

# Soil Quality Information Sheets for Rangeland

**Soil Quality Information Sheets** for rangeland describe soil properties that change in response to management and vegetation change. The sheets provide information that is related to a number of the indicators used in rangeland health assessments. They support rangeland inventories and monitoring and provide possible management strategies for planning purposes.

This set of 10 sheets is an example of the practical materials developed collaboratively by the Soil Quality Institute, the Grazing Lands Technology Institute, the National Soil Survey Center of the USDA Natural Resources Conservation Service, the USDA Agricultural Research Service Jornada Experimental Range, and the USDI Bureau of Land Management. The information is primarily intended for use by resource specialists and ranchers, but can also be used as an educational resource for teaching about soil quality on rangeland.

Soil Quality Information Sheet  
**Rangeland Soil Quality—Introduction**  
 NRCS, National Resources Conservation Service May 2003

**What is rangeland?**  
 Rangeland is land used to raise ruminant livestock or to produce forage for livestock. It includes natural grasslands, shrublands, and savannas, as well as areas that have been converted to rangeland from other uses.

**What does soil quality affect on rangeland?**  
 • Plant production, reproduction, and survival  
 • Water and soil erosion  
 • Nutrient cycling  
 • Carbon sequestration  
 • Vegetation change  
 • Rangeland health

**How are soil quality and rangeland health related?**  
 Rangeland health and soil quality are interdependent. Rangeland health is determined by the functioning of the soil and the plants that grow on it. The capacity of the soil to function affects soil quality, and soil quality affects rangeland health. For example, increased physical compaction of the soil reduces the infiltration capacity of the soil and the amount of water available to plants. As the availability of water decreases, plant production declines, and soil erosion may increase. Changes in vegetation may increase or decrease soil quality, and soil quality may increase or decrease rangeland health.

**What is soil?**  
 Soil is a dynamic mixture of organic matter, minerals, and water. It is the result of weathering of primary and secondary minerals, and the accumulation of organic matter. Soil is a complex system that changes over time and space.

**Why is soil quality important?**  
 • It affects the ability of the soil to support plant growth and soil organisms.  
 • It affects the ability of the soil to store water and nutrients.  
 • It affects the ability of the soil to resist erosion and compaction.

**What is soil organic matter?**  
 Soil organic matter is carbon-rich material that includes roots, stems, and microbial biomass in various stages of decomposition. It is the most abundant and most important component of soil. It is the source of energy and nutrients for soil organisms and is the primary source of soil structure.

**What affects soil organic matter?**  
 • The amount of organic matter in the soil is a balance between additions of organic matter and losses through decomposition and erosion.  
 • Environmental factors such as climate, soil type, and vegetation cover affect the amount of organic matter in the soil.  
 • Soil organisms play a key role in the decomposition of organic matter.

**Why is organic matter important?**  
 • It improves soil structure and water infiltration.  
 • It increases soil fertility and nutrient availability.  
 • It helps to reduce soil erosion and compaction.

Component	Rate of Input	Primary Function
Light fraction	High	• Improves soil structure and water infiltration • Increases soil fertility and nutrient availability
Physically protected	Medium	• Improves soil structure and water infiltration • Increases soil fertility and nutrient availability
Chemically stable	Low	• Improves soil structure and water infiltration • Increases soil fertility and nutrient availability

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**Rangeland Soil Quality—Organic Matter**  
 NRCS, National Resources Conservation Service May 2003

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**Management strategies**  
 The following strategies can help to maintain the optimum amount of organic matter in rangeland soil:

- Increase or maintain plant production.
- Practice the principle of diversity with high soil production and diversity of species with different rooting depths and growth habits.
- Practice the incorporation of above-ground plant material into the soil.
- Practice the incorporation of below-ground plant material into the soil.
- Practice the use of cover crops.
- Practice the use of mulch.
- Practice the use of compost.
- Practice the use of manure.
- Practice the use of urine.
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For more information, check the following: <http://www.nrcs.usda.gov/wps/wcm/connect/02000000-0000-0000-0000-000000000000/02000000-0000-0000-0000-000000000000.pdf?DocumentId=02000000-0000-0000-0000-000000000000>

**Download sheets from the NRCS-Soil Quality Institute website:**  
[http://www.statlab.iastate.edu/survey\\_SQI/range.html](http://www.statlab.iastate.edu/survey_SQI/range.html)

Soil Quality Information Sheet  
**Rangeland Soil Quality—Indicators for Assessment and Monitoring**  
 NRCS, National Resources Conservation Service May 2003

**What are indicators?**  
 Indicators are measurable attributes of soil quality that can be used to assess soil health and to monitor changes in soil quality over time.

**What soil quality indicators are used on rangeland?**  
 • Soil color  
 • Soil texture  
 • Soil structure  
 • Soil moisture  
 • Soil temperature  
 • Soil pH  
 • Soil salinity  
 • Soil erosion  
 • Soil compaction  
 • Soil nutrient levels  
 • Soil organic matter  
 • Soil microbial biomass  
 • Soil enzyme activity  
 • Soil respiration  
 • Soil seed bank  
 • Soil seed viability  
 • Soil seed germination  
 • Soil seedling emergence  
 • Soil seedling growth  
 • Soil seedling survival  
 • Soil seedling vigor

**Rangeland Information Sheets topics:**

- Introduction
- Indicators for Assessment and Monitoring
- Aggregate Stability
- Compaction
- Infiltration
- Organic Matter
- Physical and Biological Soil Crusts
- Soil Biota
- Water Erosion
- Wind Erosion



Also available from:  
 Grazing Lands Technology Institute at <http://www.ftw.nrcs.usda.gov/glti/projects.html>