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## Recent degradation and transformation of grasslands in the Terai ecosystems of the Indian subcontinent

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The importance of grasslands for the sustenance of global biodiversity is paramount. Grassland ecosystems support rich and unique diversity at all trophic levels, are remarkably productive, and resilient to environmental changes. Grasslands in the Indian subcontinent are among the most threatened due to habitat loss, sparking renewed interest in the ecology of the different grasslands found here. We studied land cover dynamics of woodland-grassland mixtures that are part of the Terai ecosystems located at the base of the Himalayan mountain ranges. The vegetation in this region is known to be extremely dynamic even within short time scales, but the patterns and processes associated with this dynamism are not well understood. We analyzed the landcover changes at eight protected wildlife conservation areas from the region (four from India and four from Nepal) that occurred over the last three decades. We used the random forest classifier and an ensemble-based classification technique to carry out supervised classification of the land cover, which was dominated by vegetation. Landsat data, verified with a set of ground measurements and Google earth imagery, were used to generate the landcover types. Using the time series of land cover data, we quantified the observed transitions over decadal timescales. We then used Linear Discriminant functions and Bayesian spatial models to determine the relative importance of environmental variables influencing land cover transitions. We found that the area occupied by grasslands have reduced across all the protected areas we studied. In the last 30 years, the overall natural grassland area decreased by 24 percent, while the agricultural area doubled. The woodland cover increased by 28 percent as a result of ecological succession. Distance from human settlements was found to be the most crucial factor affecting the transitions, followed by topography and distance to water bodies. The grasslands are being widely transformed or degraded to early successional woodland and farmlands, and show increased alien plant invasions. Human encroachment and an increase in human activities have a major influence on these transitions. The impact of these changes on biodiversity and ecosystem function needs to be studied and the urgent attention of managers to stop further degradation is needed.