Carbon Storage and Sequestration in Land Management Plan Revision

What are the relevant regulatory requirements?

The 2012 Planning Rule requires an assessment of carbon stocks for plan revisions and the Forest Service must consider the role of forests in sequestering carbon, the effects of disturbances and management on carbon stocks, and how carbon might be influenced by management activities that are allowed under the plan.

Other agency policy and direction will also be followed, including Executive Order 14072, which recognizes the role that mature and old growth forests play in carbon storage on public lands; and Secretarial Memo 1044-004 which specifically calls for land management planning to include recommendations for how to support carbon stewardship optimization and climate adaptation.

It is not Forest Service policy to maximize carbon or elevate the consideration of carbon above the many other services that National Forest System lands provide. Implications to carbon will be considered in the context of managing for ecosystem integrity as well as ecosystem services and multiple uses (such as outdoor recreation, range, timber, watershed, and wildlife), as required by the 2012 Planning Rule and the Multiple Use and Sustained Yield Act of 1960.

How may the new plan address carbon storage?

Carbon uptake and storage are some of the benefits that National Forests provide. The natural carbon cycle, which includes natural disturbances and other ecosystem processes, must be taken into account and is best considered at broad scales during land management planning.

During the plan revision, the Forest Service may develop plan components focused on carbon storage. Carbon storage may also be recognized specifically as a key ecosystem service and is one element of potential climate change adaptation strategies. Climate change is recognized as a stressor that must be addressed in the assessment as well as in the development of plan components to provide for ecological and social and economic sustainability.

Figure 1. Larch forest on the Lolo National Forest. USDA Forest Service Photo by Kate Jerman.

Many management activities supported by land management planning would be consistent with carbon mitigation strategies, although carbon management might not be the primary purpose.

Keeping forests as forests

Reducing conversion of forestland to non-forestland is an agreed principal globally to reducing greenhouse emissions. National Forest System lands would not be permanently deforested or converted to other land uses, and as such they provide a buffer against land-use change—keeping forests as forests.

How does planning take carbon into account with respect to vegetation management?

The revised plan may provide plan components that support the application of vegetation management

activities on the landscape to support conditions that are ecologically resilient and sustainable and to achieve socioeconomic benefits. The potential impacts to carbon will be considered during plan development and addressed in the environmental analysis.

Carbon analysis in a nutshell

According to the International Panel on Climate Change, the best way to consider the effects of forest management on carbon is to take the viewpoint of the atmosphere. This requires looking at how management influences carbon stocks, the emissions associated with management activities, and how carbon is stored once it leaves the forest.

Natural disturbances

Increased risk of carbon loss through disturbances, such as wildfires and insect epidemics, can undercut a goal of providing for carbon storage. In cases where forests are at risk for carbon loss through disturbances, a more effective way to reduce carbon in the atmosphere may be through management activities. This approach initially reduces the amount of carbon stocks, but transfers carbon to wood-based products or energy use. When considering the whole system—both forest carbon and use of forest products—carbon emissions can be lower than if the forest was unmanaged.

In some areas, carbon stocks might be at a level that is not resilient to disturbances and creates risks to communities. In such cases, management actions may be needed. In other areas, the best strategy to optimize carbon benefits over the long term may be to allow natural disturbance processes to dominate.

Timber harvesting and wood products

Timber harvesting (e.g., logging, commercial thinning, salvage harvesting) has an initial impact on forest carbon stocks by releasing carbon to the atmosphere through use of fossil fuels in management activities and in decomposition of woody waste material. However, this view assumes all carbon leaving the forest enters the atmosphere immediately and does not consider long-term forest carbon dynamics and pathways. The Forest Service, following the view outlined by the International Panel of Climate Change, considers forest carbon dynamics and where the carbon goes once it leaves the boundaries of the forest. In some cases, carbon emissions from harvesting activities can be less than the carbon emissions if the same forest is unmanaged, particularly in cases where forests are experiencing high rates of mortality.

When forests are harvested and maintained as forests, they regrow and eventually recover the lost carbon; this cycling is sometimes called a “closed loop.” Additionally, some carbon in harvested trees is transferred to wood products, which can store carbon for months to decades and even centuries. Carbon storage continues when forest products enter landfills.

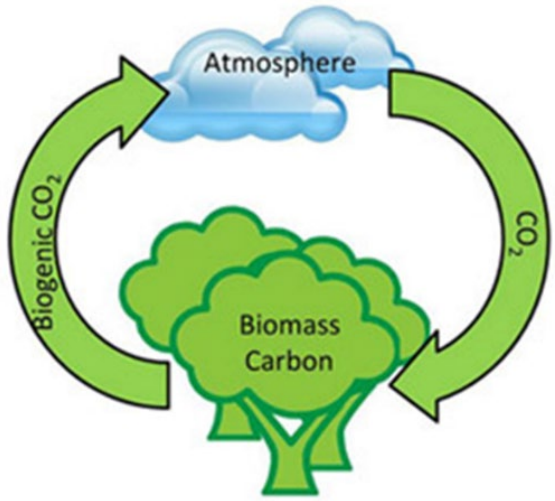

Figure 2. Closed loop carbon cycle example. Biogenic carbon is part of a relatively rapid natural cycle that impacts atmospheric carbon dioxide only if the cycle is out of balance.

For many forests, harvesting timber on sustainably managed forests may effectively “store” more carbon over time than if the forest is unmanaged. “Store” in this sense refers to carbon in the forest, carbon in harvested wood products, and the avoided carbon emissions in the atmosphere. New tree growth restarts the process of storing carbon, even as the previously harvested trees continue to store carbon in wood products and emit fewer emissions when substituted for fossil fuel-intensive materials. The magnitude and timeframe of carbon dynamics vary depending on forest attributes, type of harvested wood products, and environmental factors.

Figure 3. Regenerating forest after harvest. USDA Forest Service Photo by Mike Ryan

Can fuel reduction treatments have carbon benefits?

The revised land management plan may include plan components that allow for the application of hazardous fuel reduction treatments (such as thinning and prescribed burning) on the landscape. Forest type, conditions, site variation, and differing fire regimes make it difficult to make general conclusions about the carbon outcomes of fuel treatments. Fuel reduction treatments may be done with a goal of reducing the probability of severe wildfires which pose a risk to communities or other values. In some ecosystems, increased carbon stocks have a concurrent increase in risk of carbon loss through wildfires. Treatments may lower carbon stocks to a more stable level if they are maintained. There may be instances where these treatments have a positive effect on carbon storage and some that would not. The carbon costs of treatments would need to be weighed against the probability of losing greater amount of carbon should the forest sustain a high-severity wildfire.

Is the Forest Service participating in carbon markets?

No. Congress has not given the Forest Service the authority to allow National Forest System lands to participate in carbon markets or produce carbon credits. However, organizations can partner with the Forest Service in needed restoration work to improve carbon sequestration, forest health, and resilience to climate change.