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Economic Impacts of Climate Change on Winter Tourism: Challenges for Ski Area Operators

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Increasing temperatures and snow scarce winter seasons pose a big challenge for the winter tourism industry. Changing natural snow reliability influences tourism demand and ski area operators are faced with an enhanced need of technical snow production. The goal of the present research work is to analyze the economic effects of technical snow production under future climate conditions.
Snowmaking as an adaptation strategy to climate change impacts on the ski tourism industry is already taken into consideration in several studies from a scientific perspective concerning snowmaking potentials under future climate conditions and the impacts on ski season length (e.g. Scott et al. 2003; Scott & McBoyle 2007; Hennessy et al. 2008; Steiger 2010). A few studies considered economic aspects of technical snowmaking (e.g. Teich et al. 2007; Gonseth 2008). However, a detailed analysis of the costs and benefits of snowmaking under future climate and snow conditions based on sophisticated climate and snow models has not been carried out yet.
The present study addresses the gap of knowledge concerning the economic profitability of prospective snowmaking requirements under future climate scenarios. We carry out a detailed cost-revenue analysis of snowmaking under current and future climate conditions for a case study site in Styria (Austria) using dynamic investment models. The starting point of all economic calculations is the daily demand for artificial snow that determines the requirements for additional snowmaking investments and additional operating costs. The demand for artificial snow is delivered by the snow cover model AMUNDSEN (see Strasser et al. 2011) and is driven by four climate scenarios. Apart from future climate conditions the profitability of snowmaking depends on changes in costs and visitor numbers. The results of a ski tourism demand model analyzing daily visitor numbers and their dependencies of prevailing weather conditions enter the cost-revenue analysis of snowmaking and enable the determination of the immediate benefits in terms of additional revenues of ski ticket sales.
Furthermore, we conduct an econometric analysis of how snowmaking investments changed ski ticket prices in previous years, as the positive effects of snowmaking on snow reliability could be offset in the longer term by the effects of higher prices for skiing, possibly resulting in lower demand.

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