The Carbon Bank beneath Our Feet
Carbon Storage in Rangeland Soils

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Introduction

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Outline

What are rangelands?

Rangeland carbon sequestration: process

Rangeland carbon sequestration: challenges

Putting rangeland carbon to work

Conclusion
What are rangelands?
Rangelands...

- ...occupy about 50% of the world’s land surface

*Metternicht et al., 2015*
Rangelands...

- occupy about 50% of the world’s land surface
- sequester about 0.5 Pg of carbon per year
  - To compare, transportation produced about 1.86 Pg of CO2 or CO2 equivalents in 2018 in the United States, equal to 29% of total US carbon emissions
Rangelands…

- …occupy about 50% of the world’s land surface
- …sequester about 0.5 Pg of carbon per year\textsuperscript{1}
  - To compare, transportation produced about 1.86 Pg of CO\textsubscript{2} or CO\textsubscript{2} equivalents in 2018 in the United States\textsuperscript{2}, equal to 29% of total US carbon emissions
- …store more than 10% of carbon associated with living things on land, and 10-30% of organic carbon in soil
Takeaways

✰ Without interference, rangeland soil gains and loses carbon very slowly
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★ Disturbance is the primary cause of loss of carbon from rangelands
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★ It is easier to preserve existing soil carbon than rebuild it once it is lost.
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Rangeland Carbon Sequestration

Images: Sage Grouse Initiative
Rangeland Carbon Sequestration

- 10 years
- 100 years
- 1000 years (or more)
Rangeland Carbon Sequestration
Rangeland carbon sequestration challenges

- Not all rangelands can sequester carbon at the same rate; some are very slow
Rangeland carbon sequestration challenges

- Remaining reserves of coal, oil, and natural gas frequently underlie rangelands
Rangeland carbon sequestration challenges

- Degradation due to invasive species
Putting Rangeland Carbon to Work

Marin Carbon Project
California

Carbon Offset Development
Comanche Nation, Oklahoma
Pe’Sla Lands of the Black Hills, South Dakota
Wind River Reservation, Wyoming
Santa Ana Pueblo, New Mexico

Cienega Restoration on Pitchfork Ranch
New Mexico
Marin Carbon Project

Photo: Becca Ryals

Photo: Marin Carbon Project
Marin Carbon Project

Adding compost to rangelands in Marin Co., CA resulted in:

- 50-70% increase in grass production
- 20% increase in soil organic matter for up to 3 years following compost application
Carbon Offset Development

Photos: National Indian Carbon Coalition
Carbon Offset Development

- Developed by the National Indian Carbon Coalition using Conservation Innovation Grant funding from USDA
- Explored potential for generation of carbon offsets on tribal land through improvement and conservation of rangeland

Photo: Angus M Thuermer Jr., WyoFile
Cienega Restoration on Pitchfork Ranch

Photos: Pitchfork Ranch
Cienega Restoration on Pitchfork Ranch

Improving carbon sequestration using various practices resulted in:

● Clearer, cleaner water
● Increased plant production
● Increased wildlife habitat

Photo: Avery McGaha, High Country News
Takeaways

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★ Disturbance is the primary cause of loss of carbon from rangelands

★ It is easier to preserve existing soil carbon than rebuild it once it is lost
Sources

1: Derner & Schuman 2007
2: https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions