



## Changing landowners, changing ecosystem? Land-ownership motivations as drivers of land management practices



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### ABSTRACT

Motivations for owning rural land are shifting from an agricultural-production orientation to a preference for natural and cultural amenities. Resultant changes in land management have significant implications for the type and distribution of landscape-level disturbances that affect the delivery of ecosystem services. We examined the relationship between motivations for owning land and the implementation of conservation land management practices by landowners in the Southern Great Plains of the United States. Using a mail survey, we classified landowners into three groups: agricultural production, multiple-objective, and lifestyle-oriented. Cross tabulations of landowner group with past, current, and future use of 12 different land management practices (related to prescribed grazing, vegetation management, restoration, and water management) found that lifestyle-oriented landowners were overall less likely to adopt these practices. To the degree that the cultural landscape of rural lands transitions from production-oriented to lifestyle-oriented landowners, the ecological landscape and the associated flow of ecosystem services will likely change. This poses new challenges to natural resource managers regarding education, outreach, and policy; however, a better understanding about the net ecological consequences of lower rates of adoption of conservation management practices requires consideration of the ecological tradeoffs associated with the changing resource dependency of rural landowners.

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### 1. Introduction

A clear link exists between human behavior and land-cover change whereby a private landowner's reason for owning land translates into land use preferences and ultimately land management practices. That is, individual motivations for owning land shape land-use goals and energize behaviors necessary to achieve those goals (Greiner et al., 2009), either intentionally or unintentionally influencing the structure and functioning of ecosystems across a landscape (Dale et al., 2005; Hansen and Brown, 2005; Wilcox et al., 2011). The subsequent changes in the spatial distribution, timing and flow of ecosystem services feed back to affect the livelihoods of people and sustainability of communities (Collins et al., 2011; Kofinas and Chapin, 2009).

Motivations for owning rural land are currently shifting from an agricultural production orientation to a preference for natural and cultural amenities. In some areas of the United States, migration

away from urban, suburban, and exurban areas is leading to the subdivision and sale of rural lands to lifestyle-oriented landowners who purchase land primarily for recreation, for its esthetic qualities, and to experience the rural lifestyle (Brown et al., 2005; Gosnell and Abrams, 2009; Johnson, 2008). This trend is occurring in a number of post-industrialist countries including Australia (Gill et al., 2010; Luck et al., 2011; Maybery et al., 2005; Mendham and Curtis, 2010) and countries in Western Europe (Brown and Kandel, 2006; Hujala et al., 2007; Moss, 2006). These changes in motivation for land ownership have significant implications for the type and distribution of ecological disturbance across the landscape that ultimately affects the delivery of ecosystem services (Collins et al., 2011).

The phenomenon of changing land ownership has been well documented in the intermountain and western United States (e.g., Gosnell and Travis, 2005; Jackson-Smith et al., 2006; Theobald, 2001) and the eastern forestlands (Butler, 2008; Kendra and Hull, 2005; Majumdar et al., 2008, 2009); but, landscapes in the southern Great Plains face similar pressure from changes in land ownership (Brown et al., 2005; Johnson and Rathge, 2006; Mitchell, 2000). In Texas the change has been particularly striking. Between 1997 and

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2007 the number of farms and ranches less than 40 hectares increased by 22% while the appraised market value of land increased by 140%; and, more than 849,000 hectares of farms, ranches and forestlands were converted to other uses (Wilkins et al., 2009).

This change paints a picture of a social landscape that is undergoing a significant shift in who owns the land and why. Traditional farmers and ranchers tend to be more resource dependent and production focused compared to lifestyle-oriented landowners (Sorice et al., 2012). They also are likely to have greater local knowledge of the resources as well as the skills needed to achieve land management goals. In contrast, lifestyle-oriented landowners may have stronger pro-environmental attitudes (Jones et al., 2003), a greater willingness and financial capacity to engage in conservation practices (Greiner et al., 2009), but lack the knowledge and skill to do so (Gill et al., 2010; Mendham and Curtis, 2010). Compared to agricultural producers, lifestyle-oriented landowners may value cultural ecosystem services, such as aesthetics and recreation, over provisioning or regulating services (Martín-López et al., 2012). Thus, a shift in the type of landowner not only changes the structure of rural communities (Brown and Kandel, 2006; Robbins et al., 2009) and desired social outcomes and subsequent policies (Yung and Belsky, 2007) but can drive changes in land use and ultimately in land cover and ecosystem function across the landscape. Although there has always been heterogeneity to some degree across the rural landscape, landowners with agricultural production values have been the predominant culture for generations. Culture change can be thought of as a so-called slow variable that can remain stable for extended periods of time but that yields substantial social and ecological change when it does occur. Given that culture is a major driver in the state of a social–ecological system (Gunderson and Holling, 2002), understanding the potential change in land management behavior is critical for anticipating and predicting ecological regime shifts.

One outstanding question is whether or not changes in land ownership have a negative effect on the capacity for rural communities to sustain the supply of ecosystem services (Chapin III et al., 2009). Our study informs this important question by addressing the role of motivations for land ownership and land-management behavior. We use a behavioral approach to identify the antecedent relationships between motivation for owning land and the application of conservation-oriented land management practices that promote ecosystem sustainability. Rangelands in a Texas watershed, which are undergoing ecological conversion from grasslands to woodlands, serve as a case study to categorize landowners based on their motivations for owning land. We subsequently examined the implementation of land management practices identified by the United States' Natural Resource Conservation Service (NRCS) as conservation practices. Specifically, our objectives were to: 1) use existing socio-demographic data explore social change in the landscape over time; and 2) use a typology of landowners to relate land-use motivations to land-management practices to better understand the relationship between landowner type and soil and water conservation.

## 2. Materials and methods

### 2.1. Study area

Rangelands are comprised of diverse ecosystems and landforms that are unsuited for intensive agriculture or forestry because of climatic, soil and/or topographic limitations (SRM, 1998; Holechek et al., 2004). In the southern Great Plains, such ecosystems have been maintained as grasslands for centuries because of natural disturbances (e.g., lightning-strike fires, bison grazing) as well as early human disturbances (e.g., Native American-generated fires).

European immigrants established crop cultivation and livestock grazing in this area beginning in the 1870s (Parton et al., 2007; Wishart, 2004). In cases where supplemental irrigation was not available for crop production, formerly cultivated areas often reverted back to rangelands.

Although these grasslands have coevolved with human drivers of land use, it was the last phase of human use of semi-arid grasslands beginning around 1875 that has led to the fundamental changes in these landscapes and their ability to support rural livelihoods associated with livestock ranching (Parton et al., 2007; Wilcox et al., 2011). These changes were set in motion by active fire suppression and the severe overgrazing that occurred during the last decades of the 19th century (Box, 1967; Wilcox et al., 2012)—one outcome of which was highly degraded landscapes that no longer supported frequent fires. The virtual elimination of fire from these landscapes in combination with heavy grazing has favored the expansion of fire sensitive woody plants within these ecosystems, the net result being that many former grasslands and savannas in the southern great plains have now converted to shrublands and woodlands (Archer, 1994; Archer et al., 2001). This phenomenon, known as woody plant encroachment (WPE), has far-ranging consequences for both human and ecological systems, because it alters the delivery of ecosystem services including: forage availability, grassland wildlife habitat, carbon and other biogeochemical cycling, aesthetics, among others (Archer et al., 2011; Eldridge et al., 2011; Stafford Smith et al., 2009). Despite this, WPE is not well understood as a complex problem with both ecological and social dimensions.

One way of enhancing the ecological resilience of rangeland ecosystems (i.e., the ability of rangelands to absorb disturbance and maintain the grassland state) is through the use of land management practices that maintain or restore healthy grasslands and reduce soil loss. Through cost-sharing programs, the United States Natural Resources Conservation Service promotes a number of activities as so-called conservation practices for rangelands related to grazing management, woody plant management, rangeland restoration, and water and riparian management (NRCS, 2011) (see Table 1). The NRCS considers these land-management practices as best practices that help rangeland owners sustain their operations over the long term, yet landowners do not universally adopt the behaviors or participate in the cost-share programs. A comprehensive understanding of the factors that influence the adoption of conservation practices amongst agricultural producers continues to be elusive (see Lockeretz, 1990; Prokopy, 2008; Rogers, 2003). Given these challenges with production-oriented landowners, questions remain about their adoption as the social landscape changes.

Our study focused on the Cowhouse Creek watershed (159,850 ha) in north-central Texas. It is a 145-km long tributary of the Brazos River, flowing through portions of four rural counties (Bell, Coryell, Hamilton, and Mills County) and discharging into a 50 km<sup>2</sup> reservoir, Lake Belton. The watershed is dominated by privately-owned rangelands except in Bell County, which is owned by the Fort Hood U.S. Army installation. Because our focus was on private lands, we excluded the federal property from our research.

### 2.2. Demographic change

We explored socio-demographic changes in the research area by utilizing a combination of U.S. Census data, U.S. Agricultural Census data, and [texaslandtrends.org](http://texaslandtrends.org), an online source of change specific to Texas (Wilkins et al., 2009). We focused on the change in:

- Number of farms
- Size of farms

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