

Long-term changes in Serengeti-Mara wildebeest and land cover: Pastoralism, population, or policies?

K. Homewood, E. F. Lambin, E. Coast, , and M. Thompson [Authors Info & Affiliations](#)

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Abstract

Declines in habitat and wildlife in semiarid African savannas are widely reported and commonly attributed to agropastoral population growth, livestock impacts, and subsistence cultivation. However, extreme annual and shorter-term variability of rainfall, primary production, vegetation, and populations of grazers make directional trends and causal chains hard to establish in these ecosystems. Here two decades of changes in land cover and wildebeest in the Serengeti-Mara region of East Africa are analyzed in terms of potential drivers (rainfall, human and livestock population growth, socio-economic trends, land tenure, agricultural policies, and markets). The natural experiment research design controls for confounding variables, and our conceptual model and statistical approach integrate natural and social sciences data. The Kenyan part of the ecosystem shows rapid land-cover change and drastic decline for a wide range of wildlife species, but these changes are absent on the Tanzanian side. Temporal climate trends, human population density and growth rates, uptake of small-holder agriculture, and livestock population trends do not differ between the Kenyan and Tanzanian parts of the ecosystem and cannot account for observed changes. Differences in private versus state/communal land tenure, agricultural policy, and market conditions suggest, and spatial correlations confirm, that the major changes in land cover and dominant grazer species numbers are driven primarily by private landowners responding to market opportunities for mechanized agriculture, less by agropastoral population growth, cattle numbers, or small-holder land use.

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