

ECONOMICS

NSF grant enhances Oklahoma research infrastructure

by Jon Biermacher / jtbiermacher@noble.org



The Oklahoma economy is heavily dependent on the extraction and use of natural resources. Predictable and increasing services of energy, food, fiber,

freshwater and clean air are needed to maintain a healthy society. This is particularly true where climatic shifts and extremes have the potential to systemically change our food production, water resources management and transportation systems.

In Oklahoma, substantial gradients in precipitation, land cover, population and agriculture, and a diversity of Native American tribes make climate change an impending socio-ecological threat. To develop sustainable natural resource supplies that support a vibrant economy with healthy and productive citizens, we need to develop knowledge for anticipating future socio-ecological and socioeconomic systems, and for adapting how we use ecosystem services in a changing climate. The recent multiyear drought throughout the Southern Great Plains has highlighted the very real risks and vulnerabilities that variability in the climate imposes on socio-ecological systems.

In response to these issues, a

multi-institutional, multidisciplinary team of researchers at Oklahoma State University, the University of Oklahoma, Tulsa University and The Samuel Roberts Noble Foundation were awarded a five-year, \$20 million Experimental Program to Stimulate Competitive Research (EPSCoR) grant from the National Science Foundation (NSF). The research team consists of a diverse mix of basic and social scientists, including anthropologists, ecologists, sociologists, geographers, political scientists, meteorologists, hydrologists, plant and soil scientists, computer and cyber infrastructure scientists, rangeland scientists, and agricultural, natural resource and environmental economists.

The team's goals are to empower managers to effectively adapt socio-ecological systems to climate change and educate Oklahomans about regional environmental changes.

The grand vision of this project is to significantly advance our understanding of how socioeconomic and socio-ecological systems can adapt sustainably to increased climate variability caused by a changing climate. More specifically, the project focuses on water availability because it is a major stressor in Oklahoma as well as in semiarid lands around the world. To accomplish our vision, funds from

the EPSCoR grant will be used to improve our research infrastructure, transforming Oklahoma's capability to be nationally competitive in the increasingly important research area of coupled human and natural systems, and other programs in NSF's crosscutting Science, Engineering and Education for Sustainability portfolio.

Our first order of business will be to develop a first-of-its-kind, state-wide, tightly coupled human and natural systems observatory with integrated measurement, modeling and prediction capabilities, and downstream decision-support systems. The observatory platform comprises three elements: 1) a world-class, socio-ecological observatory that collects key observations of human and natural systems that are currently under-sampled or not measured; 2) a socio-ecological modeling and prediction system that integrates qualitative and quantitative approaches, and systematically examines insights from both disciplinary and integrated perspectives; and 3) a decision-support system that provides researchers, educators and practitioners the data, models, tools and scenarios to explore and understand the social and ecological impacts of decisions related to a specific need, such as a statewide water portal. ▶

ECONOMICS

This multiyear project: 1) leverages core strengths in weather and climate, environmental sociology, high-performance computing, data assimilation, numerical modeling, remote sensing, agriculture, and terrestrial ecology; 2) will add new faculty, capabilities and infrastructure, particularly in social and ecological sciences as well as human and natural systems research; and 3) will

make significant progress towards integrating these strengths around the themes of socioeconomic and socio-ecological adaptation to climate change, with a particular focus on water availability. Research infrastructure improvements are expected to position Oklahoma researchers on a highly competitive footing for sustained research and future funding success. This use-inspired basic

research will also enable researchers and extension specialists to co-produce research-infused products and tools with resource managers and policymakers.

This is a very exciting advancement in research capacity for the state of Oklahoma, and the Noble Foundation is proud to be a part of it. We will update you about our progress as this project moves forward. ■