LCLUC Abstract

Landscape Dynamics and Land-Use Land-Cover Change in the Great Basin-Mojave Desert Region

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The proposed research seeks to determine the relative importance of environmental changes occurring in semiarid regions, their drivers, and the implications for future climatic, land use, and land cover scenarios. Quantifying the relative importance of the drivers and impacts has the potential to guide future decisions in semiarid regions. We propose to address these long-term goals through an analysis of the Great Basin-Mojave Desert (GBMD) ecoregion of the SW US using a multitemporal and multsensor analysis of remotely sensed data, regional environmental data, and integration of results from other case studies focusing on semiarid regions.

There are three focus Land Use Land Cover Change (LCLUC) areas of investigation for this research: regional invasion by non-indigenous plants, expansion of pinyon-juniper woodlands, and loss of wetland communities. These three areas have important implications for LULCC in semiarid regions as they impact large regions and/or critical environments, changes in land cover due to these processes are strongly controlled by anthropogenic factors, the changes may have profound effects on the capacity of this semiarid region to deliver ecosystem goods and services, and the changes will effect water and nutrient cycling on the landscape. The native ecological communities of the Great Basin-Mojave Desert region are adapted to a highly variable climate and will respond to its variability in predictable ways. Land cover exhibiting a response significantly different from that expected of native ecosystems will be in areas affected by anthropogenic drivers of land cover change. This anomalous response is defined as: (1) Interannual change in vegetation decoupled from climate variability or from the response of native communities. (2) Interannual change in vegetation cover coupled with climate variability, but amplified relative to native systems.

Recognition of anomalous response associated with these LCLUC processes, quantifying the impacts across the region of the GBMD, and determination of the relative impacts requires a multisensor, multitemporal remotely sensed data approach. High temporal, coarse spatial resolution data provide the capability to identify locations of significant change across the region, while high spatial, but low temporal resolution data provide the necessary details of the processes and impacts. Integration of such observations with in situ, socio-economic, and regional land use data provides information for determining the drivers and impacts behind the processes.

We propose a coupled scale-up<=>scale-down approach to the analysis. The scale-up approach capitalizes on completed research and extensive in situ data in Owens Valley CA. LCLUC processes recognized in the field and at Landsat TM resolution will be scaled to AVHRR to determine the regional significance of processes and their impacts. The scale-down approach identifies anomalous interannual response of land cover in the AVHRR data across the GBMD. We then scale-down to Landsat and field data to determine processes and local impacts. Collaboration with regional scientists and land managers will provide guidance on sites for intensive investigation and for assessing impacts.