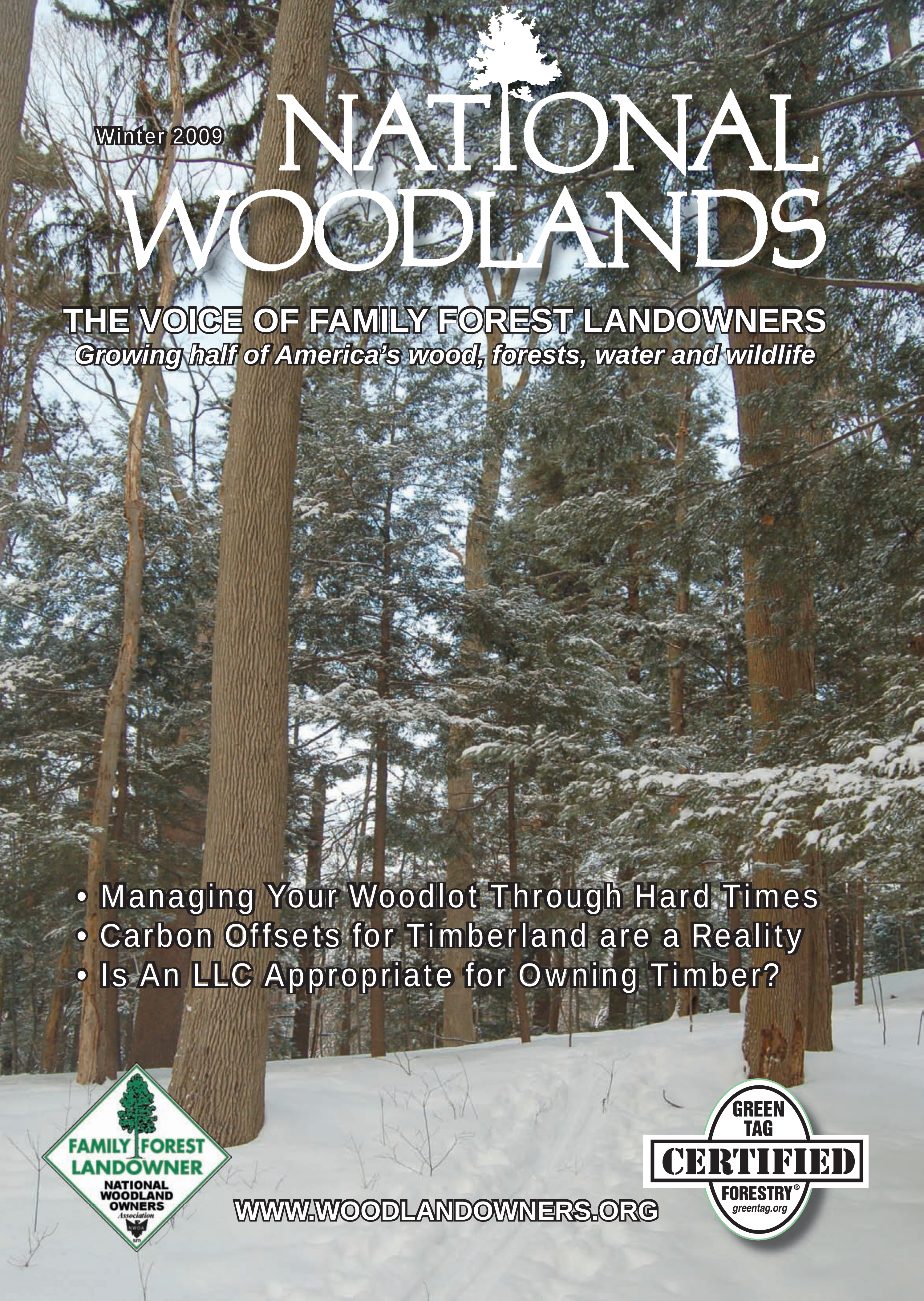

Winter 2009

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Growth measurements taken in the field and entered into a stand inventory database can be processed with GIS to create predictive models and produce a growth map.

Getting Your Start In the Growing Carbon Market

New Technology Helps Landowners and Foresters

by **Barbara Shields**

Fossil fuel emissions from manufacturing, transportation, and energy production lead to a host of problems including global warming. Forest researchers have developed a means of monitoring and counterbalancing our need for goods and services with nature's ability to cleanse the atmosphere of harmful emissions to the air. Geographic Information Systems (GIS) are very useful tools to measure and better recognize these trade-offs. It also provides a basis for designing land management plans. These systems have the capability to combine many layers of data, model those data in many ways, and generate reports and maps that make it easier to comprehend a complex problem.

One of the greenhouse gases that contribute to global warming is carbon dioxide (CO2). Natural processes that have evolved over eons offset the impact of greenhouse gases with reservoirs such as forest and oceans. In these places photosynthesis removes carbon from the atmosphere. Growing trees convert, or sequester, CO2 from the atmosphere and turn it into wood. Foresters are using geographic information systems (GIS) to analyze forests' carbon sequestration rates. This technology can also be implemented to reveal opportunities in carbon trading to gain economic advantages from sustainable forest management.

Forests in the United States alone sequester about 200 million metric tons of carbon each year. In its most recent Greenhouse Gas Inventory Report, the Environmental Protection Agency notes that U.S. forests sequestered 10.5 percent of the carbon dioxide released by the combustion of fossil fuels in the United States. GIS helps measure, monitor, and verify carbon storage occurring within forests.

Traditionally, foresters have used GIS for basic timber inventory services. Today's Internet, when coupled these new geographic capabilities, provides a helpful tool for landowners to map and monitor the forest management practices on their own lands. Consulting foresters use GIS software with forestry information such as current forest inventories and forecasts of tree growth. Using geography for forest analysis also gives foresters site-specific information about how carbon stocks associated with specific forests are changing. This, in turn, provides the information needed to develop sound and sustainable forest management plans.

Except for one encouraging exception, even these wonderful new GIS tools cannot help landowners when they encounter sudden costs, such as a jump in property taxes or the illness of a family member. If the money is not available, they are forced to sell some of their land. The resulting parcelization can lead to the undesirable impacts of forest fragmentation. The landowner loses, the forest loses, and eventually society loses.

An emerging market is the sale of carbon credits. Measuring, evaluating and marketing these credits are much easier when landowners or their foresters have already implemented the GIS mapping and data monitoring just described.

In the U.S. these carbon credits can provide woodland owners cash, most often through sales on the Chicago Climate Exchange (CCX). The Exchange has developed a market that facilitates the reduction of greenhouse gases. Here is how it works: First, manufacturing companies determine that they want to reduce their carbon emissions footprint by a certain percentage within a specified time period. One means of doing this is through carbon offset credit trading. To meet emission reduction goals, CCX member businesses can purchase forest carbon sequestration credits to help offset their emission production levels. The revenue paid to the carbon offset credit provider goes toward compensating for the costs of sustainable forest management. Exchange allowances are issued to members in accordance with their emission baseline and other regulations.

The use of GIS gives the seller of carbon credits (the landowner) a means of calculating carbon sequestration and the basis for credible certification. Third party validation is essential for accreditation of forest carbon sequestration, and calculating these credits must be held to scientific standards. GIS not only houses and manages immense forestry databases, it also runs forestry models and displays stand volume and carbon sequestration data via tables and maps. This information can also be delivered over the Internet along with tools that help clients easily interact with spatial and tabular data. Landowners are able to provide detailed information confirming that their carbon sequestration projects are credible and the forest is well managed.

Computer programs have been developed providing forest managers and carbon buyers the information they need. The process starts in the field, where foresters gather timber inventory data. Using Global Positioning System technology while they are inventorying the forest, foresters tie geographic location coordinates to forest stand attribute data. The field data collected includes tree species, diameter measurements and additional ecological information. Geo-referenced field data is downloaded into a geodatabase, and tree data is joined to other timber stand data tables. Sample data points representing particular stands of trees are run through a timber inventory program to produce timber volumes and stem counts by species and diameter-class for a particular area designated by a geographic polygon on the map.

The timber data collected is put into a software program that provides growth estimates for a variety of time intervals. The next step is to translate timber data into carbon units, which are in fact the product that is sent to market for sale through "market aggregators." This can be done at a local, state, or regional level. Several of NWOA's affiliated state landowner associations have developed carbon credit programs. They are described in this issue on p. WR 2.

Using a GIS-enabled Web site, foresters and investors can geographically view carbon reports. These sites provide clients with a forest-centric map experience. Built on ESRI's ArcGIS technology, mapping websites allow users to run customized and standardized growth models on stands, tracts, and management units as well as generate reports in various file formats.

Site visitors on the Internet can view growth rates and carbon sequestration conversion data needed to make sound investment decisions for both business and the environment. A mapping function graphically displays the specific forest's ownership, and users can drill down to the tract and forest stand level. GIS allows users to link to various reports, including stand and stock tables by species and diameter class as well as the associated carbon stock equivalents, for any particular part of the forest's ownership.

The potentially significant consequences of climate change are causing many companies to be more mindful of their

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THE READERS RESPOND

(Continued from page 2)

reliance on others to represent forestry has not been effective in watershed activities. The Midwest Flood Report is an example.

Perhaps the biggest fallacy associated with wetland reports is that logging cleared the bottomland hardwoods and caused the loss of the Ivory-billed Woodpecker. Gosselink and Lee's 1987 report indicates that land conversion and drainage cause most of the loss which began in the 1800s. NASF responded to this accusation by saying the woodland owners should get credit for the bottomland hardwoods they saved.

The NWI does not provide a sound basis for making decisions on the silviculture exemption. The mature habitat goals of the NWI and the inclusion of areas without surface water are not consistent with the CWA.

Wetland regulations are another pitfall. The Clean Water Act exempts forest roads if BMPs are used. The 1982 Dredge and Fill regulations specifically required the use of BMPs in the States approved program. Special interest groups put 15 provisions on the exemption for roads in the regulations to offset Congressional intent. When the 1988 regulations were written, the requirement to use State BMPs was dropped and only the 15 provisions were listed. The State role in water quality got lost.

Forestry can contribute much to the understanding and retention of forested wetlands. Making woodland owners part of the process can be beneficial to all concerned.

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GROWING CARBON MARKET

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impact on the environment. By participating in carbon trading, businesses not only reduce their carbon impacts but also are applauded for their corporate social responsibility. These green marketing strategies provide a competitive advantage because they enhance brand perception by the emerging environmentally conscious consumer.

Forest industry carbon-trading participants include timber investment management organizations (TIMOs), industrial forest companies, nongovernmental organizations such as land trusts, pools of small private landowners, and tribal landholders. After a rigorous analysis of their forest resource is made and a project proposal is accepted by CCX and verified by an independent verification entity, forest landowners may be able to register their carbon sequestration credits and sell them at the current market rate. Forest carbon offset project owners are then committed for a period of 15 years to manage that forest sustainably to continue benefiting from carbon market participation.