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# A general model for assessment of the carbon sequestration potential of afforestation projects

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**Abstract** Among the objectives of afforestation projects, carbon sequestration is attracting increasing political attention. Therefore, there is a need for understanding the carbon sequestration 'mechanism' and for ex-ante assessment of the sequestration potential of afforestation projects. Such assessment must be based on parameter estimates that are inherently uncertain, making the basis for applying an advanced sequestration model weak. This paper presents a transparent, simple and general model for quantification of the carbon sequestration in afforestation projects. The model can easily be modified so as to fit specific conditions, and it is held sufficiently reliable when taking into account the ex-ante character of the decision problem. The use of the model is exemplified by application to a yield table for Sitka spruce. Limitations of the model framework and its application in combination with scenarios of climate change are discussed.

**Keywords** Analytical model · Carbon storage potential · Ex-ante assessment · Normal forest · Reforestation · Sequestration model

## Introduction

In case afforestation is considered a relevant means in the policy of reducing net carbon emission, there is a need for assessment of the carbon storage potential. At this stage, a specific area of land has presumably not been allocated and the main decision-making objective is through modelling to investigate whether afforestation is a relevant measure at all. Any ex-ante assessment is inherently uncertain, but when nothing specific is known about the geographical location of the contemplated afforestation project, estimates of various site-specific model parameters will, obviously, be very uncertain. Hence, there is no point in using a detailed model, working at the physiological and geo-mechanical levels where climatic and pedological input data are required. Moreover, information on the expected lifetime of wood

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