

Estimates overstated for Mongolian rangelands damaged by livestock

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Winter in central Mongolia. Credit: Colorado State University

Livestock and wildlife graze on rangelands, grasslands, savannas and marshes that cover 45 percent of Earth's land surface. Damage or degradation on these lands is a major concern globally, and the subject

of widespread scientific study in countries including Mongolia.

An estimated 70 percent of the rangelands in Mongolia are damaged by [livestock](#) and unregulated land use. But new research led by Colorado State University found less irreversible damage—up to 10 percent at most—from livestock in Mongolia's rangelands. This positive news is countered by findings that show key areas in the country may be reaching a tipping point of irreversible damage.

The study, "Applying a dryland degradation framework for rangelands: the case of Mongolia," is published in *Ecological Applications*.

Lead author Chantsaa Jamsranjav, a postdoctoral researcher in the Department of Forest and Rangeland Stewardship at CSU, said the research team hopes the findings will generate greater understanding about the deterioration of what Mongolia's citizens call the "green gold" or vast grasslands that cover three quarters of the country.

Scientists said that they are also hopeful that the study will help guide management of these extensive natural resources.

"We wanted to build a clear definition of degradation that can be commonly used in Mongolia," said Jamsranjav. "Having a unified understanding can lead to more targeted national policies for rangeland management, as well as providing help for herders on how to better manage resources by rotating herds and resting pastures."



A herder with his sheep during a harsh winter in the West Central part of Mongolia. Credit: Chantsaa Jamsranjav/ Colorado State University

The Mongolian herding tradition dates back at least 4,000 years—well before the time of Genghis Khan—and breeding and caring for sheep, cattle and other livestock contributes up to 15 percent of the country's total gross domestic product. Irreversible land degradation is a growing concern, as these areas must continue to support livestock that outnumber Mongolians 20-1, a ratio consistently among the highest in the world.

Defining degradation

To study grazing impacts, the research team sampled data in 36 counties (soums, as they're called) across 10 provinces, or aimags. Scientists analyzed climate and ground measurements, and chose winter shelters and pastures as a focal point for the project. Families that raise livestock live in these shelters only during the winter, which allows the pastures to rest from livestock use during the summer growing season.

The team collected extensive ecological field data for the study to better measure degradation or damage. Based on these measurements, they classified each sampled area into a different stage, or step, of degradation. The first step, 0, is considered "undergrazed" in rangelands that, like Mongolia, have evolved with many native grazers. Step 0 also incorporates natural climatic fluctuations as part of these natural rangeland ecological processes. Step 4, on the other end of the scale, indicates potentially irreversible changes in vegetation and soil surface due to excessive grazing or other human-driven disturbances, including development of roads and industrial land use.

The research team also compared this new set of measurements with data from two other national studies, and found the same conclusion: very severe or irreversible damage is rare in Mongolia, with most rangelands only slightly or moderately degraded.



Winter in Central Mongolia. Credit: Chantsaa Jamsranjav/Colorado State University

Pinpointing vulnerable areas

CSU's study linked livestock use to ecological impacts on winter pastures throughout Mongolia's steppe region. Winter pastures are a critical resource for herders through the long, cold winters. Livestock rely on exposed vegetation for food during this frigid time.

"Even though overall permanent damage was less than expected, our findings suggest that the steppe environments are changing the fastest under persistently high levels of forage use, which could push these pastures towards a point where damage becomes irreversible," said

Jamsranjav.

This could be attributed to 15 years of heavy animal grazing and trampling reported in steppe areas near human settlements, according to the study. Livestock populations on a national level have increased dramatically, bouncing back from two large-scale dzuds, or harsh winters that caused considerable livestock casualties. Some parts of the country saw livestock numbers remaining stable.

Jamsranjav said winter ranges in steppe areas require the most immediate attention by policymakers, managers and herders. Preventing or slowing down further [damage](#) by a continuously growing national herd can ensure these areas are still available for grazing in the future, just as they have been for millennia.

"Addressing the effects of livestock is low-hanging fruit to consider," she said. "Unlike a variable climate, grazing practices can be altered by management and policy."

Researchers said the study's framework can be applied in other arid rangelands around the world, which could help balance the growing pressures of herds and other human-caused disturbances on other [rangelands](#).

More information: C. Jamsranjav et al, Applying a dryland degradation framework for rangelands: the case of Mongolia, *Ecological Applications* (2018). [DOI: 10.1002/eap.1684](https://doi.org/10.1002/eap.1684)

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