PERSPECTIVE

Climate Change and Carbon Sequestration Opportunities on National Forests

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Climate change is one of the most compelling and challenging issues facing us today with potentially significant policy implications for forestry and forest management. The United Nations Framework Convention on Climate Change (2007), defines climate change as a change of climate that is attributed directly or indirectly to human activity and that is, in addition to natural climate variability, observed over comparable time periods. There is some debate on the impact humans have on climate change but increasing global CO_2 levels are well documented. Burning of fossil fuels is the primary contributor for greenhouse gas emissions. However, loss of forestland is a major concern and deforestation globally accounts for about 20% of total greenhouse gas emissions (Food and Agriculture Organization 2005). One of the major forestry challenges here in the United States is reducing the loss offorestland from development. Foresters have a critical role to play in forest management and carbon sequestration to reduce greenhouse gas emissions, and if deforestation is the problem, then forestry can be part of the solution. The linkage berween forest management, climate change, and carbon was the focus and theme of the recent National Silviculture Workshop (NSW).

The NSW is a biennial event sponsored by the US Forest Service that brings together silviculturists, forest practitioners, and researchers to discuss emerging issues for forest management. In 2009, the workshop was held June 15-18, in Boise, Idaho. The theme for the workshop was "Integrated Management of Carbon Sequestration and Biomass Utilization Opportunities in a Changing Climate." The primary goal of the workshop was to present and discuss new ideas in forest management and research for silvicultural practices including fire behavior, biomass removal, biofuels, and carbon sequestration. The NSW included broadly integrated topics including ecosystem services, climate change, forest biomass removal, and carbon storage. Noteworthy presentations included a keynote address by former Idaho Governor Cecil Andrus on silviculture in a changing climate, and national approaches to address climate change from US Forest Service Deputy Chief Dave Cleaves. The workshop also included regional perspectives from researchers and silviculrurists working in numerous forest types and regions of the United States. Examples of state-of-the-art research included the role of silviculture in sequestering carbon, forest biomass removal for fossil fuel offsets, estimating canopy fuels and their impact on potential fire behavior, portable pyrolysis units, ethanol production from woody biomass, and energy return and economics from using forest residues.

The NSW also included field trips and on-the-ground discussion among silviculturists and researchers to address critical issues relating to forest management and carbon. A preconference field trip visited the large Cascade wildfire complex that burned about 500,000 ac in 2007. Participants assessed how fuel treatments and fire suppression can change fire severity. On the in-conference field trip, participants discussed fire exclusion and harvesting, redistribution of carbon, fire ecology, and posrfire vegetation response including regeneration. Overall, the NSW recognized the importance of collaborative efforts berween researchers and forest practitioners and an assessment of the potential linkage berween forest management, carbon sequestration, and forest biomass in a changing climate.

Climate change could lead to significant long-term changes in forest ecosystems with potential changes in tree species distribution and abundance. Some large forest landscape models predict climate-induced stress from drought, increased insect outbreaks, and higher risk of catastrophic fires. Foresters can playa proactive role in both planning and adapting strategies for future forest management. Adaptation strategies include selecting and planting species or varieties that are adapted to a warmer climate, planting a greater diversity of species, and planting at lower initial densities to reduce moisture stress in water-limited forests. Thinning forests to reduce fuel loads may reduce severity of wildfires as well as maintaining and enhancing carbon sequestration. Fuel treatments can also be useful for maintaining air quality, water quantity, and wildlife habitat, and should be considered based on their benefits to multiple ecosystem services, not just carbon sequestration.

Forests and forest management also have an important role for sequestering carbon and reducing greenhouse gas emissions. Forests can sequester large amounts of carbon in several ways including as standing forest (carbon sinks), in wood products, and in avoided emissions when wood is used as a substitute for more fossil fuel- consuming products such as steel, concrete, and brick. One of the obvious and most important roles for reducing CO_2 emissions is avoided deforestation and keeping forestlands in forests. Afforestation and reforestation of previously forested lands is a widely accepted forest management practice to increase carbon sequestration. Storage of carbon in wood products can also have a significant impact in storing carbon and avoiding use of more fossil fuel-intensive products. There is also increasing interest in the use of market-based approaches to add value from carbon credits and assist conservation of natural resources. The inclusion of carbon credits from forestry may provide some new opportunities for forest landowners and managers to enhance forest stewardship in addition to reducing greenhouse gas emissions through forest carbon sequestration.

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