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Abstract in English

Because of the great impact of storm damage on the ecology and management of forests we analyzed a previously unpublished database. The long-term experimental growth and yield plots of Southwest Germany were analyzed with two main objectives:

1) Evaluation and enhancement of an existing storm damage model for storm Lothar in Southwest Germany with these new data.

2) Development of a new explanatory and prognostic model for storm damage based on long-term damage data of experimental growth and yield plots in Southwest Germany, under special consideration of the impact of silvicultural interventions on storm risk.

The applied methods include classification and regression trees and regression models (generalized linear models).

Results for objective 1 were that the effects already included in the existing model represent well the trends also in the data of the experimental plots. However, the model tended to overestimate storm damage. While investigating potentials for enhancement, especially the variables describing silvicultural treatments (thinnings etc.) helped improve the model accuracy.

Results for objective 2 can be summarized as follows:

- Effects of tree species and tree height are the most determining factors for the explanation of storm damage, also when it comes to analyzing damage by multiple storm events simultaneously.

- The significant impact of silvicultural interventions (about 20%) was best quantified by the relative removals of the five or ten years prior to the storm event.

- Another strong effect, the thinning quotient, indicates that removing dominant trees especially in older stands destabilizes a forest significantly.

- Tree- and stand-level slenderness ratios showed contradictory results when it comes to storm damage analyses. Consequently, we estimate slenderness indicators as inappropriate for storm damage analysis of the available database in which storm damage as broken and uprooted trees was not coded separately.

- Storm damage of Douglas-fir was found as high as that of Norway spruce. The damage proportions of Douglas-fir were even higher than those of Norway spruce. However, this is most likely due to differing site conditions. A generally higher damage potential of Douglas-fir compared to Norway spruce is thus not likely.

In the concluding remarks we discuss the transferability and generality of our findings. From the results, we draw conclusions for minimizing storm damage in forest management as well as for storm damage research.