An Integrated Assessment and Management Optimization System for Grazinglands

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INTRODUCTION

Grazinglands have traditionally been assessed based on a particular use. Some are managed as pastures where the grazingland is devoted to the production of introduced or indigenous forage for harvest by grazing, cutting, or both; while others are managed as rangelands in which the native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs that are grazed or have the potential to be grazed. There is a need for a site-specific method that can be used to assess and optimize management of all grazinglands, including pasturelands and rangelands. We present an integrated grazingland assessment strategy that is based on the strengths of two existing assessment protocols (Fig. 1).

Figure 1. Foundation of the integrated grazingland assessment strategy which provides a semi-quantitative rating system to assess **ecosystem health attributes** as well as **optimize grazingland resilience.**
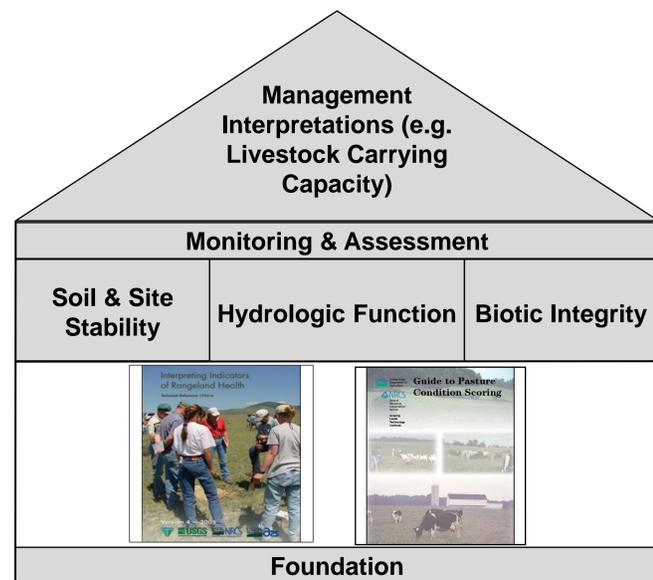
Our assessment strategy uses the ecological attributes of soil and site stability, hydrologic function, biotic integrity, and includes livestock carrying capacity. These attributes contribute to ecosystem resilience, forage/fodder production and to additional services such as sequestration of soil carbon, nutrient cycling, and prevention of soil erosion.

METHOD INTEGRATION

The Integrated Grazingland Assessment methodology takes the **ecological** strengths and site-specificity of the Interpreting Indicators of Rangeland Health methodology (Pellant et al. 2005) and combines it with the **management optimization** strengths of Pasture Condition Scoring (Cosgrove et al 2001) to produce twenty-three core indicators (Fig. 2).

Figure 2. Twenty-three indicators of the integrated grazingland health assessment tool used to rate four attributes of grazingland health: soil and site stability (SSS), hydrologic function (HF), biotic integrity (BI), and livestock carrying capacity (LCC).

Indicator no.	Indicator	Attribute
1	Rills	SSS, HF
2	Water flow patterns	SSS, HF
3	Pedestals and/or terracettes	SSS, HF
4	Bare ground (%)	SSS, HF, LCC
5	Gullies	SSS, HF
6	Wind-scoured, blowouts and/or deposition areas	SSS
7	Litter movement	SSS
8	Soil surface resistance to erosion	SSS, HF, BI
9	Soil surface loss or degradation	SSS, HF, BI
10	Plant community composition and distribution relative to infiltration and runoff	HF
11	Compaction layer	SSS, HF, BI
12	Functional/structural groups	BI
13	Plant mortality/decadence	BI, LCC
14	Litter amount	HF, BI
15	Annual production	BI, LCC
16	Invasive plants	BI
17	Reproductive capability of perennial plants	BI
18	Desirable forage plants (%)	LCC
19	Forage diversity	LCC
20	Plant residue	BI, HF, LCC
21	Percentage non-toxic legumes	LCC
22	Uniformity of use	LCC
23	Livestock concentration areas	LCC

Figure 3. Using attributes to assess condition and optimize management to needs.
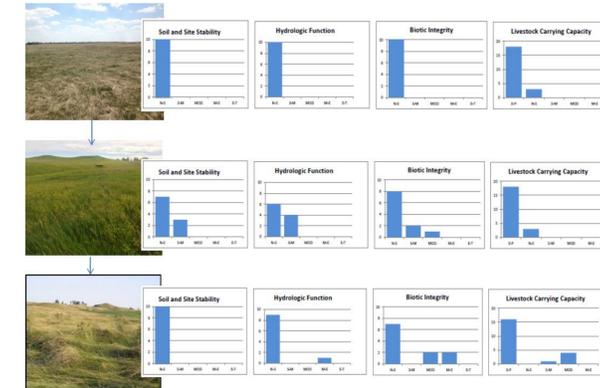
CONCLUSIONS AND MANAGEMENT IMPLICATIONS

- Assessing the ecological potential of an area, the departures from that potential, and the indicators that are specifically related to the ability of an area to support a sustainable livestock grazing operation will allow land managers to address site specific deficiencies that may be affecting the function and sustainability of their grazinglands.

- Site-specific management approaches that are informed by scientifically supported data that meet the needs of a wide range of users will lead to realistic and resilient management scenarios, as well as more cost-effective assessment programs.

- Assessments made with the integrated grazingland assessment approach will also provide comparable metrics for grazinglands across the globe.

ACKNOWLEDGEMENTS

LITERATURE CITED

Cosgrove, D., D. Undersander, and J.B. Cropper. 2001. Guide to Pasture Condition Scoring. Fort Worth, TX. USDA Natural Resources Conservation Service Grazing Lands Technical Institute.

Pellant, M., P. Shaver, D.A. Pyke, and J.E. Herrick. 2005. Interpreting indicators of rangeland health, version 4. Technical Reference 1734-6. US Department of the Interior, Bureau of Land Management, National Science and Technology Center, Denver, CO.