

EDITOR'S CHOICE FROM RANGELAND ECOLOGY & MANAGEMENT

VOLUME 73, ISSUE 5

Beyond Inventories: The Emergence of a New Era in Rangeland Monitoring

Matthew O. Jones, David E. Naugle, Dirac Twidwelld, Daniel R. Udene, Jeremy D. Maestas, and Brady W. Allred

Rangeland ecosystems are dynamic because they change in response to various biotic and abiotic drivers that can create trajectories in vegetation composition and abundance. Managers have struggled to document these trajectories in order to help identify rangeland degradation and/or invasion at an early enough stage in the process to adjust management before the change passes a major threshold. Today's focus on rangeland resistance to change and resilience of plant communities after drivers cause change is a basic tenet of rangeland management. Monitoring rangelands has been a fundamental information gathering process for nearly 100 years, since it was started by the U.S. Forest Service in the 1930s. The struggle to develop simple, easily collected monitoring criteria that provide adequate information to managers has been very illusive. Monitoring vegetation composition dominated most early attempts to capture vital information on which to make wise decisions. Spending endless hours on hands and knees counting plants was at one time a "rite of passage" into range management. After World War II, rangeland managers began to recognize the importance of soils as a necessary part of any useful monitoring program. And, even more recently, there has been a push to include many important rangeland attributes in monitoring.

Millions of dollars have been invested into monitoring over many decades, but these data have been plagued with problems tempering their usefulness. A lack of standardization from site to site and from year to year on the same site has made decades of data almost useless. The National Environmental Policy Act (NEPA) of 1969 changed the formerly independent role of the agencies and gave the interested public means of input to and oversight on the actions of the managerial agencies. NEPA also gave the interested public leverage through the courts if a decision was not of their liking. The result has been near grid lock on proactive management on public rangelands and diversion of a large portion of operating funds to planning. Availability of monitoring data for some locales is largely due to the foresight and persistence of particularly dedicated individuals. Lack of consistent and comparable monitoring procedures within and between the federal management, advisory, and regulatory agencies has made it impossible to conclude reliably the overall condition and trend of our public rangelands.

One of the most significant problems with rangeland monitoring is still largely present today. Monitoring must change to accommodate a missing but essential piece of information. The objective of monitoring is to provide land managers critical information about ecosystem change to adjust management before a critical point of no return is achieved. It provides important information about the direction and magnitude of ecosystem component changes. But, the real problem is that these data do not determine the reasons for or drivers of these changes. Understanding the actual drivers of change is essential to developing truly informed management strategies.

In light of the need for a more contemporary view of rangeland monitoring, I am excited to report to you that the Editor's Choice of this issue of *Rangeland Ecology & Management* (73/5) is entitled "Beyond inventories: the emergence of a new era in rangeland monitoring". These researchers discuss the newfound ability to monitor all western U.S. rangeland vegetation annually at 30 m resolution via preprocessed satellite imagery. While capturing continuous change in functional group vegetation cover, this method allows for the identification of national scale priorities that can guide policy, and inform regional to local management. National vegetation cover trends can be easily identified, their acreage quantified, and the most vulnerable regions and resources prioritized for management. This new era of monitoring and assessment has the potential to take rangeland ecosystem management beyond the reactive realm of diagnosis and treatment of undesirable conditions to the proactive realm of screening and prevention. Similar to practices in the medical community, where new technologies provide detection of malignant

conditions prior to the manifestation of symptoms or adverse effects, so too can rangeland managers screen for the presence of undesirable vegetation conditions or transitions prior to the manifestation of state changes. We can also now test theoretical concepts in rangeland ecology and management that have been difficult to verify at broad scales. These include the existence of large-scale persistent transitions driven by disturbance, the utility of early warning and regime shift metrics for identifying transitions, and the incorporation of resilience and resistance concepts for managing landscapes. Further analysis can test the effectiveness of common management practices and policies such as rotational grazing, brush and woody plant removal, and herbicide treatments—not only tracking effectiveness and outcomes at individual management scales, but determining comprehensively (in both space and time) whether such practices and policies are worth their resource investments.

I encourage you to read this and all the interesting articles in the current *Rangeland Ecology & Management* issue (73/5).

Roger Sheley,
Editor-in-Chief
Rangeland Ecology & Management

Rangelands 42(5):172–173
doi: 10.1016/j.rala.2019.011.001