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The combination of Forest Site Maps, Site specific Growth Models and Nutrient Balance Models as a Basis for Sustainable Management in the Northern Limestone Alps

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The demand for biomass from forests is rising continuously. Decision support tools for managers and forest authorities should help to avoid negative consequences of increased biomass extraction on ecosystem processes and the sustainable supply of forest services. Those tools have to be site and stand specific. In Alpine regions shallow soils with high organic matter content are widespread on calcareous bedrock. There is increasing evidence that those soils are particularly vulnerable and intensive harvest leads to rapid humus and nutrient losses and a decline of water storage capacity. Such soils may rely on the existence of a continuous forest cover and/or a minimum input of coarse woody debris. For a test region in Tyrol management scenarios will be modelled to predict management effects on sites with calcareous bedrock. Site specific growth and yield models for biomass fractions are developed based on existing inventory data, site maps and high resolution digital surface and terrain models, complemented by stratified biomass and nutrient inventories, and are used for the calculation of different production scenarios. Nutrient balance models taking into account nutrient extraction via harvest, leaching losses as well as gains via atmospheric deposition, and fertilization are used to calculate the potential sustainable harvest intensity. In addition humus dynamics of the frequently shallow rendzic Leptosols is taken into account. Concepts for long term carbon and nutrient management experiments as a basis for adaptive forest management in the Calacareous Alps are developed.