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Age-Related Decline in Forest Productivity: Pattern and Process

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Publisher Summary

This chapter reviews the evidence for the pattern of growth decline with age and discusses the evidence for the mechanisms that may be responsible. It begins with an overview of the proposed mechanisms. The chapter also presents a framework for understanding the changes in stand productivity with age, because many of the proposed mechanisms are linked and affect carbon allocation. The available information on the importance of various mechanisms behind growth decline, in the context of the stand carbon cycle is presented. The common patterns of a decline in stand leaf area and leaf photosynthetic capacity suggest a new model of carbon balance with stand development. In this model, photosynthesis and above-ground dry-matter production increase with canopy development. After the forest reaches a maximum leaf area, photosynthesis and dry-matter production decline as leaf area, photosynthetic

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capacity, and photosynthesis also decline. The model assumes that allocation to respiration and below ground to roots and symbionts is a constant fraction of assimilation over the life of a forest stand.

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