Approach for estimating the impact of climate change on water availability, within the forestry management of Rhineland-Palatinate, Germany

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In order to find best sulvicultural decisions, foresters in need to know how far will climate change influence the water availability of forest sites in the next 50 to 100 years. It is assumed, that under fast changing climate conditions the current method for determining the water availability of forest sites in Rhineland-Palatinate, Germany, will not be sufficient. So, our aim was to process a concept, which detects objectively the impact of climate change on water availability classes of forest sites in Rhineland-Palatinate. First, hydrological simulations for various beech sites were run with observed climate data and were analysed and classified in regard to drought stress. The results of the hydrological simulations were showing a plausible system behaviour under different climatic and topographic conditions. Furthermore, the classification of the simulated beech sites resulted in nine objective categories, characterizing different water availability conditions. Second, simulations of beech sites with projected climate data were run and mapped to the nine categories. This mapping showed, that considerable shifts to lower water availability, between reference scenario and A2 normal scenario were detected for the beech sites, characterized by observed mean annual temperature under 8.5 °C. For the other beech sites only little or none shifts were indicated. Whereas four simulated beech sites showed a little shift to higher water availability classes. Our approach is a model-based method, which allows detecting objectively the non linear impact of climate change on water availability of simulated beech sites.