, as well as agricultural stakeholders. We will also evaluate options for adaptation, provide training on the use of appropriate tools, and develop appropriate and relevant education material within the context of climate services. (UF, UGA, UM)

Activity 6.4 Perceptions of climate variability and use of climate forecasts in management decisions by farmers

This study aims to better understand farmers' perceptions of climate variability, their understandings, and attitudes towards climate information, their crop management decisions, and their information needs. (UGA)