



POLICY FORUM: ECOLOGY

State Policy and Pasture Degradation in Inner Asia

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Much of northern China, Mongolia, and southern Siberia is rolling grassland, used since ancient times for raising livestock. Inner Asia contains over 6% of the world's grassland—more than two and a half million square kilometers, an area more than seven times the size of Germany. Historically, most of this region was inhabited by Mongolian mobile pastoralists (nomads), who lived in felt tents and moved with their herds to different seasonal pastures. In contrast to Mongolia, the Chinese and Russian parts of Inner Asia have in this century seen dramatic changes in their patterns of land use as a result of very different state policies. These regions have very similar grassland environments, and thus a comparison of the landscapes of these different regions can reveal the effects of three alternative approaches to managing the Inner Asian environment—Russian, Chinese, and Mongolian.

From 1992 through 1995, a Cambridge, UK-based research project [Environmental and Cultural Conservation in Inner Asia (ECCIA) (1)] brought together local researchers from across Inner Asia to compare the changes experienced by pastoral societies and their environments in six different regions: Mongolia, Inner Mongolia, Xinjiang, Buryatia, Chita, and Tuva (see map above). A number of earlier studies by Inner Asian specialists reported widespread declines in grassland productivity that they identified as pasture degradation. Degradation is generally defined as a more or less permanent decline in the rate at which land yields livestock products (2), although it is often impossible to determine whether declines in productivity are permanent and to what extent they result from human or natural processes (3). The ECCIA project set out

to investigate the extent to which these assessments could be linked to the different patterns of pastoral land use in the region (4).

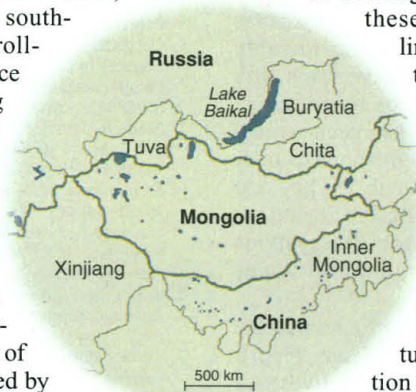
Specialists in China's Inner Mongolian Autonomous Region have concluded that more than a third of Inner Mongolian grassland has been degraded during this century (5). Pasture degradation has also been widely reported in Buryatia and Chita, with some studies suggesting that more than 75% of pastures in some regions have been degraded. Land used for agriculture has also been badly affected, and the official estimate is that more than 50% of the region's arable land has undergone some

degree of degradation (6).

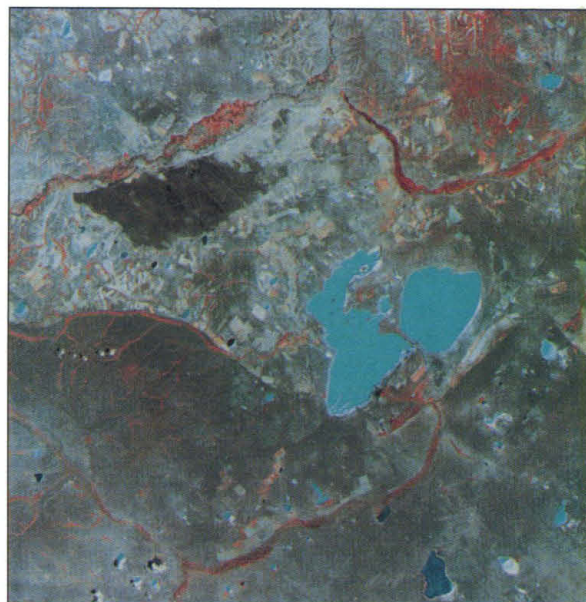
In contrast, relatively little pasture degradation appears to have occurred in the independent state of Mongolia (7). A recent report concluded that about 9% of the pasture land was degraded (8). Some estimates are higher than this (9), but there is little doubt that in Mongolia the problem is much less severe than in the Russian and Chinese sectors of Inner Asia. Tuva is an interesting exception; incorporated into the USSR relatively late (in 1944), it retained an older style of pastoralism. The ECCIA project found that in all three Mongolian case-study sites and in the single Tuvan one, the local perception was that the district had negligible pastoral degradation. By contrast, local officials in Buryatia and Chita estimated the extent of pasture degradation in their districts as 79 and 77%, respectively (10).

Satellite images can reveal degradation and allow direct comparison of the landscapes in the different administrations (see figure below). Over the past 50 years, the Russian agricultural collectives introduced mechanized mixed farming methods, modeled on European agroindustrial techniques, that led to processes causing pasture degradation and topsoil loss (see the upper part of the image). The extensive use of heavy machinery to cultivate fodder crops resulted in topsoil loss, because plowing up the light steppe soil exposed the dustlike sandy strata beneath. Also, livestock were kept in the same fenced fields for much or all of the year, leading to continuous grazing and trampling of the vegetation (11).

Although collective farms were also introduced in Mongolia in the 1950s, the Mongolians were much less reliant on the cultivation of fodder crops. Like the Tuvans, they retained a relatively mobile system of pastoral land use. Herding families, generally supported by trucks and deliveries of hay, continued to move with their



Map of Inner Asia.



Tracking degradation from space. Satellite image (Landsat, October 1989) of the border between the Russian district of Chita and northeastern Mongolia. Lakes are blue, areas with the most vegetation are red, greens and grays indicate intermediate amounts of vegetation, and pale and white areas are sandy and bare earth. In the northern (Russian) half of the image, the land is lighter in color, scarred, and marked where the thin topsoil has been exposed or covered with drifting sand. In the southern (Mongolian) half of the image, the vegetation cover is much more uniform. (Inset) A map is given for comparison.



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livestock to seasonal pastures. This system had a much less dramatic impact on the landscape (see the lower part of the satellite image).

In the 1950s, the Chinese collectivized the pastoralists of Inner Mongolia and Xinjiang into People's Communes. Some pastoral mobility was retained, but thousands of square kilometers of land were damaged by disastrous attempts to plow virgin steppe land for crop cultivation in the late 1950s and the 1960s (12). The People's Communes were dissolved in the early 1980s, and pastoralists gained ownership of livestock. Over the past decade, the Inner Mongolian administration has divided the pasture land into individual allocations for each herding household. These and other policies have reduced or eliminated large-scale pastoral movements between seasonal pastures and increased the tendency toward year-round grazing of livestock in specific areas.

One of the justifications for these measures was that individual allocations are supposed to prevent a "tragedy of the commons"—a theoretical problem popularized by Garrett Hardin in 1968 (13). Reviving a 19th-century argument, Hardin contended that when many individuals graze their livestock on communally owned land, it is in the interest of each one to keep increasing the number of his or her animals even if the land is facing overgrazing and degradation. Hardin contended that private ownership, by combining interest in both land and livestock, would prevent overgrazing.

This model has been widely rejected by pastoral specialists, who found that it provided a very poor guide to understanding pastoralism (14). Despite these findings, however, the specter of a tragedy of the commons ties in well with official Chinese explanations of pastoral degradation, which stress overgrazing as the main cause. Since the late 1980s, the Chinese administration has assumed that pastoralists have a tendency to keep too many domestic animals and has placed ceilings on stocking levels (15).

Since the Chinese Communists gained control of Inner Mongolia in 1947, livestock totals have risen by around 280%, and by the early 1990s the region, although having 28% less pasture land than Mongolia, had 45% more livestock than its northern neighbor (16). This might suggest that Inner Mongolia's ecological problems do indeed stem from the high number of domestic animals. Materials from the 1930s, however, suggest that Inner Mongolia supported about the same quantity of livestock (when calculated in terms of a standard unit of livestock) at that time as it has in the 1990s—the equivalent of about 70 million sheep (17).

In Buryatia and Tuva, the pastoral sector also supported similar numbers of animals in precommunist times as it does now. If Inner Mongolia and Buryatia are facing acute and historically unparalleled problems of environmental damage, they thus cannot be attributed purely to the high number of animals (18). Other factors, however, have affected pastoralism in these regions in an unprecedented way. Much of the better land has been turned over to crop-raising in the past 100 years (about 6% of Inner Mongolia's usable open land is now used for crops, as is 30% of Buryatia's) (19). Perhaps more important, mobile pastoralism has been largely replaced with more static methods of rearing livestock that rely heavily on hay and fodder to feed the herds. Recent studies indicate that these low-mobility systems have created pressure on the thin steppe topsoil (20).

The ECCIA case studies found that the highest levels of degradation were reported in districts with the lowest livestock mobility; in general, mobility indices were a better guide to reported degradation levels than were densities of livestock (21). This pattern corresponded with the experience of local pastoralists. At six sites, locals explicitly associated pasture degradation with practices that limited the mobility of livestock, and at two other sites informants stressed the importance of seasonal movement for productive livestock rearing.

These findings invite a reconsideration of the long-term merits of abandoning mobile systems of pastoral land use and of the enclosure of grazing lands to create static systems of livestock raising that rely on mechanized fodder cultivation. Although it may be too late for Chinese Inner Mongolia, the Mongolian administration is still in a position to avoid the division of pasture lands that inhibits mobile pastoralism.

Mongolian pastoralism faces new problems, however. Economic reforms have led to falling living standards, and Mongolians have seen their real wages halved between 1990 and 1992 and then decline by a further third in 1993 (22). Since the dissolution of the collectives, pastoral families have faced rapidly rising food and transportation costs, and many herders find it difficult to continue to make the seasonal moves that the collectives had supported. In some regions, the tendency of pastoralists to stay all year near their best pastures has been exacerbated by uncertainties over rights to use pasture land, which used to be regulated by the collectives. Without technical and organizational support, individual herding households may be unable to maintain systems of wide pastoral movement, even where pasture land is not divided into individual allocations.

References and Notes

1. ECCIA was funded by a grant from the John D. and Catherine T. MacArthur Foundation. The director was Caroline Humphrey and the research coordinator was David Sneath. It was based at the University of Cambridge, Mongolia and Inner Asia Studies Unit, Department of Social Anthropology.
2. R. Behnke and I. Scoones, in *Range Ecology at Disequilibrium*, R. Behnke, I. Scoones, C. Kerven, Eds. [Overseas Development Institute (ODI), London, 1993], pp. 1–30.
3. Y. Biot, in (2), pp. 153–172; K. Homewood and W. A. Rodgers, *Hum. Ecol.* **12**, 431 (1984).
4. C. Humphrey and D. Sneath, Eds., *Culture and Environment in Inner Asia*, vol. 1 (White Horse Press, Cambridge, 1996).
5. O. Loucks and W. Jianguo [Grasslands and Grassland Sciences in Northern China, Committee on Scholarly Communication with the People's Republic of China (CSCPRP), National Research Council, Ed. (National Academy Press, Washington, DC, 1992), pp. 55–66] and Z. Xinshi [Grasslands and Grassland Sciences in Northern China, CSCPRP, National Research Council, Ed. (National Academy Press, Washington, DC, 1992), pp. 39–54] estimate that 35.6% of Inner Mongolian grassland has been degraded during this century. E. Erdenijab's 1988 estimate was 38.5% [in (4), pp. 189–197], and C. Shan gives 39.4% [in (4), p. 123].
6. B. Gomboev [in (4), pp. 17 and 21] notes that the degradation process may date back to the past century.
7. Opinion differs as to whether there is any significant degradation, and if so, how much [B. Erdenebaatar, in (4), pp. 65 and 91].
8. D. Sheehy, *Grazingland Interactions Among Large Wild and Domestic Herbivores in Mongolia*, report for the Mongolian Ministry of Nature and Environment Biodiversity Project, October 1995, pp. 9–10.
9. Asian Development Bank, *Mongolia: A Centrally Planned Economy in Transition* (Oxford Univ. Press, Hong Kong, 1992), pp. 186–187; N. Utziykhatu, cited in *An Evaluation of Natural Grasslands of Mongolia for Sustainable Management*, report for the United Nations Development Programme, Mongolia, October 1995 (Lincoln International, 1995), p. 10. Other studies [such as *Improved Livestock Feed Production, Management and Use in Mongolia: Socio-Economic Potentials and Constraints*, report of a survey undertaken by the Policy Alternatives for Livestock Development in Mongolia (PALD) project for the Asian Development Bank (Asian Development Bank, Manila, 1993)] suggest virtually no pasture degradation.
10. C. Humphrey and D. Sneath, *Pastor. Dev. Netw.* **39**, 12 (1995). These figures represent local assessments rather than independently conducted ecological studies.
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12. E. Erdenijab, in (4), pp. 189–197.
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14. D. Feemy, B. Fikret, B. McCay, J. Acheson, *Hum. Ecol.* **18**, 1 (1990); T. McCabe, *ibid.*, p. 81.
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16. The sheep unit counts goats as 0.9, cattle as 5, horses as 6, and camels as 7.
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18. Republic of Buryatia State Statistical Department, *Buryat Narodnoe Khozyaistvo Buryatskoi ASSR: statisticheskii sbornik* (Ulan-Ude, Russian Federation, 1963), p. 89; *ibid.*, 1986, p. 62; *ibid.*, 1993, p. 190.
19. B. Gomboev, in (4), pp. 12–57.
20. D. Williams, *Hum. Org.* **55**, 307 (1996); D. Sheehy, *Nomadic Peoples* **33**, 17 (1993).
21. The case-study sites had largely comparable average levels of annual precipitation, between 200 and 350 mm over most of their territories. [See (4), plates 1 through 8].
22. World Bank, *Mongolia, Country Economic Memorandum: Priorities in Macroeconomic Management*, report no. 13612-MOG, 31 October 1994, p. iii.