Opportunities and Challenges for Society, Landowners, and Foresters

Seven conclusions are apparent from the analyses presented in this report:

1. The world’s forests are critically important in carbon cycling and balancing the atmosphere’s carbon dioxide and oxygen stocks.
2. Forests can be net sinks or net sources of carbon, depending on age, health, and occurrence of wildfires and how they are managed.
3. Forest management and use of wood products add substantially to the capacity of forests to mitigate the effects of climate change.
4. Greenhouse gas emissions can be reduced through the substitution of biomass for fossil fuels to produce heat, electricity, and transportation fuels.
5. Avoiding forest conversion prevents the release of GHG emissions, and adding to the forestland base through afforestation and urban forests sequesters carbon.
6. Existing knowledge of forest ecology and sustainable forest management is adequate to enable forest landowners to enhance carbon sequestration if there are incentives to do so and if carbon and biomass management have value that exceeds costs.
7. How global voluntary and mandatory markets develop will play a significant role in establishing the price of carbon dioxide and thus creating the incentives to ensure that forests play a significant role in climate change mitigation.

Given those facts, society’s current reluctance to embrace forest conservation and management as part of the climate change solution seems surprising. Time is of the essence. Forest management can mitigate climate change effects and, in so doing, buy time to resolve the broader question of reducing the nation’s dependence on imported fossil fuels.

Opportunities, incentives, and recommendations for including carbon storage as part of the forestry solution vary markedly depending on ownership and market and nonmarket considerations. It is essential that natural resource professionals provide leadership in recognizing these opportunities and in encouraging the development of incentives that enhance forest conservation and management.

Ownership Considerations

US forests are owned by a diverse array of federal, state, industrial, nonindustrial corporate, nonindustrial family, and tribal entities. The forests themselves differ markedly in species, composition, stocking, and productivity. Each ownership manages its forests, either intensively or extensively, under different policies and regulations, and each has different goals, objectives, and incentives that determine how the land is managed. Specific opportunities to incorporate carbon storage as part of management will be highly dependent upon the particular forest and forest owner. Overarching policies, programs, and incentives to enhance carbon sequestration must recognize this diverse ownership pattern and encourage partnerships and collaboration. This will require substantial effort in technology transfer, education, and information outreach.

Private forest owners and public land managers should investigate developing opportunities for incorporating carbon storage and addressing the challenges of climate change into management objectives for their respective forest ownership type, whether the opportunities are market or nonmarket based.

Market Considerations

Private forest owners and managers must monitor the developing forest carbon sequestration markets and become familiar with the concepts of carbon pools, carbon baselines, additionality, permanence, and leakage. As the markets for forestry offsets develop, the standards associated with these concepts will become better established. Specific forest tracts within specific ownerships and operating with set objectives will have varying degrees of opportunity to market carbon offsets, based on how these standards develop. For example, a forest managed on a sawtimber rotation primarily to produce wood building products might have little opportunity to market carbon credits unless wood-frame structures are accepted as a pool for carbon storage.

It is impossible to accurately predict how a future carbon market will develop and how that market will affect forest owners. At recent traded values of CO₂ equivalents, income from carbon offset projects would not be high enough to preempt forest management practices employed to produce traditional forest products. However, this potential income would likely provide incentive to alter management practices to produce some level of traditional value combined with increased carbon sequestration. Market compensation for all ecological services, including GHG reductions, may help balance landowner income streams, thereby reducing the pressure to convert forests to other uses.

Emerging biopower and biofuels markets will likely enhance values for small-diameter materials and increase competition for traditional forest products. Although this increased revenue should benefit forest landowners, the traditional forest products industry may lose suppliers or see lower profit margins because of the new markets. Like-
wise, carbon trading and emission reduction credits associated with biomass power production could also benefit industries and forest owners investing in the new bioenergy industry.

**Nonmarket Considerations**

Management of forests is complex. It includes consideration of diverse components—soil, vegetation, wildlife habitat, water, recreation, aesthetics—as well as diverse products and values. Management involves determining what balance of revenues and outputs is desired and what costs and inputs are needed to sustain those outputs. Nonmarket forest resources, such as species diversity, clean water, enhanced fish and wildlife habitat, fire-resilient ecosystems, and scenic values, are also likely to be affected by carbon management strategies. Typically, efforts to increase the output of one forest product or value will likely decrease the outputs of others.

Carbon sequestration and storage are likely enhanced by increasing the rate of leaf area production and maintaining canopy cover. This could be accompanied by, for example, a decrease in wildlife diversity or water yields. Commercial timber production is commonly driven by value growth rate rather than volume growth rate, and thus stocking levels for timber production may be lower than if the goal were to maximize biomass production. Conversely, opportunities for pulpwood production and biomass energy will encourage higher stocking levels. If wood products are accepted as carbon pools, the mix of products from the forest may change. Possibilities for carbon management must also include consideration of spatial and temporal issues—whether one is managing stands, forests, or landscapes, and what time frames are involved. Justification for increased carbon storage will be influenced by such factors as carbon prices, policy incentives, and regulations.

**The Profession**

The profession of forestry is a broad field covering biological, physical, quantitative, managerial, and social components. The values, needs, and uses of forests are similarly broad. Carbon storage is a new “ecosystem service” that is being added to the management opportunities that traditionally included wood, water, wildlife, and recreation. Forest managers are already beginning to consider carbon sequestration and storage and the fate of carbon following disturbance and management treatments. In addition, foresters must consider the threats that climate change poses for forests and develop strategies to mitigate potential increases in pests, drought, severe weather events, and wildfires.

America’s foresters must become informed and actively consider opportunities and effects associated with climate change so that forests and forest management can continue to both serve and enhance the welfare of society. The profession must be proactive in communicating to society the importance of growing and managing the nation’s forests both for the sustainable supply of diverse values and uses and for their capacity to contribute to mitigation of the adverse effects of global climate change.

There is now agreement among many that the world is facing global climate change. It is beyond argument that forests play a decisive role in stabilizing the Earth’s climate and that prudent management will enhance that role. For example, the Intergovernmental Panel on Climate Change (Nabuurs et al. 2007, 543), the preeminent international body charged with periodically assessing technical knowledge or climate change, has stated, “Forestry can make a very significant contribution to a low-cost mitigation portfolio that provides synergies with adaptation and sustainable development. However this opportunity is being lost in the current institutional context and lack of political will and has resulted in only a small portion of this potential being realized at present (high agreement, much evidence).”

The challenge is clear, the situation is urgent, and opportunities for the future are great. History has repeatedly demonstrated that the health and welfare of human society are fundamentally dependent on the health and welfare of a nation’s forests. Society at large, the US Congress, state legislators, and policy analysts at international, federal, and state levels must not only appreciate this fact but also recognize that the sustainable management of forests can, to a substantial degree, mitigate the dire effects of atmospheric pollution and global climate change. The time to act is now.