

SC CASC SCIENCE NEEDS 2013

In Fiscal Year 2013, the SC CSC is interested in inviting Statement of Intent (SOIs) that address the following topical science needs:

The overarching theme that threads through this RFP for SC CSC will be "Precipitation Variability." The South Central region exists in a zone of dramatic transition both in terms of eco-climate system diversity and in terms of occurrence of extreme events. This transition zone is the perfect natural laboratory for development of climate and ecological models, and decision support tools for land and water managers, and culture keepers. Precipitation variability should be a component of consideration in the proposals along with the science priorities listed below.

The science priorities for the 2013 funding are:

1. Regional physical climate variability and trends.

- a. Develop tools to comprehensively assess strengths, weakness, and uncertainties associated with the understanding of the drivers of regional physical climate variability and trends in the South Central region. The project should incorporate observations, modeling and methods/techniques.
- b. Development of methodology for cataloguing high-resolution regional climate data (both observational and modeled) that is already available and currently under development for the South Central region.
- c. Establish variables and timescales *of* interest to stakeholders and identify ways to determine and communicate level of confidence for existing matching parameters in the catalogue of data.
- d. Develop methods to close research gaps for variables of interest that do not exist in catalogue and for an integrated approach towards the development of regional projections.

Example for over-arching theme: Ability to understand and model drivers of convective precipitation and resulting consequences to variables of interest such as soil moisture.

2. Ecosystems and landscapes.

- a. Identify major ecosystem drivers and disturbances across the South Central Region (extent of precipitation variability, temperature modification and extremes, impacts of fire, habitat fragmentation, land use change due to urbanization and agriculture, etc.) and assess the current level of understanding of each.
- b. Develop a methodology for compiling, organizing and assessing available data in the South Central region and for integrating results across varying scales (spatial, species, time, etc.).
- c. Establish priority landscape functions and services of concern to stakeholders and develop methods to close existing research gaps.
- d. Determine priority, order, and structure for future data collection and research efforts in the South Central region.

Example for over-arching theme: Develop tools and methods to enhance the ability to understand and model the resilience of ecosystems and landscapes to drought, flood or temperature extremes, and the resulting consequences on local biota.

3. Human dimensions as they relate to climate change and precipitation variability.

- a. Develop methods and approaches to studying-coupled human and natural systems and determine whether an appropriate framework exists, or can be developed for examining the impacts of climate change on human populations and cultures on a regional scale.
- b. Summarize research efforts undertaken so far in the South Central region, including both traditional populations and those especially vulnerable to climate changes such as Native American, coastal, low-

income, etc. communities.

- c. Evaluate opportunities for collaboration between participants and examine how to incorporate additional available data sources such as traditional ecological knowledge.
- d. Develop a geospatial representation of evapotranspiration for use in the analysis of agricultural water use that is compatible with geospatial data for water use analysis needed for natural resources.
- e. Using estimates of population growth and demographic data, predict future impacts on habitat fragmentation and on the ability of tribes to maintain cultural practices which rely on plant and animal species.
- f. Identify best practices for valuing landscapes and evaluating impacts of landscape change on sacred sites (so lar, wind, water withdrawal, recreation). Identify best practices for consultation and preserving sacred significance of landscapes.
- g. Model analysis of predicted changes in ecosystem composition and distribution across the tribal lands to look at species abundance, distribution, habitat, and human impact. Consider the time between changes before, during, and after dramatic changes in climate; impacts of resource availability for animal and human consumption (e.g. grasses, shrubs, trees, and medicinal plants); and estimate when changes may occur (e.g. extinction events, increase in species list of being threatened and endangered).
- h. Develop method to incorporate Gallons Per capita Depletions per Day into global climate models to understand what is going to happen to depletions over time.

Example for overarching theme: Ability to understand and describe the impact of sea level rise on coastal communities, their perceived risk, and the resulting individual and group actions.

Example for overarching theme: Ecosystem services are a nexus between the ecosystem functionality, changing landscapes, and human decision making

(conservation decisions, policy decisions, etc.). Develop research projects, tools or models that consider climate change and precipitation variability, specifically considering the human dimensions' aspects in determining valuations of various ecosystem services, and how they might be applied to conservation and land management decisions.

4. Conservation and water governance

Water governance decisions are often characterized by conflicts over how to prioritize and balance diverse societal water uses with the needs of fish and wildlife resources (and the services they provide). This has been especially true in the Southeast, South Central and South West, CSC regions that have seen limited success reconciling conservation of fish and wildlife resources with other water use. Science and decision making tools have not fully met the challenge of incorporating fish and wildlife conservation into the larger context of water governance, which encompasses a broad range of social, economic, and aesthetic values.

LCC's thus face the challenge of developing conservation planning tools that are transparent in how they account for diverse stakeholder values concerning water quantity and quality within large river basins. This challenge is made more difficult by an incomplete understanding of the relationship between a changing climate, altered hydrologic regimes, and conditions in human and natural ecosystems. To develop effective strategies for adapting to change, decision makers must understand (a) how their conservation activities are influenced (constrained) by water-management policies that are beyond their direct control; as well as (b) how to value fish and wildlife resources so tradeoffs with the broader suite of water-related uses can be analyzed; this can help ensure that fish and wildlife resources receive due consideration in the development of water-management policies by those that have the authority to do so.

Proposed research related to this topic should attempt to:

1. Describe how fish and wildlife conservation decisions are situated within a broader context of water governance at the scale of one or more river basins in the SC CSC, or in addition to SE and/or SW CSC geographic areas:
2. Determine how existing water governance and stakeholder interests either

- limit or enable potential conservation strategies;
3. Develop methods to identify preferred conservation actions or strategies that conservation partners can implement to enhance fish and wild life resources in the face of changing river hydrology;'
 4. Explore decision analysis and decision support modeling tools that can be used to aid decisions made in the face of uncertainty about water-resource dynamics and the impacts of water management; and
 5. Develop and apply valuation methods that will (a) help identify tradeoffs among biological resources within existing or developing conservation partnerships (e.g., LCCs); (b) promote a more comprehensive assessment of competing values by those authorities charged with managing water quantity and quality in river basins; and (c) enable decision makers to understand and account for uncertainty in assessing tradeoffs.