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Forum

Impact of Land Subdivision and Sedentarization on Wildlife in Kenya's Southern Rangelands

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Abstract

Subdivision and sedentarization of pastoral communities is accelerating rapidly across the African rangelands, posing a severe threat to wildlife populations, but few studies have looked quantitatively at the ecological impact of sedentarization. Here we look at the impact of sedentarization on wildlife by comparing ecologically matched subdivided and unsubdivided Maasai pastoral lands (ranches) in semiarid southern Kenya. We found no significant difference in livestock densities on the two ranches but there was a significantly higher wildlife density on the unsubdivided ranch, in both dry and wet seasons. Nonetheless, the unsubdivided ranch still had a higher percentage of grass biomass and ground cover and lower grazing pressure than the subdivided ranch. Distribution of homesteads (bomas) was mostly random on the subdivided ranch, with little area unaffected by human settlement. On the contrary, the unsubdivided ranch had a highly clumped boma distribution pattern, resulting in much of the land being relatively far from permanent human settlement. We show that the regular distribution and permanence of settlements following subdivision and sedentarization greatly reduces wildlife populations both through direct displacement and a reduction of forage. Relative to mobile pastoralism on open rangelands, sedentarization leads to reduced seasonal movements of livestock, lowered grass biomass, and slower grass recovery after very dry periods. This study points to the need to maintain mobile, large-scale herd movements to avoid the heavy impact on grasslands associated with sedentarization of pastoral settlement and herds.

Key Words: grass biomass, land tenure, livestock, Maasai, pastoralism, wildlife conservation

INTRODUCTION

Most arid and semiarid regions of the world have seen progressive sedentarization of pastoral populations over the past two millennia (McPeak and Little 2005). Sedentarization refers to the settlement of previously nomadic or seminomadic peoples into permanent homesteads, with a corresponding decrease in the mobility of people and livestock (Salzman 1980). In Kenya, the causes of sedentarization are reviewed in Groom (2007), and include economic, political, demographic, and environmental factors and, in recent years, legal subdivision of communal lands (Njoka 1979; Roth and Fratkin 2005). Sedentarization has led to a rapid decrease in the mobility of pastoral herds and households throughout the country (Fratkin 1992; Schwartz et al. 1995; Roth 1996). Many studies report negative environmental consequences of land subdivision and sedentarization (e.g., Salzman 1980; Stanley 2000; Ntiati 2002; Seno and Shaw 2002; Worden et al. 2003; Schwartz 2005).

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Despite the scale and speed of sedentarization of pastoral lands across Africa and the potential impact on people, rangelands, and wildlife, few studies have looked at the ecological impact of sedentarization. Exceptions include work by Norton-Griffiths (1998), Worden (2007), Boone (2005), and Boone et al. (2005). More recently, Western et al. (2009) used 33 yr of continuous aerial monitoring of ecologically matched ranches to show that wildlife on a subdivided and settled ranch in eastern Kajiado District in Kenya declined sharply relative to the adjacent communally grazed ranch. They attributed the decline to the distribution and permanence of settlements rather than differences in human and livestock density. However, the aerial study was unable to distinguish the exact mechanisms whereby the increase in permanent settlement caused a decline in wildlife. In this study we monitored seasonal changes in standing crop biomass of grasslands in the same two ranches in order to investigate whether the decline in wildlife was 1) due to the direct physical displacement of wildlife by settlements (i.e., loss of range) or 2) the indirect effects on grassland productivity (i.e., loss of forage).

METHODS

Study Area

We compared the same two areas as Western et al. (2009): Mbirikani Group Ranch and Kaputei individual ranches. However, in this study we sampled only a portion of Kaputei, the Merueshi section, which neighbors Mbirikani, as opposed