It appears unlikely that the 112th Congress of the United States will approve incentives for the commoditization of biogenic carbon (C) (i.e., “cap and trade”), so where should the science of forest C accounting head in the near future? Initial versions of the 2012 Farm Bill coupled with the National Forest System Climate Change Performance Scorecard highlight areas of current and future research in C accounting. The Forest Inventory and Analysis (FIA) Program of the U.S. Forest Service has adopted several areas of priority research in the area of carbon: reduction of the uncertainty associated with FIA’s C estimates; downscaling of national C estimates to the national forest or mid-level; and refinement of biomass estimation procedures. This represents a substantive course of action to improve the science of C accounting and to meet user demands.

Over the past year (2011-2012), the major changes to the accounting of U.S. forest C involved adoption of the Component Ratio Method (CRM) approach (Domke et al. 2012) to biomass/C estimation and incorporating standing dead tree measurements in the national inventory (i.e., annual Phase 2) (Woodall 2012). Incorporating standing dead tree measurements greatly improved the sensitivity of the national inventory to stand-level dynamics (Woodall et al. 2012a). FIA is encouraged that incorporating a national downed dead wood inventory (Woodall et al. 2008) in the 2012 National Greenhouse Gas Inventory (NGHGI) may impart the same positive effect. In 2013 and beyond, it is hoped that many aspects of the FIA national inventory of forest health indicators (Woodall et al. 2011) may refine C estimation. Sometimes the casting of a forest health indicator in a different light can greatly inform the estimation of a C stock such as found with components of the forest floor (Woodall et al. 2012c). This process of “stepping through” each forest C pool with the objective to increase estimate precision and linking the estimates to recently derived empirical information (i.e., Phase 3 inventory) is a tremendous benefit to C and biomass accounting.

Refined C stock estimates at the national scale may benefit the NGHGI, but can this be downscaled to our national forests and other comparable
scales? Estimates of National Forest System C stocks (Heath et al. 2011) are now a requirement of climate change scorecard reporting for national forests in the United States. Because an intention of the scorecard is to understand and consider the effects of management activities on carbon budgets at the scale of a national forest, the uncertainty (sometimes > 5 percent sampling error) associated with a “downscaled” NGHGI may not appropriately inform such management activities. Ongoing research into “downscaling” NGHGI to inform mid-level activities (Wilson et al. in review, Coulston et al. this proceedings) may improve the statistical power (Westfall et al., in review) to detect management/disturbance effects on C budgets. Whereas the techniques used to develop the NGHGI satisfy requirements under United Nations Framework Convention on Climate Change (U.S. EPA 2012), new areas of research are needed to downscale NGHGI to empower land managers interested in mitigating climate change.

As renewable biomass is an emerging topic in regards to energy and economic development (Woodall et al. 2012b), the draft 2012 Farm Bill language requests more information on the supply of renewable forest biomass in the United States. In addition to C accounting, it should be recognized that forest C accountants are also biomass experts. The FIA program has already initiated a national effort to improve the modeling of individual tree biomass/C attributes (Coulston et al. this proceedings). This same drive should be reflected in non-live tree pools. Refining the estimations of standing dead tree, downed dead, and understory components should benefit more comprehensive biomass assessments. Domke et al. (2011) found that biomass estimates could be improved by refining the decay reductions and structural deductions for standing dead trees. Such a research approach across the many diverse pools associated with C accounting will benefit renewable biomass estimation.

Finally, all of these technical improvements do not occur in isolation within the FIA program. State and university partners in concert with an array of federal partners (e.g., USGS and NASA) are critical to the development and application of C/biomass accounting. Only through partnership can FIA’s refined approaches to C/biomass monitoring be leveraged to meet the expectations of our diverse user community.

LITERATURE CITED


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