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Exploding demand for cashmere wool is ruining Mongolia's grasslands

An area twice the size of Texas is at risk of degradation. Can scientists turn the tide?

30 JAN 2019 • BY [KATHLEEN MCLAUGHLIN](#)



A herder with her goats in southern Mongolia ADAM OSWELL

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NOMGON SOUM, MONGOLIA—A massive sandstorm is crashing in over South Gobi province, darkening afternoon skies over the village meeting house where dozens of chattering herders from far-flung camps have come together to elect a leader for their cashmere collective. The mood is sour—perhaps the lingering hangover of the harsh, stormy winter of 2017–18, which killed hundreds of thousands of grazing animals, threatening the lives and incomes of the nomadic families who raise cashmere goats and other livestock on Mongolia's grasslands. Perhaps it's also the opaque nature of cashmere pricing, controlled by China, and the unceasing pressure to raise goats with the best hair.

Or maybe it's the degradation of the pastures themselves. Essential to the identity and economy of Mongolia—more than half of the country's 3 million people live there—the grasslands are under increasing threat from overgrazing and climate change. Multiple studies over the past decade have shown that the once lush Mongolian steppe, an expanse twice the size of Texas that

is one of the world's largest remaining grasslands, is slowly turning into a desert. An estimated 70% of all the grazing lands in the country are considered degraded to some degree. But a consortium of researchers is hoping data from space could help herders on the ground lighten their impact.

The collective here of a little more than 100 families is at the center of [an unusual effort, run by the Wildlife Conservation Society \(WCS\)](#), to turn space-based maps of the grasslands into a tool for making grazing more sustainable. Supported by the world's largest mining company and a luxury apparel giant, the pilot effort uses data gathered by NASA and Stanford University in Palo Alto, California, to help herders find places where the vegetation is healthy enough to sustain their voracious herds. "We don't have a lot time left," says Enkee Shiilegdamba, head of WCS Mongolia in Ulaanbaatar, which manages the project.

[A perfect storm of factors is damaging Mongolia's grasslands](#), says Troy Sternberg, a researcher at the University of Oxford's School of Geography and the Environment in the United Kingdom. From 1940 to 2014, annual mean temperatures [here have increased by 2.07°C](#), more than double the global average. Ten of the warmest years on record have occurred since 1997, while rainfall has decreased and seasonal weather patterns have shifted. This has exacerbated soil erosion, which has begun to alter the vegetation, a trend that projections show will intensify in the first half of the 21st century. Meanwhile, development, especially mining, has exponentially increased water usage. Twelve percent of rivers and 21% of lakes have dried up entirely. An increasing number of people, vehicles, and heavy equipment put additional stress on the land.

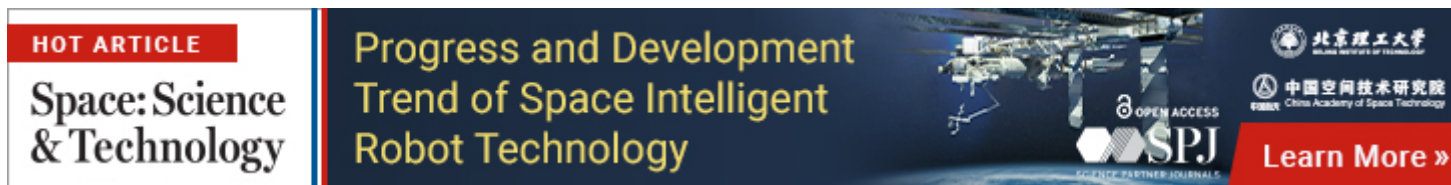
But one factor stands out: overgrazing, which, according to a 2013 study by researchers at Oregon State University in Corvallis, [has caused 80% of the recent decline](#) in vegetation on the grasslands.



Goitered gazelles, including this one, collared for a tracking study, also roam the grasslands. BUUVEIBAATAR BAYARBAATAR

In the 1990s, Mongolia abandoned its communist system of government and with it, strict quotas on the number of grazing animals allowed across the vast grasslands. Since then, the country has gone from 20 million grazing livestock to 61.5 million, eating their way across the land. When animals eat more plants than can grow back naturally, the landscape begins to shift in subtle ways. Plants become sparser and patchy and dead areas emerge, which accelerates soil erosion. Native grasses are replaced with poisonous, inedible species.





And it's not just herders who are suffering; the grasslands are also home to many species of wildlife, including snow leopards, the little-studied khulan or Mongolian wild ass, and the Mongolian gazelle. Conservation scientists are tracking these animals through radio collars and camera traps to better understand their population sizes and how grassland degradation may threaten their numbers.

Mongolia's herders raise camels, horses, cows, and sheep, but the fastest-growing herds are goats, thanks mostly to the swift rise in global demand for cashmere. More than a decade ago, fast fashion and increased knitting capacity in China helped push the soft wool, once a luxury product for the rich, to a mass market consumer good. Mongolia is now the world's second-largest cashmere producer, after China. Goats, which account for more than half of all grazing animals on the grasslands, can be more lucrative than other livestock, but they're also much more destructive than the sheep they've replaced because they eat roots and the flowers that seed new grasses.

The crush of grazing animals across an increasingly arid landscape has some longing for the pre-1990s Soviet-style days of heavy-handed governance; at least it helped keep the grasslands healthy, says Zandraa Baljinnyam, a former government official in Dalanzadgad in charge of provincial grazing animal quotas. Today, he laments, herders boast of owning more than 1000 goats. "We should not reward people for having large herds," he says.

Yet sweeping changes to protect the grasslands have been politically unpalatable in a democracy whose voters feel a deep connection to the open, unregulated grassland. With urbanization on the rise, herders also face new financial pressures, such as college tuition fees for their children, that cashmere goats can help them meet. So far, the government has taken only small steps to protect the grasslands.

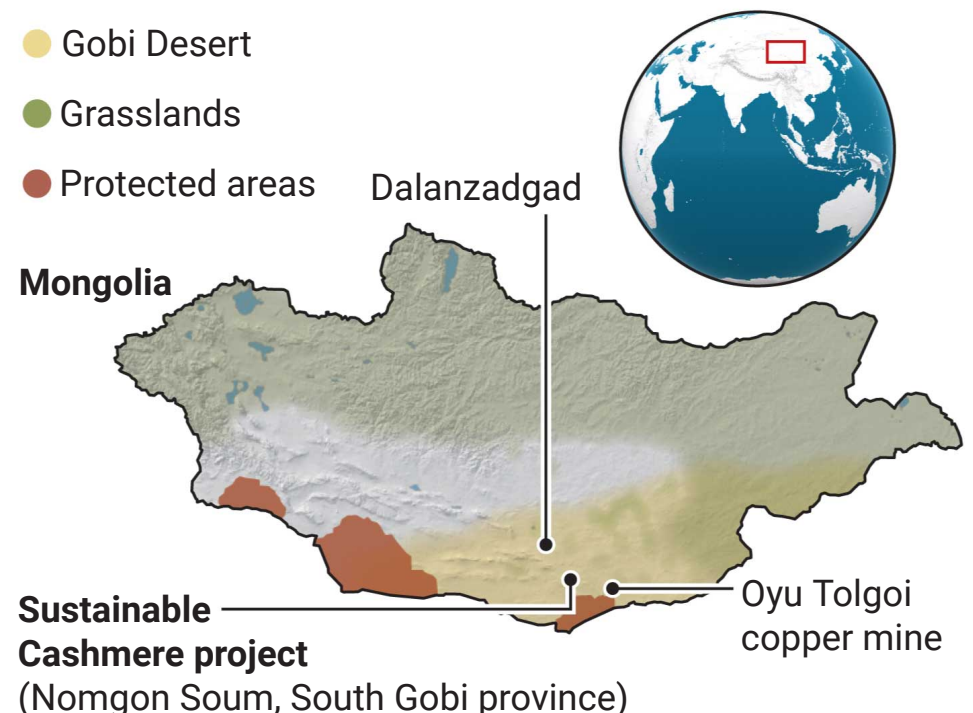
WCS's Sustainable Cashmere project may offer part of the solution. The project, whose budget the organizers won't disclose, is funded by mining giant Rio Tinto, which runs a massive copper mine not far away, and Kering, the French luxury apparel giant that owns Gucci, Balenciaga, and other brands. Both aim to help offset their impact on the Mongolian environment, a requirement of Rio's mining agreement and part of Kering's corporate social responsibility program.

The effort relies on vegetation maps created by Stanford's Natural Capital Project, which draws on satellite data, mainly from the Moderate Resolution Imaging Spectroradiometer, an instrument aboard NASA's Terra satellite; NASA also helps interpret the data. Healthy vegetation reflects a lot of infrared, explains Cindy Schmidt, a research scientist in the Earth Science Division at NASA's Ames Research Center in Mountain View, California; degraded grasslands less, and deserts none at all. The satellite data are combined with data on soil and plants from 200 field sites to create detailed maps of the health of the grasslands.

During the team's visit late last summer, Schmidt and Becky Chaplin-Kramer of the Natural Capital Project sat down in one herding family's *ger*—a large, round tent—opened a laptop, and scrolled through a series of maps, showing areas where erosion seemed to have taken a heavy toll and others that looked relatively lush. The team's modeling also projects how a change in management practices could improve the health of the land.

Disappearing grasslands

An estimated 70% of Mongolia's grazing lands are considered degraded to some degree.



C. BICKEL/SCIENCE



Onon Bayasgalan, who leads the project for WCS Mongolia, visits the herders frequently to present research findings at meetings of their collective. What the herders do with the data is up to them, but Bayasgalan and the rest of the team hope it will help them find healthier pastures with more food and avoid destructive overgrazing.

A more immediate and perhaps attainable goal is to convince herders to keep fewer goats. They might do so if their animals produced better cashmere, which would fetch higher prices. The project is helping herders breed better goats by providing them with in vitro fertilization and superior sperm; offering free veterinary care; and instilling better management practices, such as regularly combing the animals. It also encourages herders to negotiate prices directly with clothing manufacturers, potentially cutting out the Chinese middlemen who control the cashmere market.

If the pilot succeeds in lowering herd sizes among the more than 100 families here—and reducing their impact on the land—the team hopes it can be scaled up to the entire country. And Schmidt thinks the Mongolian project—the first time NASA has cofunded and supplied data to an ecosystem management effort—could become a model for degraded and threatened lands around the world.

But NASA data may not always be necessary, Chaplin-Kramer says. "WCS is trying to teach the herders how to tell by visual observation—on the ground, not via satellite—when it's time to move the herd, that is, before they've caused degradation, and to build up other revenue streams ... that would allow herders to reduce their herd sizes overall."

Better land management and husbandry alone are unlikely to restore the grasslands. "Personally, I don't think these are very effective programs," says Sternberg, who has spent years studying Mongolia's grassland cultures. "They don't change the larger system." The government will also need to take stronger protective measures, most importantly a tax on grazing livestock, Sternberg and other scientists say. But that would take politicians willing to face big risks.

For Bayasgalan, the stakes are clear. When she studied in the United States, she took a trip across Montana and Wyoming, places with landscapes remarkably similar to Mongolia's but for one important thing: fences. Bayasgalan blanches at the idea of locking up Mongolia's land; the notion of open grasslands where herders and animals roam freely is, to her and many others, the country's essence. Whether that ideal can be saved in a world of cheap cashmere sweaters and climate change is the question Mongolia is now facing.

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ABOUT THE AUTHOR

Kathleen McLaughlin 

Kathleen McLaughlin is a journalist based in Missoula, Montana, and Singapore.

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