PROJECT INFORMATION

Project title:

Development of a climate-sensitive growth simulation model with economic component for the main tree species in Serbia and forest treatment strategies as basis for the decision-making of forest management under climate change (ANKLIWA-DS, work package 3)

Project ID: 208

Contact person: Dominik Sperlich // dominik.sperlich@ife.uni-freiburg.de

PROJECT DESCRIPTION

Background

Developing adaptive forest management strategies for climate change for Serbia requires management tools that are not currently available in the country, but which can be adapted to Serbia on the basis of recent developments in Germany. The focus will be on the economically most profitable two species in Serbia: a) European Beech (**F. sylvatica**) and b) Pedunculate oak (*Quercus robur*) covering 351 000 ha and 32 000 ha (respectively) of the total forest area in Serbia. Although beech covers roughly 10 times more area, the wood of pedunculate oak wood is economically much more profitable. Both tree species are managed as high forests. For these two tree species adaptive management will be developed for Serbia. The impacts of changes in temperature and precipitation under different climate scenarios will be simulated and evaluated economically.

Adaptation of a climate-sensitive forest growth simulator

The first step involves gathering the necessary data in the two defined forest regions in cooperation with WP2 and WP4 (activities 2.1, 3.1 & 4.1). In order to obtain the necessary growth models, the WP2 and WP4 will work together at locating and covering all the sites with different yield potential, where the tree growth analysis will be conducted.

Additionally, stem discs from selected plots will be taken in cooperation with WP2 and WP4 in order to get forest growth data for the model validation. For a robust parametrization of the forest growth model, we will gather data for the leaf biomass submodel. For this purpose the leaf area index (LAI) and the leaf morphology (leaf mass per area - LMA) have to be quantified. LAI can be measured with an already existing leaf area index analyzer (LAI-2200C). Whereas LAI measurements are rapid nondestructive, LMA measurements are more time-consuming and tedious. Additional ecophysiolgical data that are required to parametrize the forest growth simulator is intended to gather via literature review and possibly Level II plot data.

The existing climate-sensitive forest growth model (SIBYLA and/or GOTILWA+) will be adapted for Serbian conditions (activity 3.2) and also for Germany. The available data sets will serve as a basis for parameterizing, calibrating, and validating the model on the yield maps/productivity maps for selected management types. During the scientific stay in Belgrade (activity 3.3) the model will be tested (activity 3.3) and improved/corrected locally with Serbian help aiming at creating a simulation with a current, business-as-usual management (BAU) (milestone 3.1). In the following, climate

change scenarios for Serbia will be applied to BAU (activity 3.4) for the parameterized tree species and potential effects on growth, productivity and mortality analysed.

The output of the simulator for the different silvicultural strategies and tree species will then be evaluated economically. Therefore, the output of harvested and standing timber must be categorized in diameter classes and then assessed with local/regional prices and costs. For this purpose, existing sorting algorithms with prices/costs from a previous cooperation project will be used and updated during the stay (activity 3.3) in project year 2. In addition, economic parameters such as NPVs, annuities and land expectation values for the different tree species as well as optimization algorithms will be calculated (activity 3.5). In addition to standard optimization approaches, this project will also use "robust" decision methods that are able to handle "worst case" scenarios (milestone 3.2).

Development and evaluation of adaptive forest management strategies considering multiple ecosystem services (activity 3.6)

With the help of the most important stakeholders and building on the results of various projects (see above), silvicultural strategies for the main tree species in Serbia are implemented in the simulator. AP 1 will support the initiation and implementation of the stakeholder inputs in form of workshops and surveys.

Emphasis will be placed on the development of adaptation strategies to climate change, i.e. strategies designed to increase the resilience of Serbia's forests. A variety of simulation runs will be carried out under a range of climate scenarios and optimized taking into account the ecosystem services wood production, carbon storage and biodiversity (Milestone 3.3).