A technique to evaluate rangeland health

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Abstract. According to pasture law in Kyrgistan, pasture management is executed by local communities. The aim of Community Pasture Management Plans is to decrease risks of reducing pasture quality and to raise pasture resource use sustainability. One of the important parts of a pasture management plan is pasture health assessment. The objective of our work was to develop a rapid and simple technique to assess pasture health for community members and other land managers who live or work on pastures. This tool is the result of a collaborative effort of scientists from different countries. This technique utilizes 6 indicators, which are easy to measure, of plant community and important natural processes and functions. They are described in Field Worksheet for Grasslands which was produced in the period of our activity. A pasture condition assessment provides a snapshot in time of management impacts on a particular site. Pasture condition monitoring can alert livestock producers to manage issues and problems and introduce management changes. The outputs of this assessment evaluate the attributes of rangeland health at the ecological site or its equivalent level. This protocol provides managers with a starting point to better describe and ultimately manage rangeland.

Keywords: Rangelands health, assessment, qualitative ranking, indicator.

Introduction

The Kyrgyz Republic (39 to 44ºN, 69 to 81ºE) is a mountainous country. The total area of pastures in Kyrgyzstan is 9.15 million hectares (87% of land area). This large area spans a remarkable diversity of rangeland ecosystems, from desert to high mountain meadows. In these landscapes there are several grassland types which are classified by season: spring-autumn, summer and winter pastures (Table 1).

The winter pastures (or Kyshtoo) are located in the areas that receive least snow and are close to the village to enable animals to be housed at night. Summer pastures (or Jailoo) are located in middle elevation and higher gorges and valleys and because they are distant from most villages these grasslands are still highly productive. Due to the steep slope (often 40º) landslides can occur on the terraced pathways, especially created by grazing cattle. The spring-autumn (or Jazdoo-kuzdoo) pastures are located in the foothills below 2500 m and provide the link between the summer and winter pastures.

Most observers agree that rangeland degradation was wide-spread, while rangeland monitoring in Kyrgyzstan was done more than 20 years ago. Land managers are constantly searching for more efficient methods to assess rangeland condition. It can be conducted using quantitative measures and a qualitative rapid assessment protocol. Qualitative assessment can then be used to prioritize land for restoration and more intensive monitoring.

Materials and methods

The objective of our work was to develop a rapid and simple technique for community members and other land managers who live or work on pastures. It was necessary to

Table 1. Seasonal pasture resources of the Kyrgyz Republic (KyrgyzGiprozen cited by Esengulova *et al.* 2008).

Types of pasture	Area (million ha)	Proportion of total (%)
Summer	4.13	45
Autumn/Spring	2.96	32
Winter	2.06	23
Total	9.15	100

Figure 1. location of field study.

evaluate the methodology to select indicators for natural pasture of the Kyrgyzstan. The study field was located in Narin, Issikul, Jalalabad, Osh and Chuy regions (Figure1).

Pasture management specialists from the Kyrgyz Livestock and Pasture Research Institute, Bishkek, Kyrgyz Republic, and pasture department and international specialists from AAFC – Land Management Division Canada, and the Swiss Agroscope Changins-Wädenswil Research Station were involved in this study. The aim of this study was to understand and define the optimal state of

each type of pasture and to define appropriate management strategies.

In order to do medium term monitoring, a pasture condition system must be used. This needs to be based on what would be most applicable for Kyrgyzstan, and should be a priority to be developed as part of pasture management reform. There are some very well developed systems already in places such as the Ecological Site Inventory methods (ESI) used in the United States (Habich 2001), and the Rangeland Health Assessment used in Canada

(Alberta Sustainable Resource Development 2005). Consideration was given to current methodologies used in the Kyrgyz Republic, former Soviet methodologies, the U.S. Ecological Site Inventory and Canadian Rangeland Health.

Results

A six indicator system was developed which incorporated components of all of the methodologies above, but was organized on the basis of the Canadian Rangeland Health system. This system allows both professionals and pasture users to evaluate their pasture condition in a consistent way, and to be able to use this as a tool for setting carrying capacities and evaluating management. The six indicators (and examples of scoring) are bare ground (Table 2), moisture retention and litter (Table 3), soil erosion (Table 4a), stoniness (Table 4b), weeds and undesirable shrub cover (Table 4c) and plant community (Table 4d).

Each indicator is scored from the lowest to the highest, dependant on type of pasture. Each indicator is evaluated separately. Evaluation of indicators have been done by visual method and method of cross line (Herrick *et al.* 2009) adapted for conditions of Kyrgyzstan. The pasture condition score is then a cumulative measure of the

Table 2. Scoring of the bare ground indicator

Score	% Bare ground			
	Desert Steppe	Steppe	Meadow Steppe	Meadow
10	<5	<1	0	0
8	5-20	1-5	1-2	1-2
6	21-35	6-20	3-5	3-5
4	36-45	21-30	6-20	6-20
2	46-55	31-40	21-40	21-40
0	>55	>40	>40	>40

Table 3. Scoring of the litter indicator

	Litter Scale							
	Desert Steppe		Steppe		Meadow Steppe		Meadow	
	kg/ha	g/ ¼ m^2	kg/ha	g/ ¼ m^2	kg/ha	g/ ¼ m^2	kg/ha	g/ ¼ m^2
Potential Score	400	10	600	15	1500	38	2300	58
30	>280	7	>420	>11	>1050	>26	>1610	>40
24	241-280	6-7	366-420	9-11	916-1050	23-26	1401-1610	35-40
18	201-240	5-6	306-365	8-9	766-915	19-23	1171-1400	29-35
12	161-200	4-5	246-305	6-8	616-765	15-19	941-1170	24-29
6	120-160	3-4	185-245	5-6	465-615	12-15	710-940	18-24
0	<120	<3	<185	<5	<465	<12	<710	<18

Table 4. Scoring for (a) erosion, (b) stoniness, (c) weeds and number of undesirable shrubs, and (d) plant community

(a) Erosion		(b) Stoniness		(c) Weeds/undesirable shrubs		(d) Plant community	
Score	% erosion	Score	% stoniness	Score	% Weeds/ undesirable shrubs	Score	Plant community (% of key grass species)
10	No erosion	5	Less than 1%	5	No weeds/ No undesirable shrubs	20	>50%
8	Single/isolated	4	1 to 5%	4	1 to 2%	16	41-50%
6	2 to 3%	3	6 to 10%	3	3 to 5%	12	31-40%
4	4 to 10%	2	11 to 15%	2	6 to 10%	8	21-30%
2	11 to 20%	1	16 to 20%	1	11 to 15%	4	10-20%
0	>20%	0	>20%	0	>15%	0	<10%

Table 5. Pasture Condition Categories

Score	Rating	Action	Recovery
>80	Excellent	None required – reference community	N/A
66-80	Good	None required	N/A
51-65	Slightly degraded	Early warning that changes are required	1-5 years
26-50	Degraded	Immediate changes are essential	3-10 years
<25	Severely degraded	Immediate intervention including periods of rest	Long term

6 indicators. This will rate the representative area of grassland and determine if actions are required (Table 5).

The condition category scores are based on whether all of the key functions of healthy pastures are being performed. Lower scores provide a clear signal that adjustments in current management must be made. The lower the score is, the more significant the changes that are required, and the longer the recovery period.

There is a strong relationship between pasture condition and productivity. The higher the pasture condition score the greater the productivity, thus the more livestock that can be carried on the land.

Conclusions

The Field Worksheet for Grasslands has been tested in all areas of Republic. Testing has shown that the score sheet may be used by pasture users to rate different pastures in a single growing season or the same pasture over a period of years. The indicators are things that can be observed and are easy to measure.

Acknowledgment

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