

Scaling Up From the Stand to Regional Level: An Analysis Based on the Major Forest Species in Ireland

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Abstract

The potential carbon (C) sink capacity of the major Irish forest species, Sitka spruce, was assessed using eddy correlation, detailed inventory measurements and a generalised National C sink model (CARBWARE) to resolve stochastic characteristics at different temporal and spatial scales. Meta-analysis of eddy correlation and stand level inventory estimates of net C stock change showed good agreement between the different stand based estimates over short periods (1-2 years). When data derived from the CARBWARE model were validated against detailed chronosequence data, the largest degree of uncertainty was associated with the estimation of current annual biomass increment (CAI) and soil C pools. Uncertainties in the CAI component of the CARBWARE model were primarily associated with the use of general stand management assumptions due to the lack of information from repeated National forest inventories. The results from this study imply that a large degree of uncertainty is introduced when the spatial representation of C stock change estimates, at the stand level, are scaled up to national or regional level unless inventory data is available to develop generalised forest sink models in an iterative manner.

Key words:

scaling-up, eddy covariance, forest inventory, regional stand-level models