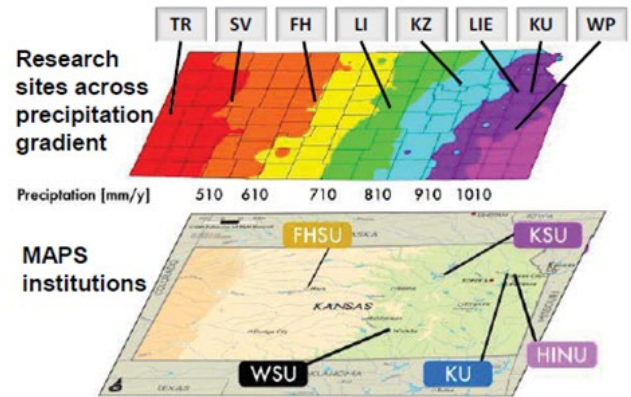




Microbiomes of Aquatic, Plant and Soil Systems Across Kansas (MAPS) Kansas NSF EPSCoR RII Track-1 Award OIA-1656006

Overview:

Microbiome science is an emergent discipline recently recognized as a critical pursuit for understanding ecosystem function. The challenge of simultaneously feeding a growing population, sustaining agriculture, maintaining soil quality, and minimizing greenhouse gases and water contaminants requires new data-driven solutions based in a fundamental understanding of the role and dynamics of Microbiomes of Aquatic habitats, Plants, and Soils (MAPS). MAPS mediate disease and productivity of plants, control the quality of water, and moderate edaphic characteristics and greenhouse gas production. The goal is to create an



observational and experimental network across the strong precipitation gradient in agriculturally-dominated Kansas, using both agricultural and native sites. This project extends traditional scientific approaches to work at scales ranging from genes to ecosystems, and across habitats (terrestrial to aquatic). The MAPS Team will specifically aim to quantify how climate and land-use legacies govern MAPS as a means of predicting the



resistance and resilience of multiple ecosystem properties to long-term (e.g. contemporary climate change) and punctuated (e.g. extreme climate events, land use changes) perturbations. To do this the team will couple coordinated sampling and experimental manipulations of terrestrial and aquatic environments across Kansas' precipitation and land-use gradients. A synergistic interdisciplinary research network with common interests in the role of microbiomes will be created along with databases to link metagenomic data to environmental parameters. While previous efforts have focused on plant, soil and aquatic microbiomes individually, our novel, integrated investigation across these natural biomes can inform best management practices to curb terrestrial resource losses and maximize agricultural productivity, while controlling pollutants. These results will be important in Kansas and beyond, informing basic research relevant to myriad agricultural landscapes globally.

The broader impacts of this project include the contributions of the findings as part of a broader societal goal of realizing sustainable food production while protecting soil, water, and human health. MAPS science underpins the function and supply of freshwater ecosystem services that are so crucial to Kansas' water needs. We have developed an integrated group of educational and outreach programs that focus on hypotheses, approaches, and findings that are foundational to our disciplines, and also emphasize the sense of excitement and relevance inherent in scientific problem-solving. Our programs will reach individuals of all ages and levels: K-12 students and teachers; undergraduate and graduate students; faculty members at tribal colleges and four year institutions; and adults interested in broadening their knowledge.