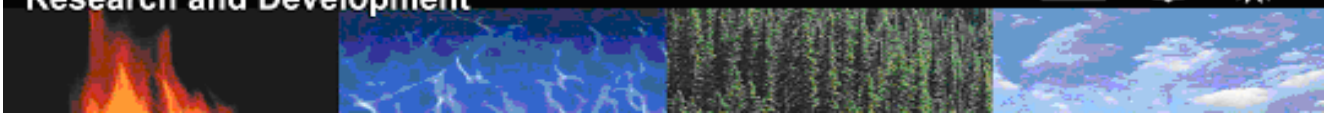

November, 2007

Climate Change and Carbon Sequestration

Issue: There are a variety of activities that, taken together and implemented regionally, can protect existing forest carbon stocks and increase the rate of carbon sequestration. But, increasing threats from climate change, wildfire, and other disturbances also threaten the stability of the carbon currently stored in forests.

Key Points:

- U.S. forests currently offset 10% of carbon dioxide emissions from fossil fuels, but this rate of carbon sequestration may not be sustainable without additional actions.
- One hundred years ago, U.S. forests were so heavily cleared, utilized and damaged that they emitted vast quantities of stored carbon. Because of regrowth, good management practices, and fire suppression, today's forests and forest products sequester 700 million tons of CO_2 per year.
- The current rate of net sequestration is not sustainable without continued good management, and may not be sustainable at all under some climate change scenarios.
- There is potential to sequester an additional 1,200 million tons of CO_2 per year. The potential for forest biofuel offsets may be 600 million tons of CO_2 or more per year.
- Wildland fires release about 1 billion tons of carbon gases and particulates to the atmosphere annually, compared to about 6 billion tons released by burning fossil fuels.
- As long as the incidence and severity of wildfires remains constant, regrowth of burned areas offsets this release.
- There is growing scientific evidence that climate change will increase the number and size of wildfires, resulting in increased carbon gases and particulates, and other greenhouse gases especially in the western United States.
- If the fires burn more frequently, or burn more acres or burn vegetation more severely, then carbon stored in ecosystems will decrease, and carbon gases and particulates in the atmosphere will increase. Air pollution, especially fine particulates and ozone, will also increase.
- Fire produces many greenhouse gases; the net impact of wildfire emissions on global warming potential is not fully understood.
- Areas of melting permafrost and drying peat bogs will be more susceptible to fire; if these areas burn, carbon that was stored over thousands of years will be released into the atmosphere.
- Restoring healthy forests that resist intense wildfire is good carbon management especially if fuel removed from the forest is utilized for wood products or energy.
- Land management programs that restore forests to healthy and productive conditions will help ensure the long-term maintenance of existing forest carbon stocks which would otherwise be lost to disturbance, reentering the atmosphere and negating carbon sequestration efforts.
- Carbon can be stored in live trees as well as in long lived forest products such as buildings, where wood can be substituted for materials that have a high CO_2-intensity such as cement, steel and petroleum based products.

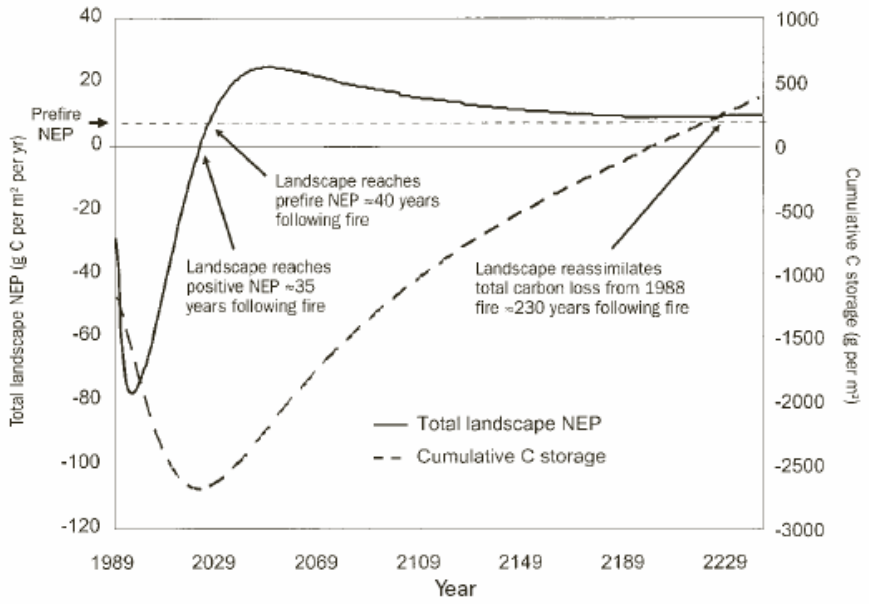

Figure 4. Predicted total net ecosystem production (NEP; solid line) and cumulative carbon (C) storage (dashed line) for lodgepole pine forests on the entire 525,000-hectare Yellowstone landscape following the 1988 fires. The landscape is expected to recover all C lost during and after the 1988 fires over the course of the fire interval. Abbreviations: g, gram; m^2, square meter; yr, year.

From: Kashian, D.M., W. H. Romme, D. B. Tinker, M. G. Turner and M. G. Ryan. 2006. Carbon Storage on Landscapes with Stand-replacing Fires, BioScience 56:598-606.

For more information contact: Allen Solomon, National Program Leader, Global Climate Change Research, US Forest Service. Phone (703) 605-5251. E-mail: allensolomon@fs.fed.us