Assessing the affect of distance from settlements on landscape function analysis indices in central Mongolia

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Introduction Changes in grazing pressure in many rangeland areas of Mongolia has resulted in increased stocking rates around settlements and the decreased number of functional water points (Fernandez-Gimenez , 1999) . Despite these changes , there is very little published research regarding the impact of such shifts in grazing pressure on rangeland functionality . This paper describes the use of the Landscape Function Analysis (LFA) (Tongway & Hindley , 2004) rangeland monitoring method to assess landscape health in reference to distance from settlements .

Materials and methods In September , 2007 , six rangeland sites were selected and georeferenced along a 200km transect between two glacial-derived valleys and an associated saddle connecting Bayonkhongor and Tsetserleg . These towns have an annual average rainfall of 199 .4 and 313 .2mm respectively . Sites were mid-slope , native perennial grasslands (steppe to mountain steppe) 100-200m from available livestock water . At each site , two transects of 5m were positioned upslope and assessed using LFA , a method measuring soil and vegetation parameters that sum to give indices of nutrient cycling , infiltration and soil stability . These indices can then be tracked over time , or compared to an associated analogue , to identify trends in rangeland functionality' (Tongway & Hindley , 2004) . LFA indices , including basal cover , soil texture , litter cover and the presence of cryptogams , were entered into a LFA pro forma spreadsheet then correlated with distance from the nearest settlement using regression analysis .

Results and discussion None of the three LFA indices were significantly correlated with distance from settlement (Table 1) , suggesting that distance from settlement does not have a significant affect on LFA measures of rangeland functionality . Other indicators that relied more heavily on patch size/length were significantly correlated , however . This suggests that either soil stability , infiltration and nutrient cycling may not be as dependent on patch size in this area of Mongolia or that this landscape may be more resilient to high levels of grazing pressure , as reflected in patch size , than assumed by LFA . Increasing sample size and grazing utilization assessment at the sites would benefit future research .

Table 1 *Regression analysis on correlations between distance from nearest town and the following LFA variables .*

Patch/interpatch measures of rangeland health	Interpatch Length	NS
	Maximum Interpatch Length	NS
	Patch Area Index	**
	Landscape Organisation Index	**
	Total Patch Area	*
LFA indices	Stability	NS
	Nutrient Cycling	NS
	Infiltration	NS

NS = not significant . * = significant at 0 .10 .** = significant at 0 .05 . See Tongway & Hindley (2004) for further explanation of LFA variables .

References

Fernandez-Gimenez , M . , (1999) . Sustaining the steppes : a Geographical history of pastoral land-use in Mongolia . The Geographical Review 89 .

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