2007 Range Vegetation Assessment in the Darkhad Valley, Mongolia

Temuulen Tsagaan Sankey, Idaho State University, GIS Training and Research Center, 921 S. 8th Avenue, Stop 8104, Pocatello, ID 83209-8104

ABSTRACT

The rangeland vegetation of the Tsakhiriin tal study site in the Darkhad Valley of north-western Mongolia was assessed in the summer of 2007. Field measurements were made at 100 randomly generated point locations throughout the study site. Ground cover types, their percent cover, and available forage biomass were estimated within 10m x 10m plots at the 100 locations. Live herbaceous species had the greatest mean percent cover, while rock, weeds, and shrub cover types were estimated have a mean of less than 0% cover. Available forage biomass estimates were 1434 kg per hectare in the Tsakhiriin tal study site. The observed patterns were consistent with the expected trends in the Darkhad Valley rangelands that are continuously grazed throughout the growing season.

KEYWORDS: Field measurements, forage estimate, ground cover estimate

INTRODUCTION

Mongolia, a continental semi-arid country, is known as one of the five most heavily grazed places in the world (Asner et al., 2004). All grazing lands in Mongolia are public lands, although the herds are privately owned by nomadic herders who migrate at least four times a year between seasonal pastures. Darkhad Valley in north-western Mongolia is grazed by several different livestock species: cattle, sheep, goats, and horses. The Tsakhiriin Tal area in the Darkhad Valley, the focus area of this study (Figure 1), is primarily used as summer pasture by approximately 30 nomadic households. Rangeland wildfires are very rare in the Darkhad Valley potentially due to low fuel accumulation associated with continuous grazing use. The isolated small forest stands along the boundary of this study site (Figure 1) are also likely excluded from fire disturbance, although the continuous, expansive forest stands surrounding the Darkhad Valley might have higher fire frequency (Sankey et al., 2006).

Figure 1. Mongolia and the Tsakhiriin tal study site in the Darkhad Valley.

The point locations in the Tsakhiriin tal LANDSAT imagery indicate 100 randomly generated points at which field-based measurements were made in the summer of 2007.

The objectives of this study are to: 1) assess the rangeland vegetation in the Tsakhiriin tal area of the Darkhad Valley using LANDSAT and SPOT satellite imagery and field measurements and 2) compare the rangeland vegetation assessment with similar assessment performed at the US Sheep Experimental Station in Idaho, USA. The field-based measurements of the Tsakhiriin tal rangeland vegetation assessment were performed in late June-early July of 2007. The results of the field-based measurements are presented here and will be later combined with satellite imagery analysis results.

METHODS

A total of 100 random points were generated within the Tsakhiriin tal study site prior to field assessment. Each point represented a sample location, at which field measurements were made within 10m x 10m plots. The plots were centered at each random point and the edges of the plots were aligned in the cardinal directions. Two digital photographs were taken at each plot to record the general characteristics of each point at a landscape scale and at the plot scale. The field measurements included ground cover estimation and forage biomass measurement. Ground cover estimation included estimates of percent cover of bare soil, rock >75 mm, litter, herbaceous standing dead, dead standing wood, live herbaceous species, live shrubs, and dominant weed. Percent cover estimates were made along two 10 m line transects, perpendicular to each other and crossing at the center of the plot at 5m of each line transect, using a point-intercept method. Records were made every 20 cm along each 10 m line, beginning at 10 cm and ending at 990 cm, to indicate the cover type at the point (n = 50 points for each line and 100 points for each plot).

Litter refers to biomass that is on the ground and in contact with the ground. Live herbaceous species refers to live (i.e., green) forbs and grasses, while live shrubs include all species of shrubs.

Forage biomass was measured in four cable hoops 93 inches in circumference and 0.44 m^2 in area. The hoops were tossed randomly in each of the four quadrants of each plot. All green and senescent herbaceous biomass was clipped and wet-weighed in a paper bag using a spring scale. For each field day, 5 bags of clipped biomass were labeled and kept to be air-dried and weighed again to convert wet weights to dry weights.

RESULTS

The most common ground cover type was live herbaceous species with a mean estimate of 69% cover (Figure 2). The second most common ground cover type was litter, which made up 18% cover on average. Standing dead herbaceous and bare soil cover types fairly minimal with means of 7.8% and 4.6% cover respectively. Other ground cover types of rock, shrub, and weed comprised less than 0% cover (Figure 2).

Plot-level averages of wet forage biomass ranged between 35-225 gm per hoop. The average wet forage biomass at this study was 63 gr per hoop. These estimates translate to average forage biomass of 1434 kg per hectare.

CONCLUSIONS

The observed ground cover types and their estimated percent cover were similar to the expected trends in the Darkhad Valley grasslands. Standing dead herbaceous species and litter cover types were estimated to have low percent cover, which might be expected in such continuously grazed areas. Low percent cover of bare soil and weeds, but high percent cover of live herbaceous species might suggest that this area is not overgrazed, although it is grazed continuously throughout the growing season. Shrubs were not found in any of the plots in the Tsakhiriin tal study area. This was consistent with the observed patterns in the Darkhad Valley, where shrubs are present only in ungrazed riparian areas.

Figure 2. Mean (±SE) percent cover of all ground cover types (LH=Live Herbaceous, DH=Standing Dead Herbaceous, L=Litter, W=Weeds, BS=Bare soil, R=Rock, S=Shrubs) at the Tsakhiriin tal study site in the summer of 2007.

ACKNOWLEDGEMENTS

This study was made possible by a grant from the National Aeronautics and Space Administration Goddard Space Flight Center (NNX06AE47G). Idaho State University would also like to acknowledge the Idaho Delegation for their assistance in obtaining this grant.

LITERATURE CITED

Asner, G.P., A.J. Elmore, L.P. Olander, R.E. Martin, and A.T. Harris. 2004. Grazing Systems, Ecosystem Responses, and Global Change. Annual Review of Environmental Resources 29: 261-299

Sankey, T.T., C. Montagne, L. Graumlich, R. Lawrence, and J. Nielsen. 2006. Lower Forest-grassland Ecotones and 20th Century Livestock Herbivory Effects in Northern Mongolia. Forest Ecology and Management 233: 36-44

Recommended citation style:

Sankey, T. T. 2009. *2007 Rangeland Vegetation Assessment in the Darkhad Valley, Mongolia*. Pages 19-22 in K.T. Weber and K. Davis (Eds.), Final Report: Comparing Effects of Management Practices on Rangeland Health with Geospatial Technologies (NNX06AE47G). 168 pp.