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Comparing approaches to estimate expected changes in growth trends due to climate change

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The significant shift of site conditions caused by the ongoing climatic change is a serious challenge for forest managers with regard to maintaining the parameters of sustainable forestry. The expected decline of forest increment and increasing damages caused by abiotic factors and biotic agents generate increasing uncertainties in forest planning. From economic point of view, the estimation of future harvestable yield is a crucial issue.
In the presentation, methods to estimate forest yield changes are described and compared. In the framework of the development of a decision support system, five different approaches to forecast increment and yield changes are under investigation in Hungary:
(1) Expert estimation based on professional practice, utilizing yield data of analog sites. Main problems arise on projected sites where analog examples are unavailable, such as on sites shifting into the steppe climate zone.
(2) Growth models using the database of forest inventory across site gradients. Although producing acceptable statistical accuracy, results are biased by the actual distribution and frequency of compartments in the different site classes.
(3) Applying machine learning on available site potential data tables, used for optimization of tree species selection in artificial regenerations. The exact determination of trends is however influenced by the strong human interference, primarily by species preferences.
(4) Estimation of growth trends based on simulated climatic change in common garden trials. In spite of uncontrollable representativeness of trials, calculations indicate significant trend differences between species.
(5) Field monitoring of mortality, following extreme weather events (droughts) and of appearance of natural succession by native tree and shrub species. Approaching the xeric limits of closed forest cover, the natural regeneration capacity is declining.
The evaluation of merits and drawbacks of the parallel assessments is directly utilized to contribute to adaptive forest management practice through the decision support system “eDTR”.
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