



© Brullin Remi / iStock

Rangeland Health and Drought Resilience

The Promise of Sustainable Pastoralism in Eurasia

Rangelands consist of vast natural and semi-natural grasslands, shrublands, woodlands, and deserts (also known as steppes, prairies, meadows, and savannahs), which are grazed by either livestock or wildlife or both. Healthy, productive, and resilient rangelands provide a wide range of goods and services that support pastoral livelihoods and grassland communities and provide huge benefits for the society at large. They also regulate critical ecological functions on regional and global scales, including the carbon, nutrient, and water cycles. However, land use change and development pressures (e.g., cropland expansion, grazing management, urbanisation, infrastructure), and the effects of climate change (e.g., rising temperatures, drought, wildfires) pose significant challenges to the protection and restoration of rangelands and their communities worldwide.¹

Rangelands tend to be more resistant to intense droughts and recover faster after prolonged water stress, partly due to their perennial vegetation with deeper root systems. However, the debilitating impact of drought and water scarcity on the health of rangelands and the resilience of their communities is becoming increasingly visible as these conditions become more frequent and severe. This includes reduced forage productivity, shifts in species composition, and increased soil erosion, water stress, and biodiversity loss. Indirect or secondary impacts can also be significant, including the increased risk of wildfires and sand and dust storms, and the spread of invasive species, pests, and disease.²



© GreensajidBlues / Elevato Elements

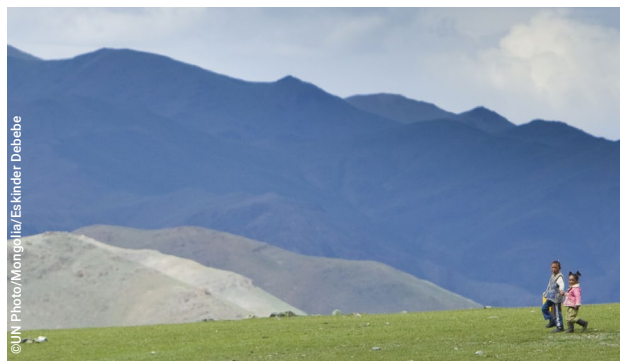
Atmospheric Evaporative Demand (AED) Increases Drought Severity

While rainfall remains the primary drought risk variable in rangelands, the atmosphere's capacity to evaporate water from the Earth's surface can significantly increase the severity of agricultural and environmental drought, particularly in arid and semi-arid rangelands where water is a key limiting factor.³ The atmospheric demand for moisture from soils, plants, and surface water has been growing faster than precipitation rates, causing an average global increase in drought severity of 40%. From 2018 to 2022, the areas affected by drought expanded by an average of 74% compared to 1981-2017, with AED accounting for 58% of this increase. In 2022, around 30% of the world's land area was affected by moderate and extreme drought, 42% of which can be attributed to increased AED. This is a trend that is likely to continue in the context of future warming scenarios and increasing pressures on rangeland resources.⁴

Policy neglect and unsustainable land use, coupled with climate impacts, have measurable socioeconomic consequences for rangeland communities – adversely affecting food production, human and livestock health, cultural survival, and regional economies. Community livelihoods suffer when pastoralists, herders, or ranchers are forced to cull or sell their livestock due to a lack of feed, forage, and water. Development policies, economic incentives, and weak governance can also undermine their production systems, contributing to food and water insecurity, demographic shifts, and greater conflict over natural resources in rangelands.⁵

The Eurasian Context

The Eurasian rangelands (steppes) stretch over 8,000 kilometres from the Black Sea to the Mongolian Plateau and Manchuria, forming the world's largest contiguous area of grazing land. Comprising 25% of global rangelands and over 6% of the Earth's total surface area, they are characterised by an arid to semi-arid climate and vast open spaces divided by mountain ranges, where livelihoods are largely dependent on pastoralism. Extensive livestock production remains the primary land use and source of livelihoods, with traditional management practices playing a key role in the stewardship of these rangelands.



The Eurasian Steppe is divided into two major regions. The Western Steppe consists of grasslands that extend south of the Ural Mountains – from the Danube River and north shore of the Black Sea across the lower Volga – and east to the Altai Mountains. Pastures in the west tend to be more fertile than those in the east due to greater rainfall. The Eastern Steppe – which extends from the Altai Mountains to the Greater Khingan Range and Manchuria – is generally higher, colder, and drier than the Western Steppe, with greater seasonal extremes in temperature.⁶

Throughout history, the Eurasian Steppe has connected wildlife, peoples, and cultures through exploration, trade, and conquest. Mobile pastoral systems established corridors of nomadic connectivity that shaped social networks and economic development across the Eurasian rangelands.⁷ Seasonal grazing patterns were largely determined by access to forage and water, with herders taking advantage of summer pastures in the mountainous regions and along river valleys. Their mobility was crucial in establishing the first caravan routes along the Silk Road around the 2nd century BCE. At the same time, the domestication of the horse enabled pastoralists to access a wider range of pastures for their growing herds of cattle, sheep, goats, yaks, and camels.⁸

During its heyday in the 13th and 14th centuries CE, the Silk Road was unified under the Mongol Empire and evolved into a secure environment for east-west trade and cultural exchange, as documented by Marco Polo and others. Local nomadic tribes acted as vital intermediaries along these grassland corridors, providing caravans with food, forage, water, local knowledge, and security. However, during the

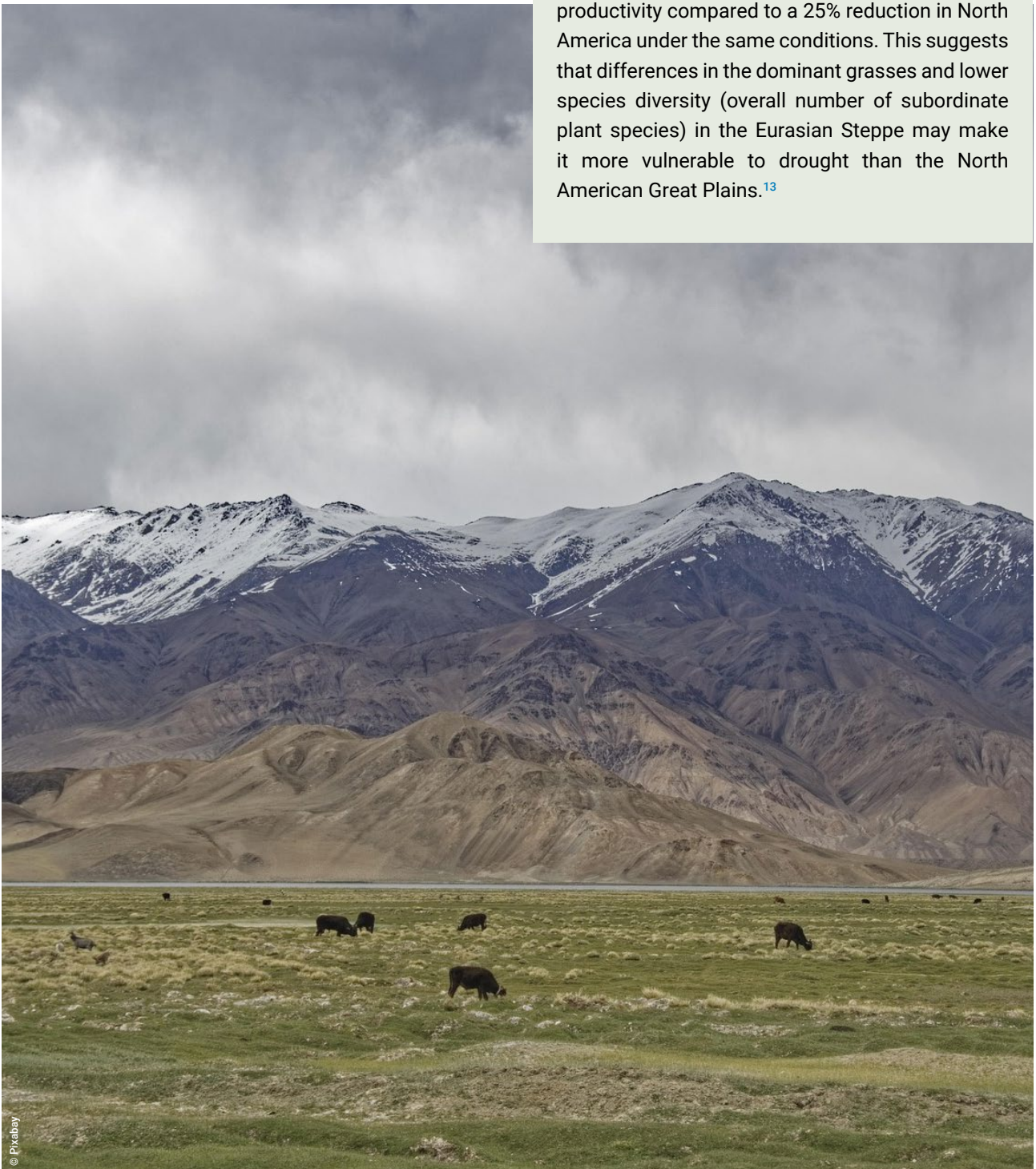
19th-century Great Game, these rangelands transitioned from trade routes to strategic buffer zones and contested territories as part of a major geopolitical struggle between the British and Russian Empires.⁹ China's Belt and Road Initiative is often regarded as a modern revival of the Silk Road concept, prioritising infrastructure development to enhance global connectivity.¹⁰

Over the past century, trends in rangeland use and management reflect a rapid intensification of resource exploitation (e.g., agriculture, mining, energy) at the expense of traditional utilisation patterns. The conversion of rangelands into croplands has had the most significant land use impact in the Western Steppe, while climate change and overgrazing are compromising the health of rangelands throughout Central Asia and Mongolia.¹¹ Despite the region's unique flora and fauna, including large herds of migrating deer, reindeer, and antelope, the proportion of intact natural ecosystems and protected areas is relatively low compared to other major rangeland regions.

The impacts of climate change, particularly drought and extreme temperatures, are becoming a major driver of rangeland degradation in Eurasia. Increasing drought risk in the Western Steppe is primarily caused by the direct effects of climate change, with prolonged dry periods that increase exposure. In contrast, higher drought risk in the Eastern Steppe is associated with management practices that contribute to rangeland degradation and increased vulnerability. Under medium and high warming scenarios, the extent and magnitude of drought risk are projected to continue increasing across the Eurasian Steppe, with greater increases anticipated for the period 2071-2100 than for 2031-2060.¹²

Comparing Drought Response: North American and Eurasian Rangelands

A recent study found that sites typifying the three major grassland types in the Eurasian Steppe experienced greater losses in productivity over time with extreme drought, while those representing the five major grassland types of the North American Great Plains were more resistant to losses in function over time. The study found the Eurasian grasslands experienced a 43% reduction in annual productivity compared to a 25% reduction in North America under the same conditions. This suggests that differences in the dominant grasses and lower species diversity (overall number of subordinate plant species) in the Eurasian Steppe may make it more vulnerable to drought than the North American Great Plains.¹³



© Pixabay

Central Asia and Mongolia

The rangelands of Central Asia¹⁴ and Mongolia make up the vast interior and eastern portion of the Eurasian Steppe, about 60% of its total land area. Livestock herding contributes an average of 10-45% of national gross domestic product and supports the livelihoods of nearly one-third of the region's population.¹⁵ These rangelands are primarily composed of deserts, grasslands, and forests, where significant populations of nomadic or semi-nomadic peoples still rely on traditional herding and land management practices. It is estimated that over 170 million livestock graze on the Central Asian rangelands, which are characterised by highly variable forage and water resources, depending on seasonal mobility as their key strategy for sustainable management.¹⁶

National economies are primarily based on agriculture and natural resources, making rangeland communities more susceptible to drought and water scarcity. These communities include thousands of pastoralists and agro-pastoralists belonging to various ethnic groups. They have a long history of adaptive management practices, grazing their livestock across vast distances from the tundra in the north to the deserts in the south, and along mountain ranges and river valleys to the east and west. However, long-distance mobility and seasonal transhumance are now only accessible to wealthy, large-scale producers, while poorer pastoralists are forced to pool resources to adapt to drought conditions, otherwise they are forced to cultivate crops or diversify their incomes through off-farm work.¹⁷

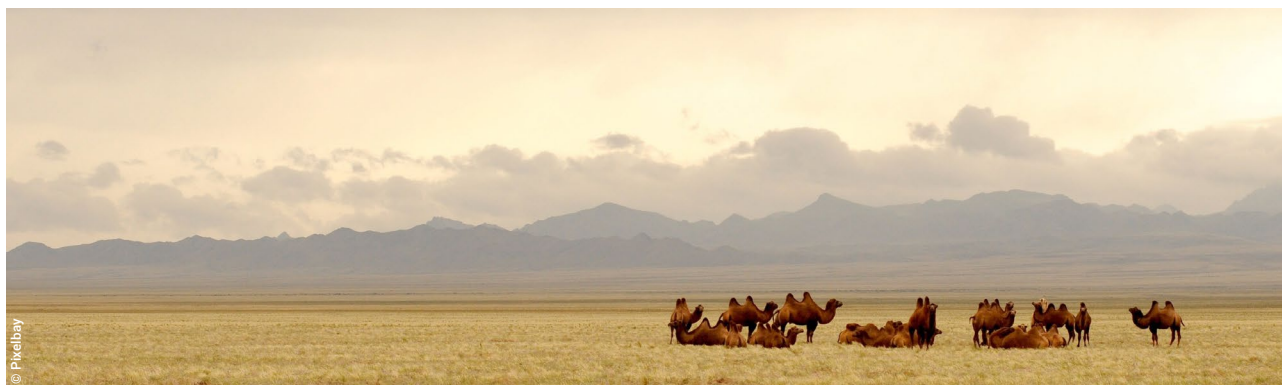
Following the collapse of the Soviet Union in 1991, the process of de-collectivisation in Central Asia involved the transfer of livestock and rangeland resources to private owners, as part of the transition to a market-based economy. In the last few decades, some countries have begun readjusting their policy priorities to encourage community-based pasture management and supply chain innovations (e.g., value-added and certified commodities). Kyrgyzstan's 2009 Pasture Law was the first to transfer authority from the state to municipalities, replacing individual leasing with collective ownership.¹⁸ Followed by Tajikistan (2013), Turkmenistan (2015), and Kazakhstan (2017), this

Inclusive Governance, Community-based Management, and Economic Diversification

Supported by the International Land Coalition's Asia Rangeland and Territories of Life Initiatives, the Central Asia Pastoral Alliance promotes community-based natural resource management of pasture lands.^{19 20} These efforts have facilitated a return to traditional governance practices based on kinship relationships, enabling rangeland communities to invest in diversified economic activities, such as processing, marketing, and value chains for sustainable meat, dairy, fibre, forest products, and ecotourism. Significant progress has been made across the region, including the empowerment of pasture user groups and the official recognition of their legitimate rights to collective use, leasing, and ownership.²¹

reorientation in governance frameworks has been effective in increasing pastoralist and herder incomes, while incentivising rangeland stewardship and boosting rural economies.²²

In recent decades, Mongolia has made significant progress in recognising and supporting the legitimate tenure and resource rights of herder communities (e.g., communal management contracts). In addition to more equitable governance arrangements between herders and local authorities, the application of pastoralist knowledge, experience, and skills has clearly demonstrated the effectiveness of traditional management practices in achieving many sustainable development objectives.²³ This evidence base now needs to be translated into an appeal to donors and the private sector – to invest in community-based projects and programmes that improve the health of rangelands and their communities, and increase their resilience to drought.²⁴



The Promise of Sustainable Pastoralism

Despite numbering an estimated half a billion people worldwide, pastoralists and rangeland communities are frequently overlooked or neglected. They are often marginalised and lack a voice in decision-making processes that directly affect their lives and livelihoods.²⁵

Sustainable pastoralism is defined as the integrated management of livestock and land resources for economic, social, and environmental benefit. Its capacity to adapt to climatic and resource variability makes it one of the most efficient forms of land use in rangelands. In order to protect and restore the multifunctional nature of these landscapes – providing benefits such as food, water, biodiversity conservation, climate regulation, and drought resilience – a comprehensive master plan is required to guide policy and investment towards sustainable management and restoration initiatives at different scales.²⁶

Many Eurasian countries are seeking to prioritise policies, land use planning, and social safety nets that support rangeland health and the resilience of pastoralist communities. To this end, they recognise the need to balance growing development pressures and to invest more in participatory governance processes. Leveraging the perspectives, knowledge, and skills of pastoralist communities puts countries in a better position to protect and restore their vast rangelands. Ultimately, the enhanced capacity of herder communities and local authorities to plan and collaborate around shared objectives is required to promote responsible development, manage resource conflicts, and encourage learning and innovation.

Recognising that sustainable pastoralism involves both livestock production and rangeland stewardship, Eurasian countries are exploring market-based incentives to support pastoralist engagement in conservation initiatives, as well as commodity processing and value chains. This could involve developing niche markets for certified goods and services that command a premium for producers, such as organic meat and dairy, specialised fibres and medicines, traditional handicrafts, and ecotourism.²⁷ In addition,

payments for ecosystem services or pay-for-performance schemes are recognised as politically viable models to incentivise rangeland management practices that safeguard biodiversity, soil, water, carbon, and other vital environmental services.²⁸

The Return of Megafauna and Rangeland Health

Historically, the iconic megafauna of the Western Steppe acted as ecosystem engineers, with grazing patterns that prevented shrub encroachment and maintained a healthy and productive grassland mosaic. International efforts to restore self-sustaining populations of Przewalski's wild horses in their native steppes of Kazakhstan, Mongolia, and China are helping these animals make a comeback after centuries of decline and being declared extinct in the wild in 1969.²⁹ In Kazakhstan, the recent reintroduction of the Kulan (Asiatic wild ass) on the Torgai steppe and the Saiga antelope on the Altyn Dala steppe is showing great promise through scientific innovations in captive breeding and other modern technologies. The use of drones, satellite collars, and GPS tools help to plot migration routes and calving areas, which provide the evidence needed to expand reserves and protected areas, as well as to plan for landscape-scale restoration initiatives.^{30 31}



Enhancing drought resilience in rangelands usually means conserving biodiversity, both above and below ground, and implementing more sustainable grazing practices.³²

A better understanding of the relationship between drought risk variables (e.g., water stress, soil health, climate variability, higher temperatures) and pastoralist management practices could inform policy and investment frameworks – providing rangeland communities with flexible and secure options for managing livestock and natural resources across vast landscapes.³³ In degraded rangelands that are increasingly vulnerable to drought, such as in Kazakhstan and Mongolia, a key priority for rangeland restoration is ensuring that grazing and stocking practices align with their carrying capacities, including by:

- (i) supporting mobility as a primary strategy for livestock production and rangeland health;
- (ii) promoting rotational grazing and the seasonal resting of pastures;
- (iii) protecting and enforcing legitimate collective rights for the governance of common lands and state-owned rangelands;³⁴
- (iv) incentivising sustainable management practices through community-based initiatives that conserve and regenerate biodiversity, soil and water resources;
- (v) encouraging the adoption of livestock species and breeds best suited to cope with drought and water stress; and
- (vi) improving risk management through early warning systems and drought insurance.³⁵

National and sub-national authorities across Eurasia now have an opportunity to prioritise community- and place-based initiatives that embrace the principles and practices of sustainable pastoralism.

Flexible institutional arrangements, such as pasture user groups, unions, networks, and associations, have demonstrated capacity to improve tenure security, prevent and manage resource conflicts, promote collaborative learning, and empower rangeland communities economically. However, as long as pastoralists continue to be marginalised and excluded from governance processes and development planning, their future will remain uncertain. Sustainable pastoralism offers great potential for simultaneously addressing climate change, land degradation, and biodiversity challenges, while creating new socioeconomic opportunities that support rangeland health, productivity, and resilience.³⁶

International Year of Rangelands and Pastoralists 2026

The International Year of Rangelands and Pastoralists (IYRP) 2026 was endorsed by the United Nations General Assembly. In 2024, the sixteenth meeting of the Conference of the Parties (COP16) to the United Nations Convention to Combat Desertification (UNCCD) held in Riyadh, Saudi Arabia adopted the first-ever decision on sustainable rangelands management. In the same year, Mongolia's parliament adopted a Resolution setting out a roadmap for the IYRP and allocating funding for national actions in support of rangelands and pastoralists.

In August 2026, Mongolia will host UNCCD COP17, featuring the launch of the Rangelands Flagship Initiative – a global, multi-partner effort to increase investments in rangelands and pastoralist communities, with the aim of achieving land degradation neutrality and related development goals. The Initiative will support national and regional response measures (i) to increase the extent and integrity of rangelands designated as protected areas (in line with the Kunming-Montreal Global Biodiversity Framework under the Convention on Biological Diversity), (ii) to enhance climate change adaptation through sustainable rangeland management and restoration activities (within the Nationally Determined Contributions and National Adaptation Plans under the United Nations Framework Convention on Climate Change), and (iii) to strengthen drought resilience in rangelands through the Riyadh Global Drought Resilience Partnership announced at COP16.

In the lead up to COP17 and in support of the IYRP, an epic journey from Riyadh to Ulaanbaatar along the historic Silk Road will bring much-needed attention to these landscapes and their custodians, showcase countries' efforts in sustainable rangeland management and restoration, and advocate for increased political support and investment, culminating in a global call to action at COP17.³⁷

Endnotes

- 1 UNCCD. 2024. Global Land Outlook Thematic Report on Rangelands and Pastoralists. United Nations Convention to Combat Desertification, Bonn. <https://www.unccd.int/resources/global-land-outlook/glo-rangelands-report>
- 2 Rapiya, M. and Ramoelo, A. 2025. Groundwater–Vegetation Interactions in Rangeland Ecosystems: A Review. *Water*, 17(8), p.1174. <https://www.mdpi.com/2073-4441/17/8/1174>
- 3 Vicente-Serrano, S.M., et al. 2020. Unraveling the influence of atmospheric evaporative demand on drought and its response to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 11(2), p.e632. <https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wcc.632>
- 4 Gebrechorkos, S.H., et al. 2025. Warming accelerates global drought severity. *Nature*, pp.1-8. <https://www.nature.com/articles/s41586-025-09047-2>
- 5 UNCCD. 2024. Global Land Outlook Thematic Report on Rangelands and Pastoralists. United Nations Convention to Combat Desertification, Bonn. <https://www.unccd.int/resources/global-land-outlook/glo-rangelands-report>
- 6 See: <https://www.britannica.com/place/Eurasia>
- 7 Frachetti, M.D., et al. 2017. Nomadic ecology shaped the highland geography of Asia's Silk Roads. *nature*, 543(7644), pp.193-198. <https://www.nature.com/articles/nature21696>
- 8 Taylor, W.T.T., et al. 2020. Early pastoral economies and herding transitions in Eastern Eurasia. *Scientific reports*, 10(1), p.1001. <https://www.nature.com/articles/s41598-020-57735-y>
- 9 Hopkirk, P. 2001. The great game: On secret service in high Asia. Oxford University Press.
- 10 See: <https://www.chinadaily.com.cn/a/202509/17/WS68ca2caa3108622abca13d4.html>
- 11 Wesche, K., et al. 2016. The Palaearctic steppe biome: a new synthesis. *Biodiversity and conservation*, 25(12), pp.2197-2231. <https://link.springer.com/article/10.1007/s10531-016-1214-7>
- 12 Nandintsetseg, B., et al. 2024. Future drought risk and adaptation of pastoralism in Eurasian rangelands. *Climate and Atmospheric Science*, 7(1), p.82. <https://www.nature.com/articles/s41612-024-00624-2>
- 13 Yu, Q., et al. 2025. Contrasting drought sensitivity of Eurasian and North American grasslands. *Nature*, pp.1-5. <https://www.nature.com/articles/s41586-024-08478-7>
- 14 Turkmenistan, Uzbekistan, Kazakhstan, Kyrgyzstan, and Tajikistan.
- 15 Ulambayar, T. 2021. Rangelands and Pastoralism in Central Asia and Mongolia: Challenges and Perspectives. In Joint XXIV International Grassland & XI International Rangeland Virtual Congress, pp. 1–4. <https://uknowledge.uky.edu/igc/24/6/16/>
- 16 Robinson, S., Jamsranjav, C., and Gillin, K. 2017. Pastoral property rights in Central Asia: Factors and actors driving the reform agenda. *Études rurales*, 200(200), pp. 220–253. <https://doi.org/10.4000/etudesrurales.11774>
- 17 Mirzabaev, A., et al. 2016. Rangelands of Central Asia: challenges and opportunities, *Journal of Arid Land*, 8(1), pp. 93–108. <https://doi.org/10.1007/s40333-015-0057-5>
- 18 Crewett, W. 2015. Introducing decentralized pasture governance in Kyrgyzstan: Designing implementation rules. *Environmental Science & Policy*, 53, pp.215-224. <https://www.sciencedirect.com/science/article/abs/pii/S1462901114002378>
- 19 See: https://d3o3cb4w253x5q.cloudfront.net/media/documents/case_studies_leaflet_10_mongolia.pdf.
- 20 Samakov, A. and Foggin, M. 2022. Territories of Life in West and Central Asia and the Caucasus: Diversity, present status, and threats. ICCA Consortium. <https://report.territoriesoflife.org/national-and-regional-analysis/west-central-asia/>
- 21 See: <https://asia.landcoalition.org/es/newsroom/central-asia-pastoral-alliance-moves-forward-new-work-plan/>.
- 22 Nori, M. 2022. Assessing the policy frame in pastoral areas of Asia. RSC Policy Paper 2022/04. <https://www.fao.org/family-farming/detail/en/c/1732378/>
- 23 Ulambayar, T. and Fernández-Giménez, M.E. 2019. How Community-Based Rangeland Management Achieves Positive Social Outcomes In Mongolia: A Moderated Mediation Analysis. *Land Use Policy*, 82 pp. 93–104. <https://doi.org/10.1016/j.landusepol.2018.11.008>
- 24 See: <https://iyrp.info/central-asia-mongolia>
- 25 UNCCD. 2024. Global Land Outlook Thematic Report on Rangelands and Pastoralists. United Nations Convention to Combat Desertification, Bonn. <https://www.unccd.int/resources/global-land-outlook/glo-rangelands-report>
- 26 Ouedraogo, R. and Davies, J. 2016. Enabling sustainable pastoralism: policies and investments that optimise livestock production and rangeland stewardship. *Revue scientifique et technique (International Office of Epizootics)*, 35(2), pp.619-630. <https://pubmed.ncbi.nlm.nih.gov/27917966/>
- 27 See: <https://www.unccd.int/land-and-life/rangelands-and-pastoralists/standards>
- 28 McGahey, D.J. and Davies, J. 2014. Pastoralism and the Green Economy: A Natural Nexus?: Status, Challenges and Policy Implications. International Union for Conservation of Nature and United Nations Environment Programme. <https://iucn.org/resources/publication/pastoralism-and-green-economy-natural-nexus>
- 29 See: <https://nationalzoo.si.edu/conservation-ecology-center/przewalskis-horse-tracking-and-reintroduction>
- 30 See: <https://www.izw-berlin.de/en/press-release/a-year-in-the-making-release-of-kulans-into-the-wild-marks-important-step-for-ecosystem-restoration-in-kazakhstan.html>
- 31 See: <https://www.nationalgeographic.com/animals/article/saiga-antelope-threatened-conservation-success>
- 32 Tommasino, A., et al. 2023. Rangeland resilience to droughts: Changes across an intensification gradient. *Applied Vegetation Science*, 26(2), p.e12722. <https://onlinelibrary.wiley.com/doi/10.1111/avsc.12722>
- 33 Ojima, D.S., et al. 2004. Eurasian land use impacts on rangeland productivity. *Ecosystems and Land Use Change*, 153, pp.293-301. https://cdn.greensoft.mn/uploads/users/1277/files/Greenmongolia/%D0%93%D0%B0%D0%B4%D0%B0%D0%B0%D0%B0%D0%B4/Mongolian_steppe_studies/Rangeland%20ecology/153GM22.pdf
- 34 FAO. 2014. Improving the governance of pastoral lands. <https://openknowledge.fao.org/handle/20.500.14283/i5771e>
- 35 Irob, K., et al. 2023. Savanna resilience to droughts increases with the proportion of browsing wild herbivores and plant functional diversity. *Journal of Applied Ecology*, 60(2), pp.251-262. <https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.14351>
- 36 WWF. 2025. From Roots to Riches: Priority policy and investment decisions for grasslands and savannahs. WWF International, Gland. https://wwf.panda.org/discover/our_focus/food_practice/grasslands_and_savannahs/roots_to_riches_priority_decisions_for_grasslands/
- 37 See: <https://www.unccd.int/land-and-life/rangelands-and-pastoralists/flagship-initiative>

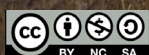


United Nations
Convention to Combat
Desertification

**United Nations Convention to Combat Desertification
(UNCCD)**

Platz der Vereinten Nationen 1
D-53113 Bonn, Germany
Tel: +49 (0) 228 815 2873

www.unccd.int



Some rights reserved. This work is available
under a CC-BY-NC-SA 3.0 IGO licence

