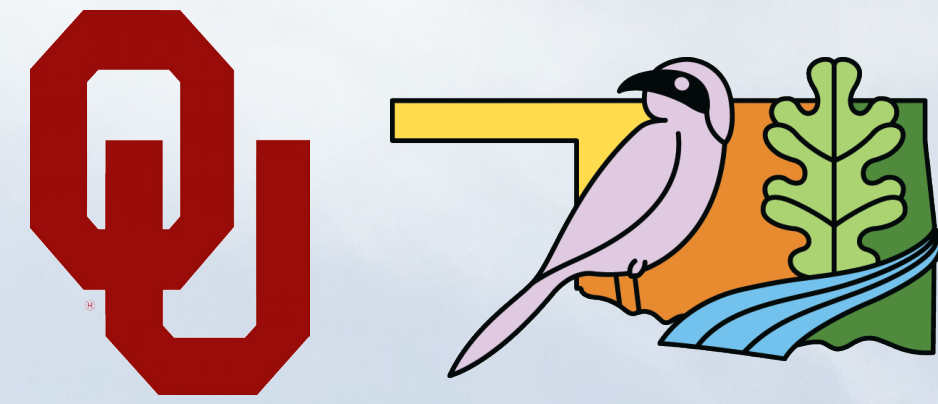


# Socio-ecological Perspectives on Drought: A Case Study from the Southern Great Plains



OKLAHOMA  
BIOLOGICAL  
SURVEY



Experiencing Drought  
in the Grasslands of  
the American West



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## INTRODUCTION

The ecological consequences of prolonged and recurrent drought are many and varied. These impacts may be further unintentionally exacerbated by state- and local-level public land and water management policies. With growing recognition of the role of land-use and land-cover change (LULCC) in global climate change (Pielke et al. 2016), understanding human LULCC decisions is essential for reducing vulnerability and enhancing resilience (Fagin et al. 2016; Wenger et al. 2017).

Drawing on land architecture (Turner 2010), landscape ecology, and governance theory (Ostrom 1990), this research promotes a holistic understanding of how couplings between humans and nature vary at multiple scales.

TABLE 1: LAND TENURE REGIMES

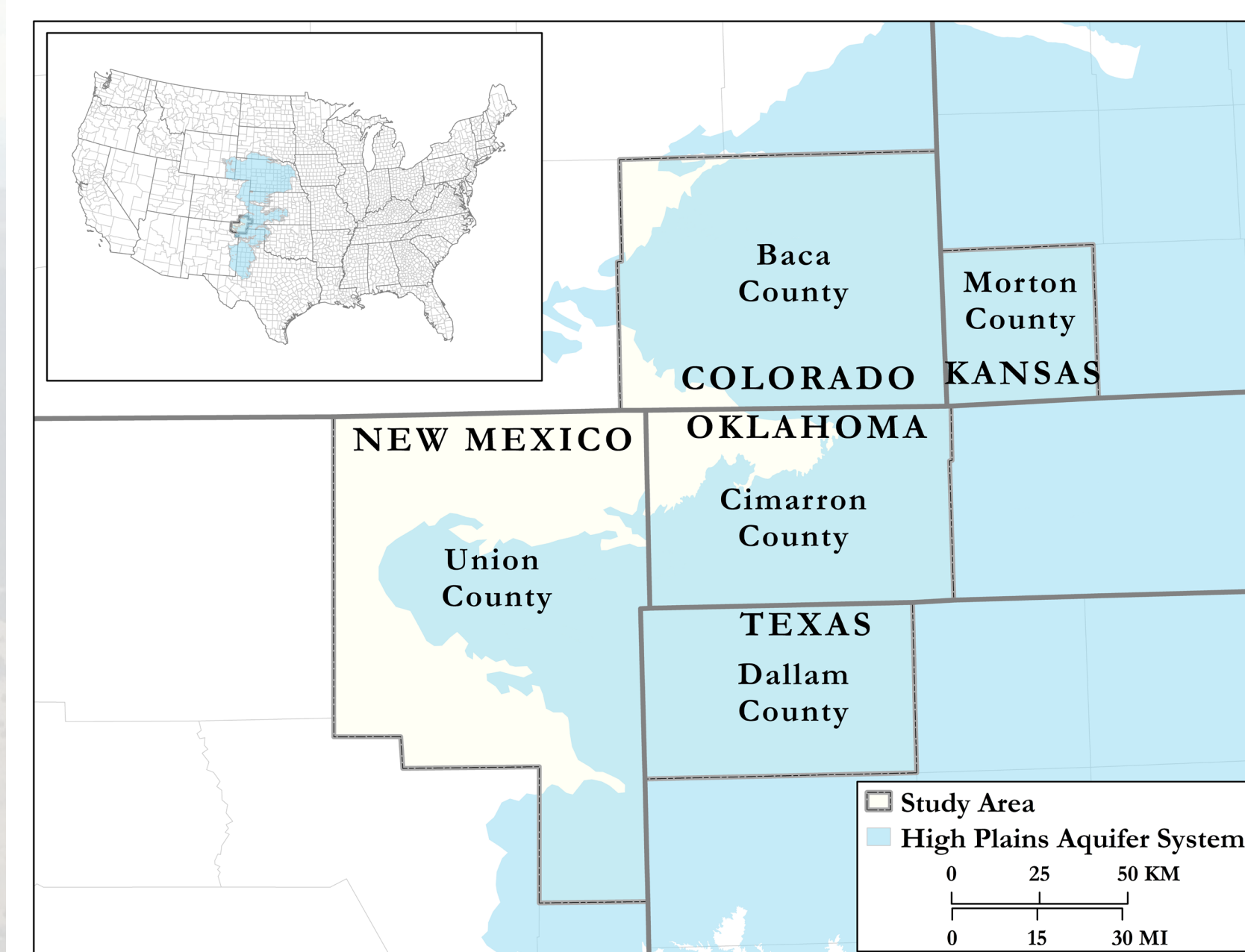
| Land Tenure (ha)        | Cimarron County, OK | Union County, NM | Dallam County, TX | Baca County, CO | Morton County, KS |
|-------------------------|---------------------|------------------|-------------------|-----------------|-------------------|
| Total Area              | 480,940             | 989,185          | 373,255           | 657,037         | 189,308           |
| Private Land            | 380,096 (79%)       | 788,790 (80%)    | 341,938 (92%)     | 467,245 (71%)   | 145,703 (77%)     |
| State Lands             | 92,575 (19%)        | 176,563 (18%)    | 0                 | 13,967 (2%)     | 0                 |
| State Parks/Other Lands | 1,254 (0.26%)       | 128 (0.01%)      | 0                 | 5,365 (0.82%)   | 0                 |
| Federal Lands           | 6,345 (1%)          | 23,703 (2%)      | 31,314 (8%)       | 169,411 (26%)   | 43,605 (23%)      |

Table 1 Source: GAP 2016. Table 2. Sources: Culp et. al. 2005; Fagin et al. 2016; Vadjunec and Sheehan 2010; Wenger et al. 2017

TABLE 2: LAND AND WATER GOVERNANCE

| State Lands Policy                 | Cimarron County, OK                                                          | Union County, NM                                                                | Dallam County, TX                                                              | Baca County, CO                                                                           | Morton County, KS                              |
|------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------|
| Lease/Term                         | 5 years                                                                      | 5+ years                                                                        | --                                                                             | 10 years                                                                                  | --                                             |
| Open Bidding?                      | Yes                                                                          | No. Preference rights attached to deeded land                                   | --                                                                             | No. Preference rights held by previous lessee                                             | --                                             |
| Sustainability Incentives Offered? | No                                                                           | Yes. Reduced rents (up to 25% off)                                              | --                                                                             | Yes. Renewal rights based on record of stewardship                                        | --                                             |
| <b>Water Governance</b>            |                                                                              |                                                                                 |                                                                                |                                                                                           |                                                |
| Ownership                          | Surface water (SW): belongs to state<br>Groundwater (GW) as private property | SW: belongs to public, controlled by state<br>GW usage under state jurisdiction | SW: in trust by state<br>GW: private property- "First in time, first in right" | SW: public good subject to appropriation<br>GW: private. "First in time, first in right"  | SW and GW: rights through prior appropriation  |
| Regulations                        | GW: "subject to reasonable use"<br>Well permits required                     | GW: (wells/usage) via permit (and amounts withdrawn) from State Engineer        | Rule of Capture - no permitting required, some exceptions                      | Permitting required from State Engineer (wells/pump rate based on 100yr. sustainability). | GW: subject to state regulation during drought |
| Reporting/Monitoring               | Self-reported                                                                | Metered                                                                         | Metered                                                                        | Self-reported                                                                             | Self-reported                                  |

FIGURE 1: Study Area

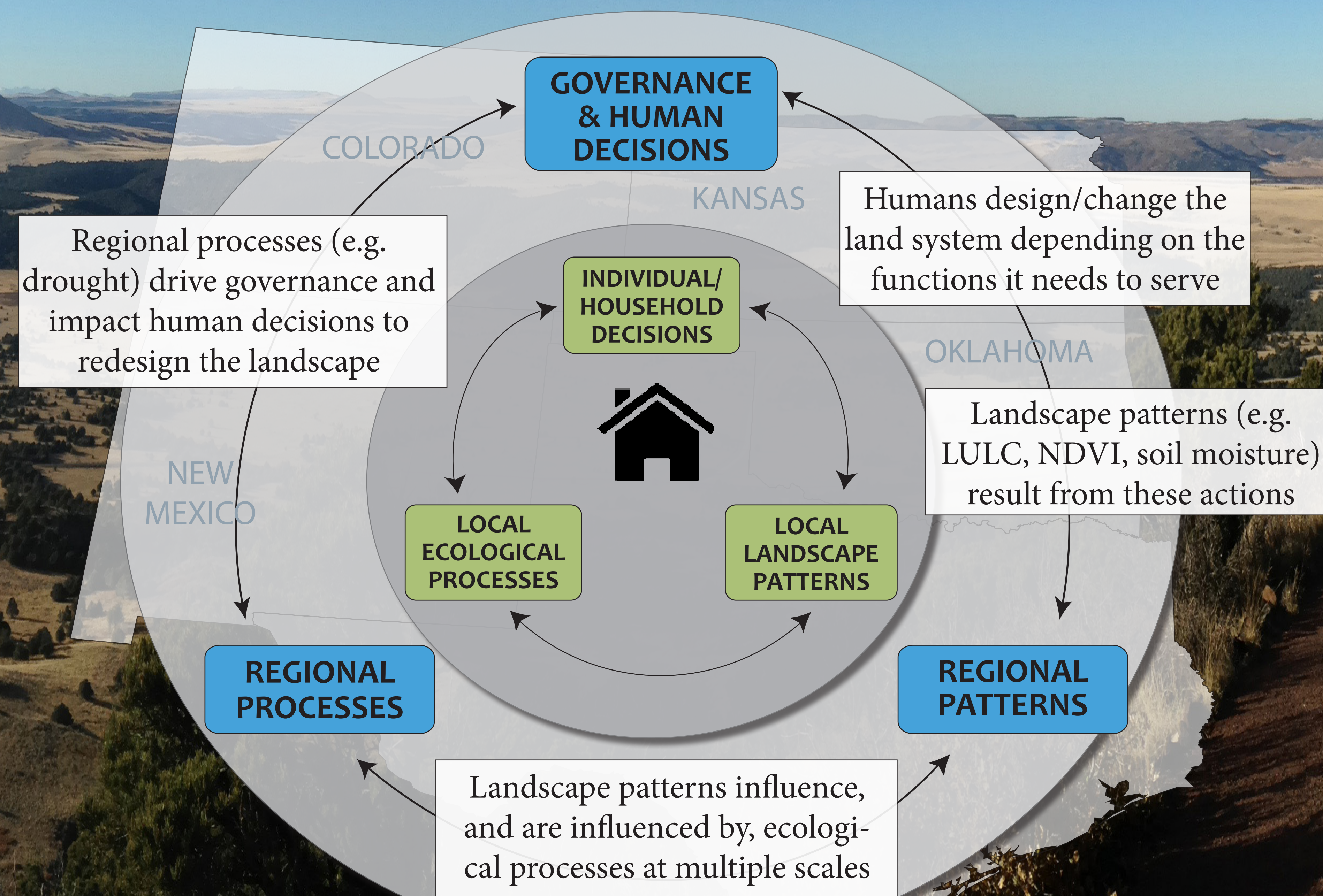


The '5 counties/ 5 states' area is a semi-arid region covering 2.71 ha in the Southern Great Plains. Economically dependent on agriculture, the region experienced 6 major drought events during the last 125 years - including the Dust Bowl (Vadjunec & Sheehan 2010) - that have shaped the ecology and cultural identity of the region and has influenced land managers' decisions.

## OBJECTIVES

Public land and water are life-sustaining commons resources threatened by overuse and climate change. Local and regional resource use decisions impact both the ecological and human components of the coupled human-environment system. This research seeks to better understand this coupling at both local and community scales by investigating land and water governance issues through the lense of reoccurring, cyclic drought (Fig. 2).

FIGURE 2: THEORETICAL FRAMEWORK



## FUTURE DIRECTIONS

This project analyzes how formal and informal governance structures operating at various levels (e.g., local/state) alter land and water use in the Southern Great Plains and the ecological consequences thereof. This study asks (1) How do individuals and communities adapt to ecological pressures wrought by climate variability under differential land and water governance regimes? (2) How do formal and informal governance structures drive sustainable LULCC decisions?

This research will help raise awareness of differential relationships between humans and the natural system through outreach to

For more information, visit:  
<http://biosurvey.ou.edu/Grasslands/main.html>

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