Essays of a Peripheral Mind

Picking Up Rocks

By K. M. Havstad

Last year I happened to be in a pecan orchard, near the geographic center of Texas, on a particulaly hot and humid day in June. Why I happened to be in this particular orchard is irrelevant to this essay. What is germane is the fact that there was work to be done, and each of us was waiting to be assigned specific tasks that needed attention. I stood there awaiting my instructions. The experience was similar to grade school when you would, often until the last, wait to be chosen for the team, whatever the sport. On this day, the first person chosen was directed to brew specific soil-nutrient amendments. The second person was assigned the task of inspecting trees for insect loads. The third was asked to make certain measures of tree production. Each had been given a duty that matched their skills, interests, and capacities. I was the last one awaiting my assignment.

They sized me up and then politely asked me to pick up loose rocks across the orchard. I took the empty bucket handed to me and proceeded out to right field, so to speak. I took some solace in the idea that this is what must have been meant by "the heavy lifting."

My consolation was found in the honest assessment that I had no experience with these types of organic fertilizer concoctions; I didn't know too much about pecan orchard entomology or pecan tree physiology. In truth, I was given the most appropriate task. I did not have the knowledge to really help this pecan grower in the short term in any other fashion. Picking up rocks was a way to help, I hoped, yet would keep me from causing unintended mischief. Fortunately, I understood this, even in 95°F heat and 85% humidity, and dutifully toted my pail.

Unfortunately, there are a number of areas regarding natural resources and their management where we also lack the knowledge base to adequately gauge our actions in order to avoid undue mischief. In a sense, we may be better off spending a lot of time picking up rocks rather than anything else.

In 2008 the Heinz Center released its report "The State of the Nation's Ecosystems, 2008." First published in 2002, the Heinz Center's reports are well-written, clearly presented sets of assessments of terrestrial and aquatic, urban and rural, forested and farmed, and rangeland and coastal environments across the United States. The current report devotes 26 pages to the ~1 billion acres of the United States that are grasslands and shrublands.

Throughout this report is the following phrase: "Data Gap – Data are not available for national reporting on (fill in the name of a specific indicator of importance)." The Heinz Center's report for grassland and shrubland systems employs 14 indicators placed within four categories: 1) extent and pattern of ecosystem area and land use, 2) chemical and physical characteristics, 3) biological components, and 4) goods and services (Table 1). The report defines indicators as "specific, well-defined, and measurable variables that reflect key characteristics that can be tracked through time." The Heinz Report likens indicators to human vital signs often employed in assessing an individual's own health, such as blood pressure or cholesterol levels. Although the appropriateness of the use of the human concept of "health" to assess a complex and diverse ecosystem of over 1 billion acres may be highly debatable, there is no denying that the concept of vital signs of health translates extremely well to the reader.

Admittedly, indicators do not reflect the drivers of these characteristics or required actions in response to indicator dynamics, nor are they reflective of many important socio-economic factors that are at play in impacting the status and trends within this ecosystem. That would be the tasks of the scientists, land managers, and resource professionals devoted to this ecosystem, if they are able to work from an appropriate and shared base of knowledge.

It would be easy to review this report, and even just the content of Table 1, and be dismayed that, after decades of management, monitoring, study, and reflection that we are still working from huge data gaps in our knowledge. To some extent, I am still in a position to really feel best qualified to just pick up rocks.

Granted, this is a national report, and there are many specific areas and regions where the depth of knowledge is much greater, and most resource practitioners are highly qualified for tasks well above the rock-picking level.

Yet, until we can assimilate this kind of information, draw upon it for effective analyses at a national level, and develop effective data-driven national policies, we will not

Table 1. Status and trends within the United States for all grassland and shrubland indicators as reported in the H. John Heinz III Center for Science, Economics, and the Environment's *The State of the Nation's Ecosystems 2008*[1]

Indicators	What do the most recent data show?	Have data values changed over time?
Extent and pattern		
Area of grasslands and shrublands	There are 830 million acres of grasslands and shrublands in the lower 48 states (2001 data, includes pasture) and 205 million acres of grasslands and shrublands in Alaska (1991 data).	*Data are not adequate for national reporting on changes in the area of grasslands and shrublands.*
Land use in grasslands and shrublands	There are 31 million acres of grasslands and shrublands enrolled in the Conservation Reserve Program (2006 data).	→ Between 1994 and 2006 there was no clear upward or downward trend in acreage of grasslands and shrublands enrolled in the Conservation Reserve Program.
	Data are not adequate for national reporting on the area dedicted to livestock raising, oil/gas/ mining, rural residences, "protected areas," and high-intensity recreation.	
Pattern of grassland and shrubland landscapes	22% of "core shrubland" is in patches larger than 100 square miles; 13% of "core grassland" is in patches larger than 100 square miles (2001 data).	*Data are not adequate for national reporting on changes in the size of "core shrubland" or "core grassland" patches.*
Chemical and physical characteristics		
Nitrate in grassland and shrubland groundwater	*Data are not adequate for national reporting on nitrate concentrations in groundwater in areas that are primarily grassland or shrubland.*	
Carbon storage	*Data are not adequate for national reproting on the total amount of carbon stored in soils and plants in grasslands and shrublands.*	
Number and duration of dry periods in grassland and shrubland streams and rivers	19% of grassland and shrubland streams have periods of zero flow (2002–2006 data).	↓ Since 1963, the percentage of streams with zero-flow periods has decreased in all grassland and shrubland ecoregions except Desert/Shrub.
	15% of grasssland and shrubland streams have substantailly (greater than 14 days) longer periods of zero-flow compared to 1941–1960 baseline period (2002–2006 data).	→ Since 1963, the percentage of streams with zero-flow periods substantially longer than the baseline period has shown no clear upward or downward trend.
	26% of grassland and shrubland streams had substanially shorter periods of zero-flow compared to the 1941–1960 baseline peri-od (2002–2006 data).	↑ Since 1963, the percentage of streams with a substantially shorter period of zero-flow has increased compared to the baseline period.
Depth to shallow groundwater	*Data are not adequate for national reporting on the depth of shallow groundwater.*	
Biological components		
At-risk native grassland and shrubland animal species	18% of native grassland animal species are at risk (2006 data).	*Data are not adequate for national reporting in changes in at-risk native species.*
	Data are not adequate for national reporting on the percentage of at-risk native grassland and shrubland plants.	
	31% of at-risk native vertebrate animal species in grasslands and shrublands have declining populations; 29% have stable populations; and 3% have increasing populations (2006 data).	*Data are not adequate for national reporting on changes in the population trends in at-risk native vertebrate animals in grasslands and shrublands.*
	Data are not adequate for national reporting on population trends in at-risk native invertebrate animals and plants in grasslands and shrublands.	

Table 1. Continued

Indicators	What do the most recent data show?	Have data values changed over time?
Established non-native grassland and shrubland plant cover	*Data are not adequate for national reporting on the proportion of established non-native plant cover on grasslands and shrublands.*	
Population trends in invasive and non-invasive birds	About 70% of invasive and 80% of non-invasive bird species have increasing populations (2001–2005 data).	→ Since 1966–1970 there has been no clear upward or downward trend in the percentage of invasive bird species with increasing population trends.
		→ Since 1966–1970 there has been no clear upward or downward trend in the percentage of non-invasive bird species with increasing population trends.
Fire frequency	*Indicator development needed*	
Riparian condition	*Indicator development needed*	
Goods and services		
Cattle grazing	Approximately 80 million cattle graze on grasslands and shrublands (2007 data).	↓ Since 1994 the number of cattle grazing on grasslands and shrublands has declined.
Recreation on grasslands and shrublands	*Data are not adequate for national reporting on participation in recreational activities in grassland and shrubland areas.*	

↓ = significant decrease; ↑ = significant increase; → = no clear trend (may be due to little numerical change in the data or large numerical fluctuations in data resulting in no single trend); *Italics* indicate that data were not available for adequate reporting.

[1] Island Press, p. 200–201; *see* www.heinzctr.org/Press_Releases/SOTNE_2008.shtml.

capture the national attention these resources fully deserve. This has always been a key problem for this ecosystem commonly referred to as non-farmed, non-forested, or simply barren wasteland. Until we can adequately fill in these gaps, add additional needed indictors to a national network, provide appropriate analyses, and implement effective actions on a national scale, we will always have a small group of devoted professionals that attend our meetings and share information outside of the national spotlight. Meanwhile, the nation will direct itself to other compelling activities: 10,000 people will attend a sports memorabilia convention to trade baseball cards in Houston, and 12,000 will line up for Leonard Nimoy's autograph at a Star Trek convention in Las Vegas. Not that I haven't traded baseball cards (okay, I was 8 at the time) or watched Star Trek movies (okay, a rerun last week). But the Heinz Center has greatly advanced our cause with these reports, and the opportunity exists to further their impact with a concerted effort that builds on these reports. Oddly, there is no direct mention in the Heinz Report of activities by the other rangeland indicator effort ongoing for nearly 10 years, the Sustainable Rangeland Roundtable. There is, however, an overlap of participants in these two efforts. In comparing these two efforts, there are two prominent advantages of the Heinz Report and its associated information: 1) it is both highly readable and readily accessible (*see* www.heinzctr.org/Press_Releases/SOTNE_2008.shtml), and 2) it addresses ecosystems of the entire nation.

Additional Heinz Center reports on priority data needs and policy recommendations as a result of these national assessments expand this vision. One key aspect of this vision is cost. In the May 2006 report, "Filling the Gaps—Priority Data Needs and Key Management Challenges for National Reporting on Ecosystem Condition" (available online at www.heinzctr.org/ecosystems), it is estimated that start-up costs to fill these gaps for all indicators for all continental ecosystems would be about $30–40 million, with annual data collection costs of $30–40 million for all ecosystems (over 2 billion acres). A few years ago this may have seemed to be a huge obstacle, and this is still a substantial amount of money. However, in an era of $700 billion bailouts and an increasing emphasis on building and rebuilding our national infrastructures during a time of recession, these estimates seem like a bargain for the kind of ecologically based information they could provide.

Without addressing these data gaps, and by adequately developing an infrastructure that makes this information available and transparent, we have little basis for focusing national attention on issues that address the health of our rangelands, which comprise over half of the nation. This would be true for any nation and/or continent.

Upon reflection, without acquiring a broader base of knowledge at a national level, our national-scale actions are akin to just picking up rocks either because we don't know any better or in order to not do unintended harm. In either case, we are just picking up rocks. Fortunately, I'm experienced.

Author is Supervisory Scientist, USDA/ARS Jornada Experimental Range, PO Box 30003, MSC 3JER, New Mexico State University, Las Cruces, NM 88003-8003, USA, khavstad@nmsu.edu.