

24th Annual Landscape Ecology Symposium
Landscape Patterns and Ecosystem Processes
Snowbird, Utah | April 12-16, 2009

Abstracts: p.159

295. Estimation of Livestock Appropriation of Net Primary Productivity in Texas Drylands

Authors: WASHINGTON-ALLEN, Robert, Department of Ecosystem Science & Management, TAMU; Jody Fitzgerald, Department of Geography, TAMU; Stephanie Grounds, Department of Atmospheric Sciences, TAMU; Faisar Jihadi, Department of Ecosystem Science & Management, TAMU; John Kretzschmar, Department of Geography, TAMU; Kathryn Ramirez, Department of Ecosystem Science & Management, TAMU; John Mitchell, USDA Forest Service, Rocky Mountain Research Station.

Poster #4: Arid landscapes - Monday, April 13: 5:30-7:00 - Mezzanine/Atrium

Abstract: The ecological state of US Drylands is unknown. This research is developing procedures to determine the impact of the ecological footprint of grazing livestock on the productive capacity of US Drylands. A pilot geodatabase was developed for the state of Texas that includes 2002 data for county boundaries, net primary productivity (NPP) derived from the Moderate Resolution Infrared Spectroradiometer (MODIS), USDA's National Agricultural Statistics Service's (NASS) county-level data on livestock type inventories, the 2001 National Land Cover, and 50-year gridded mean annual precipitation (MAP) and mean annual potential evapotranspiration (MAPET) data. The Aridity Index was generated from the ratio of the MAPET to MAP to define Drylands for Texas along with Texas county information. The Texas NLCD was subset and converted to grazing land only. Grazing land was used to subset the US NPP to indicate the forage available to livestock. The NASS livestock inventories were joined to Dryland counties and numbers of livestock were converted to forage required based on animal unit standards for sheep, cattle, and goats yielding livestock ecological footprint maps.

The footprint maps were subtracted from the NPP map to yield livestock appropriation of net primary productivity maps. Results indicated that for each type of livestock, forage consumption exceeded the available forage. It must be noted that 2002 was a drought year for Texas, which has been experiencing moderate to severe drought conditions in the past few years. Consequently, the available forage would be less under these conditions. Also this mapping exercise assumes uniform distribution of livestock within grazing lands, but this would not be the case. Additionally this model assumes fixed metabolic rates, which is not the case in drought years when forage requirements decrease. Nor does this model account for supplemental feeding of hay, a practice that is pervasive in this region.

Keywords: Animal unit, Aridity index, Ecological Footprint, LANPP, Net primary productivity