THE UNIVERSITY of NEW MEXICO

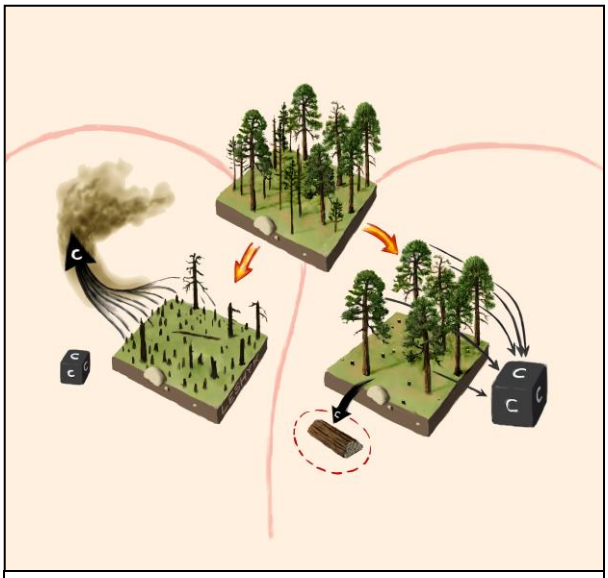
FOREST SERVICE US DEPARTMENT OF AGRICULTURE

Research Brief for Forest Managers

Matthew Hurteau[1], mhurteau@unm.edu, www.hurteaulab.org
Malcolm North[2], mnorth@fs.fed.us
[1]University of New Mexico, Department of Biology, Albuquerque, NM
[2]USDA Forest Service, PSW Research Station, Davis, CA

Carbon Sequestration in Fire-Prone Forests

As trees grow, they sequester carbon from the atmosphere, some of which is converted to wood. Carbon removed from the atmosphere and stored in trees provides a climate mitigation benefit. As a result, a number of carbon accounting protocols have been developed to quantify this climate mitigation benefit. Reforestation projects offer a clear climate mitigation benefit. By planting trees on disturbed or degraded lands, more carbon is sequestered from the atmosphere than by leaving those lands in a disturbed or degraded state. However, on lands that are currently forested, increasing the climate mitigation benefit is more complicated than increasing the amount of tree biomass per unit area. The role of disturbance in forested systems must be considered since large-scale disturbances such as wildfire can release carbon back to the atmosphere.



The carbon accounting consequences of two possible options for a given fire-prone forest stand. The cubes represent the carbon present following a wildfire. *Originally published in Frontiers in Ecology and the Environment 2008; 6(9):493-498*

In the western United States, a long period of fire suppression has increased tree density and fuel accumulation. In forest types that were historically maintained by frequent, low-severity fire, fire suppression has increased the risk of high-severity wildfire. Fuels reduction treatments to reduce this risk and restore forests to a more open, fire-resistant structure are being widely implemented. These treatments carry a near-term carbon cost because standing tree biomass is reduced to reduce the risk of high-severity fire. However, there are long-term carbon benefits from reducing high-severity fire risk. By reducing tree density and fuels, and retaining large, fire-tolerant species, carbon loss is reduced when a wildfire occurs. Forest management based on ecosystem-specific practices will likely yield the greatest benefit in carbon storage and long-term stabilization.

Management Implications:

- Consolidating carbon stocks in fewer, larger trees reduces the risk of carbon loss from fire.
- The pre-suppression forest structure provides the best target from maintaining sustainable carbon stocks and ecological function.

References:

North, M., Hurteau, M., Innes, J. In press. Fire suppression and fuels treatment effects on mixed-conifer carbon stocks and emissions. Ecological Applications

Hurteau, M., North, M. 2009. Fuel treatment effects on tree-based forest carbon storage and emissions under modeled wildfire scenarios. Frontiers in Ecology and the Environment, 7, doi:10.1890/080049.

Hurteau, M.D., Hungate, B.A., Koch, G.W. 2009. Accounting for risk in valuing forest carbon offsets. Carbon Balance and Management, 4:1 doi:10.1186/1750-0680-4-1.

Hurteau, M.D., Koch, G.W., Hungate, B.A. 2008. Carbon protection and fire risk reduction: toward a full accounting of forest carbon offsets. Frontiers in Ecology and the Environment, 6:493-498.