

Plan of Work for SERA 43
Southern Region Integrated Water Resources Coordinating Committee
October 1, 2014 through September 30, 2018

Project Number: Southern Extension and Research Activity (SERA) - 43

Requested Duration: October 1, 2014 to September 30, 2018.

I. Activity Title: Southern Region Integrated Water Resources Coordinating Committee

II. Statement of Issues and Justification:

Water has long dictated the distribution of population in the Southern region of the US. Humans have developed elaborate systems of infrastructure, water rights laws, institutions, and corporate entities to govern the use of water for agriculture and urban uses. The resulting modified water system dramatically impacts agroecosystems and their ability to provide food, water, and essential ecosystem services. SERA 43 will advance an innovative transdisciplinary paradigm to transform our understanding and management of coupled social-hydrologic-ecological water systems in the face of changing climate, land use, and populations over the next 50 years. We will work to engage the research, extension, and teaching capacities of the Land Grant University (LGU) system in the Southern US region (AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA) in a collaborative effort that will further strong regional ties between LGUs, decision-makers, and citizens working together to address critical water resource management issues.

The overall goal of SERA 43 is to better understand and advance progress on a trifecta of water related issues; water security (e.g., supply), water quality (for both agricultural production and human consumption), and provision of ecosystem services that are increasingly recognized as critical socio-economic constraints on agricultural production. Specific goals include: 1) Measure and quantitatively model linkages and feedbacks among key social, built (urban), hydroclimate, and ecological components of representative southern agricultural water ecosystems; 2) Use the integrated field and modeling results to characterize and predict the impacts of altered hydroclimate (e.g., drought, flooding, temperature) on hydrologic flows for agriculture, local communities, and ecosystem services; and 3) Provide suggested adaptation mechanisms for communities and agricultural producers to pave a ‘way forward’ in the face of present and anticipated future water constraints. These goals will support the science to answer such critical questions as: How can greater understanding of linkages among social, hydroclimate, and ecosystem components of southern water systems improve the ability of decision-makers to balance future agricultural production needs with population growth and ecosystem services in the face of anticipated biotic and abiotic stressors? And, what are the emerging threats and constraints to water availability in the southern region? A cross cutting theme of our work enables development and dissemination of educational modules and technology transfer of lessons learned to stakeholders (e.g., government and non-government institutions, agricultural producers, businesses, citizens, etc.) using multiple venues and tools.

New technologies, best management practice adoption, and improved water policies are needed to meet future water resources challenges. For agriculture, these include developing water-efficient crop varieties and cropping systems, increasing water capture technologies,

developing dryland and limited-irrigation strategies, improving water distribution systems and irrigation efficiencies, and developing economic risk assessment tools that enable producers to identify profitable, water-efficient production options. Agriculture also must protect water resources by reducing off-site transport of sediment, nutrients, pesticides, and pathogens. Similar challenges exist for the urban sector to enhance domestic water conservation, improve irrigation efficiency and management, improve landscape design, expand and optimize water reuse, and improve water capture, while at the same time reducing nonpoint source pollution in stormwater runoff. All citizens will be affected by these outcomes and are critical stakeholders in achieving long-term water security.

III. Objectives:

- 1) Foster multi-state, multi-disciplinary collaboration to address high priority water resource issues by:
 - a. Developing more effective linkages between extension and research personnel at LGUs and with external partners,
 - b. Establishing priorities for LGU work on southern water resource issues, and
 - c. Facilitating collaborative, multi-state proposals and programs to address identified issues, and where appropriate, coordinate use of internal funding on priority projects.
- 2) Co-sponsor re-establishment of a National Water Conference in concert with the Soil and Water Conservation Society, and conduct a biennial, regional water conference to share research, extension, and education resources, and to facilitate broader interaction among faculties and with external partners.
- 3) Develop a web-based portal for LGU water programs, curricula, and resources to enhance technology transfer among institutions and to external partners and clientele.

IV. Procedures and Activities:

Thirty-two faculty representing 20 1862 and 1890 institutions participated in the first face-to-face meeting of SERA 43 in Atlanta, Georgia on March 6-7, 2014. Three subject matter workgroups were established to address key issues facing the Southern Region 1) Water Quality, 2) Water Quantity/Availability and 3) Ecosystem Services (Watershed Restoration and Management). Each team identified critical water resource issues that will be targeted over the next four years through integrated research, teaching, and outreach program efforts. These objectives include:

Water Quality

- 1) Social, economic, and programmatic factors affecting producer adoption of water quality Best Management Practices (BMPs) – Can conservation programs be more effectively designed and delivered.
- 2) Edge-of-field assessment of implemented BMPs: are they being targeted to critical pollutant source areas (CPSAs).
- 3) Innovative management of nutrients, tillage, and drainage structures that minimizes nutrient loss and limits tradeoffs between production and environmental goals.
- 4) Measuring, tracking, and treating emerging contaminants.
- 5) Identification and quantification of legacy phosphorus (P) sources at local and regional scales.

- 6) Use of natural tracers and isotopes to source / date groundwater flows contributing to watershed nutrient discharge at no smaller than a 12 HUC level.
- 7) Assessment of surface water quality parameters for improved watershed decision making in specialty crops production.
- 8) Assess the impacts of climate change/variability on nutrient cycling in agroecosystems and nutrient loss to water bodies using modeling, measurement and key water quality indicators.
- 9) Differentiating the drivers of nitrogen (N) and P loss that result from climate change (unmanageable) and land use (manageable).
- 10) Development of science-based climate change curricula to educate youth on the impacts of climate change and climate-changed induced water resource issues.

Water Quantity

- 1) Identify how spatial and temporal factors influence the value of water and how water rights affect the efficient allocation of resources in the face of binding constraints.
- 2) Determine the impact of climate variability (drought, floods, temperature) on water resources and how sector demands can shift to meet critical needs (e.g., shift from surface to groundwater).
- 3) Assess how markets, policy, and infrastructure investments can be designed to meet the long-term goals of diverse water stakeholders.
- 4) Identify alternative cropping systems that enable economic sustainability in areas where non-agricultural water demands reduce irrigated acreage.
- 5) Explore water rights issues facing agronomic crop production (irrigation) in the southern region.
- 6) Evaluate agronomic and engineering approaches to maximize irrigation water use efficiency in agronomic crop production systems.

Ecosystem Services

- 1) Assess and communicate how human-altered hydrologic flows affect aquatic biota, habitats, and the ecological services they provide.
- 2) Define how agricultural and urban water demands can be most efficiently managed to protect and sustain essential ecosystem services.
- 3) Conduct comprehensive literature reviews to quantify the effectiveness of stream restoration and low impact development in maintaining and restoring ecosystem services on agricultural lands.
- 4) Based on assessments of existing science, develop and enhance stream restoration and low impact development research, education, and outreach programs.

A Letter of Intent submitted by SERA 43 to USDA NIFA was accepted and a Coordinated Agricultural Project grant will be submitted on Aug 13th 2014 for funding through the AFRI Water for Agriculture Challenge Area. In addition, this and other potential funding sources will be pursued by SERA 43 workgroups and team members to address the target issues identified above.

SERA 43 also is participating in a collaborative NIFA AFRI Water for Agriculture Challenge Area conference grant writing effort to organize/conduct a national water conference in collaboration with the Soil and Water Conservation Society.

North Carolina State University is providing leadership for development of a SERA 43 website which will serve as a clearinghouse for water resources information and tools (<http://sera43.soil.ncsu.edu>). The site will be reviewed and updated on a regular basis.

List-serves have been created for the membership and workgroups and will be utilized for routine communication. Additional members will be added as appropriate.

V. Expected Outcomes and Impacts:

- 1) New and innovative multi-disciplinary approaches that solve key water challenges in the South through capacity building between LGU research and extension faculty.
- 2) Increased number of cross-institutional research and extension collaborations that result in more effective planning and action to enhance, conserve, and protect water resources.
- 3) More resilient partnerships with key external entities engaged in water resource planning and management, e.g., federal and state water resource agencies, NGOs, business/industry.
- 4) Increased awareness and knowledge of water resource issues and increased adoption of science-based management practices for water conservation and water quality protection by agricultural and urban stakeholders.
- 5) Improved water and food security in the South.

VI. Educational Plan:

The annual meeting will serve as a venue for sharing information and resources among committee members that will then be communicated and/or distributed by members to all participating states, territories, and partner entities as appropriate. The national and biennial conferences will serve as a broader opportunity to provide training and share information, resources, and lessons learned. The regional website will provide a clearinghouse for water-related resources that can be accessed, adapted, and employed by member institutions, partner entities, and citizen stakeholders throughout the region.

VII. Governance:

Dr. Zach Easton (Virginia Tech) was elected as the inaugural chair of SERA 43; Dr. Carmen Agouridis (University of Kentucky) was elected as vice-chair; and Dr. Mark McFarland (Texas A&M University) will serve as past-chair. Elections will occur at each annual meeting with new officers installed at the conclusion.