



INTERMOUNTAIN WEST JOINT VENTURE

Storing Carbon in Sagebrush Rangelands



Understanding Carbon in the Sage - Because of their extent, rangelands are receiving increased attention for their potential to sequester carbon as a nature-based climate change solution. Many management interventions that provide benefits for communities, livelihoods, and ecosystems are thought to also help sequester or protect stored carbon. We synthesized the latest science to understand how rangeland management practices can protect stored carbon and promote resilient rangelands that sequester carbon into the future.

How is Carbon Stored in Ecosystems? - In terrestrial ecosystems, carbon is stored temporarily in plant biomass and long-term in soil organic carbon (SOC). Carbon sequestration in plant biomass and SOC are influenced by climate, water availability, and plant communities, where wetter and warmer climates tend to support greater carbon storage.

What About Rangelands? - Rangelands are vast, and they store more carbon in their soils than forests. Over 25% of carbon stored in western ecosystems is found in grasslands and shrublands. However, because rangeland carbon sequestration is highly variable over space and time and is controlled largely by environmental conditions, management actions have limited capacity to increase stored carbon. The good news is that, even if it is difficult to store more carbon in rangelands through management, we can use management practices to protect carbon already stored in rangelands to prevent them from becoming sources of carbon dioxide to the atmosphere.





How Will Changing Climate Affect Carbon in Rangelands? - Under changing climate, we expect western rangelands to become warmer and drier, experiencing more frost-free days and extreme events like drought, extreme precipitation, and wildfires. In arid regions, increased aridity is expected. Additionally, significant plant community turnover and ecosystem change could occur, meaning we could lose keystone rangeland species in places we're used to seeing them. As a result, we think future carbon sequestration may be reduced due to lower productivity. We may also lose stored carbon due to extreme events like drought, flooding, and wildfires. As such, it is more important than ever to ensure that management practices protect the carbon stored in rangelands and promote resilient ecosystems that sequester carbon into the future.

How can management actions protect stored carbon and promote resilient rangelands?

Invasive annual grasses - Cheatgrass invasion results in marked reductions in carbon stored in plant biomass and soils and may lead to further loss of stored carbon if fire occurs. As such, addressing cheatgrass in rangelands is critical to protecting currently stored carbon and promoting carbon sequestration in the future.

Grazing management - It is difficult to sequester carbon in arid systems using grazing. However, preventing overgrazing and soil erosion is important for protecting current carbon stores, especially in mesic areas and under drought.

Wetlands and wet meadows—Wetlands and wet meadows can store significantly more carbon than adjacent arid landscapes and are being lost at an unprecedented rate. Protecting and restoring wetlands will likely help to protect stored carbon.

Conservation easements—Preventing the conversion of rangelands into croplands or developments protects stored carbon, so efforts to that protect resilient and productive rangelands, like conservation easements will protect currently stored carbon.