THE UNIVERSITY OF ARIZONA

School of Natural Resources and the Environment

William G. McGinnies Annual Lecture

SHRUB ENCROACHMENT ALTERS ECOSYSTEM PROCESSES: LINKING IMAGING SPECTROSCOPY AND MICROBIAL BIOGEOCHEMISTRY

SPEAKER: **Martha Gebhardt**

2017 McGinnies Scholar

DATE: **Friday November 16th, 2018**

TIME: **11:00 am to 12:00 pm**

LOCATION: **ENR2, N350**

ABSTRACT: Arid and semi-arid grasslands are undergoing prolific changes in vegetation due to woody shrub encroachment that causes large-scale shifts in biogeochemistry. Nitrogen-fixing mesquites, a common shrub to invade these areas, fundamentally alters ecosystem processes by changing plant community diversity, net primary productivity, and soil functioning. Although the spread and proliferation of these shrubs is well documented, uncertainties related to landscape-scale biogeochemical consequences and spatial patterns associated with shrub invasion remain. This information is needed to quantify the effects of vegetation changes on nutrient cycling, soil functioning, and other ecosystem services. This project offers a novel approach to answering these questions by combining remotely sensed data from an open-access data platform to infer foliar chemistry with in situ measures of plant and soil biogeochemistry to quantify the impacts of shrub encroachment on nutrient dynamics at The Santa Rita Experimental Range (SRER) in southeastern Arizona. This study explores how hyperspectral data can be used to quantify changes in ecosystem services due to differences in vegetation chemistry and associated belowground processes across a landscape. These data are used to investigate the link between soil nutrients, topography and the abundance of shrubs and grasses; the potential effects of shrub encroachment on landscape-scale nutrient dynamics; and the utility of imaging spectroscopy to inform management practices through remote monitoring. SRER is an ideal location to investigate these questions because of the long-term data on vegetation and soil dynamics and the National Ecological Observatory Network (NEON) airborne observation platform, which offers a unique opportunity to map patterns of plant species, litter inputs and microbial-mediated biogeochemical cycling across the landscape. Scaling of plant and microbial interactions to landscape and regional scales is essential to sustainable land management worldwide.