Resilience in Mongolian rangelands

Brandon Bestelmeyer

United States Department of Agriculture--Jornada Experimental Station, Las Cruces, New Mexico, USA

bbestelm@nmsu.edu
Resilience is the capacity of a system to tolerate shocks and not change to different state.
Resilience of herders depends on the resilience of livestock and land condition to shocks.
Shocks, like weather-caused dzud and drought, cannot be controlled.

How we prepare and adapt determines rangeland resilience.
A healthy grassland state in the southwestern United States
A degraded grassland state

About two thirds of our grasslands have been degraded
Dominant grasses were lost due to overgrazing during multi-year droughts
How did this happen?
Repeated heavy defoliation reduces root mass over time

<table>
<thead>
<tr>
<th>Level of Removal</th>
<th>50%</th>
<th>70%</th>
<th>90%</th>
</tr>
</thead>
</table>

Johnson 1961

<table>
<thead>
<tr>
<th>Percent leaf volume removed</th>
<th>Percent root growth stopped</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td>40%</td>
<td>0%</td>
</tr>
<tr>
<td>50%</td>
<td>2-4%</td>
</tr>
<tr>
<td>60%</td>
<td>50%</td>
</tr>
<tr>
<td>70%</td>
<td>78%</td>
</tr>
<tr>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>90%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Reduced root mass can lead to reductions in soil organic matter inputs and water and nutrient retention in the soil.

Grazing with rest periods

Continuous heavy grazing

Stan Boltz, NRCS, South Dakota
Reduced production and cover leads to greater water loss and erosion
Especially during drought, weakened grasses die and unpalatable plants take their place.

After the transition, the good years are not as good.
On our research station, livestock numbers started very high in 1916, adjusting downward with successive droughts and degradation, and a realization of natural limits.
The loss of livestock productivity was irreversible in about one third of grasslands of the region.
But many grasslands have improved, even through drought
Set conservative stocking rates that allow for plant survival, reproduction, and recovery.
Benefits of conservative stocking matched to ecological site

- Improved forage quality and quantity
- Improved forage production in drought
- Increased livestock weight gain rate
- Improved animal condition going into dzud
- Improved soil quality
- Potential benefits for biodiversity
How was this supported by government?

- Set stocking rates on public land, ecological site descriptions, and monitor rangeland health
- Provide support for infrastructure to improve livestock distribution, disaster assistance, restoration
- Extension to work with ranchers in developing plans
- University training
- Professional development organizations (Society for Range Management)
Resilience requires a balance of short-term and long-term goals.
Will Mongolian rangelands be resilient?

Sheep Units - All Aimags

Sheep Units (Thousand Head)

Year


Sheep Units - All Aimags
Reported Dzuds

Will Mongolian rangelands be resilient?

Courtesy Jay Angerer
Persistent degradation is occurring
Most changes in vegetation due to overgrazing can eventually be reversed with changes to grazing management and policy.

1984 kg/ha—35% cover Stipa krylovi

494 kg/ha—0% Stipa krylovi (mostly Carex)

1199 kg/ha—6% Stipa krylovi

Yearly, heavy summer grazing

Deferment and reduced stocking rates

Heavy grazing

Decadal recovery, deferment with greatly reduced stocking rates
The capacity to interpret rangeland health and monitor change exists
The technology to assist planning exists
The concern for the future and interest in management change exists
Evidence for the benefits of change exists
The next steps are up to you, let’s talk about them
A national report on rangeland conditions and management strategies

- NAMEM, ALAGCAC, NUM, MSUA

- Extensive field inventory dataset will be shared after publication of report

- National and international literature review and local experience

- New concepts for interpreting rangeland conditions adapted from international approaches

- Welcome feedback on interpretations and recommendations