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# Eurasian Steppes. Ecological Problems and Livelihoods in a Changing World

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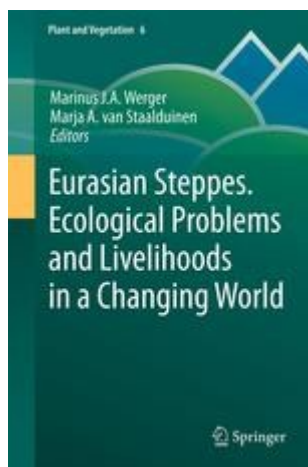
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## Chapter 1 Abiotic and Biotic Determinants of Steppe Productivity and Performance – A View from Central Asia

Karsten Weiche and Jan Treher

**Abstract** With over 13 Mio km<sup>2</sup>, grasslands of Eurasia form one of the largest continuous terrestrial biomes. They mostly represent environments with low productivity and with a long evolutionary history of animal grazing. Over the last few decades, increasing population size and socio-economic changes have subjected these steppes to increasing pressure, and associated degradation. We concentrate on the steppes of Central Asia (Mongolia, northern China and Tibet) and show that land use practices, climate and soil conditions are the most important drivers of change in these grasslands. Grazing has strongly degrading effects on relatively moist grass and forest-steppes whereas evidence indicates that acute vegetation degradation in semi-arid desert steppes is largely absent. In such environments, precipitation controls community composition and productivity at both the local and regional scales. Recurrent droughts give rise to episodic, faster steppes, which results in animal numbers being maintained at relatively low levels. This may explain the lack of degradation in dry steppes, and supports predictions drawn from the non-equilibrium theory of rangeland science. On the other hand, soil degradation due to grazing is found across the entire range of biotic conditions without any apparent interaction with precipitation. Soil nutrient contents were recently found to co-limit plant productivity, even at relatively dry sites, indicating that grazing may have indirect effects on steppe performance not predicted by standard theories. We conclude that major parts of Central Asia are sensitive to grazing degradation, which directly affects vegetation and soils, while semi-arid parts are mainly and more specifically influenced by soil degradation, which has more indirect effects on plant communities.

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