CLIMATE RESEARCH

The Oklahoma NSF EPSCoR Research Infrastructure Improvement Award No. IIA-1301789 (2013-2018), "Adapting Socio-Ecological Systems to Increased Climate Variability," is a multi-institutional collaborative project that includes researchers from Oklahoma State University, Samuel Roberts Noble Foundation, University of Oklahoma and University of Tulsa.

The knowledge gained from this project will be used to empower managers to effectively adapt social and ecological systems to climate variability, to educate Oklahomans about the expected consequences of regional environmental change, and as a foundation for future climate researchers' work.

ADAPTING SOCIO-ECOLOGICAL SYSTEMS TO INCREASED CLIMATE VARIABILITY

Oklahoma's unpredictable weather and large precipitation gradient work together to create a vulnerable and diverse landscape that is exceptionally well-suited for the climate-based research that Oklahoma NSF EPSCoR scientists are performing. Five study areas have been identified: North Canadian River watershed, Cimarron River watershed, Washita River watershed, Kiamichi River watershed, and the Oklahoma City metropolitan area.

The research team, representing more than a dozen disciplines and four institutions from across the state, is working to advance understanding of how socio-ecological systems can adapt sustainably to increased climate variability, especially as it relates to drought and water resource management.

An Integrated Approach

EPSCoR scientists are examining complex human, climate and natural resource systems while addressing three interlinked research focus areas: an observatory network, a modeling and prediction system, and a decision support system. The innovative project addresses each of the research objectives in tandem, as well as their collaborative interactions.

EPSCoR SCIENTISTS ARE FORGING NEW PATHS IN SOCIO-ECOLOGICAL RESEARCH.

DEFINING THE PROJECT

Oklahoma NSF EPSCoR's socio-ecological system research studies how humans and the environment interact with one another and how those relationships can adapt to changes in climate. As an example, drought conditions are expected to increase with climate variability. How will farmers' use of water resources change during times of drought compared to current use patterns? This and other important questions are being addressed through the EPSCoR RII award's research.

Photos courtesy of Oklahoma State University

RESEARCH OBJECTIVES

The Oklahoma NSF EPSCoR project is innovative in addressing each of the research objectives in tandem, as well as their interactions.

ADAPTING SOCIO-ECOLOGICAL SYSTEMS TO INCREASED CLIMATE VARIABILITY

Socio-Ecological Observatory

Establish a first-of-its-kind, statewide, socio-ecological observatory network designed to provide a systems-level understanding of the coupled human and natural system under a variable climate.

In addition to existing data that are being used in the Observatory, EPSCoR researchers are currently developing the following new datasets:

- Societal perceptions of climate and weather events from a first-of-its-kind longitudinal survey
- Streamflow diagrams
- Runoff and groundwater recharge from new micro-catchments
- High-resolution soil moisture maps from the new cosmic-ray neutron rover

Pictured left: Installing micro-catchments to aid in understanding runoff and groundwater recharge patterns

DECISION-SUPPORT SYSTEM

Create a decision-support system that provides researchers, educators and practitioners with data, models, tools and scenarios that are needed to explore and understand the social and ecological impacts of management and policy decisions.

Some cyber tools being developed:

- Water Data Portal www.oklahomawatersurvey.org
- Watershed-specific websites
- CyberCommons online access of research data
- New decision tools for water planning

Pictured above: Cosmic-ray neutron rover, currently in the testing stage, will be used to map soil moisture. Photo credit: Yohannes Tadesse Yimam

Pictured right: A surface flux tower is deployed to measure water and carbon exchanges between the atmosphere and land surface.

Photo credit: Jeff Basara, University of Oklahoma

Socio-Ecological Modeling and Prediction System

Develop a fully integrated modeling and prediction system based on Observatory data to predict future socio-ecological scenarios. Qualitative and quantitative approaches will be used to systematically examine insights from disciplinary and integrated perspectives.

FOR MORE PROJECT INFORMATION

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