

165 Climate change: impacts on outdoor activities in the summer and shoulder seasons in Austria - lessons learned.

Ulrike Pröbstl-Haider, Claudia Hödl, Kathrin Ginner, Borgwardt Florian, University for natural resources and life sciences, Vienna, Austria

The summer tourism market in Austria builds significantly on the country's opportunities for outdoor recreation such as mountaineering, mountain biking or water sports. This presentation looks at the most important activities from a tourism perspective and considers the likelihood of impacts by climate change based on an extended literature review.

It also examines current trends in tourism demand and concludes with both general and activity-specific adaptation and mitigation measures. The data collection and review process covered the relevant peer reviewed and grey literature. This comprehensive process was based on, and was open to, contributions by the full scientific community of relevant Austrian researchers and experts. The compilation process of the report followed quality standards such as the involvement of international partners as review editors within the review process.

The effects of climate change are already clear to see (Pröbstl-Haider, Lund-Durlacher, Olefs, Prettenthaler 2020). For example, average annual air temperature in Austria has risen by almost 2 °C since the end of the 19th century – roughly twice as much as the global average. A further temperature increase of 1.3 °C by 2050 (compared to the mean of 1971-2000) can be expected, regardless of the different emission scenarios. This warming is accompanied by an increase in heat stress (longer and more intense heat waves) and more frequent extreme drought events due to increasing evaporation.

Rudel et al. (2007) tried to summarize the effects of climate change on alpine summer tourism considering different bio-climatic parameters. According to their findings, the following effects are likely to occur:

- The number of days with heat stress will increase but tourism destinations above 1000m will not be affected.

- The number of days with thermally comfortable conditions for outdoor recreation activities will increase (+10 days).
- The number of days with sunshine will increase but this effect is limited to destinations in higher elevations.
- The number of days with no or little precipitation will increase and days with foggy conditions will decline accordingly.
- Days with significant precipitation will increase.

Without climate protection measures, it is also assumed that a significant increase in the intensity and frequency of small-scale extreme events (local heavy rain, floods, thunderstorms and hail) can be expected, and that subsequent effects such as landslides and mud flows can occur. Burdens for the guest also result from a change in biological conditions, in particular from an increase in harmful insects, an increase in algal growth in warmer waters and from the spread of neophytes and allergenic plants. During all activities outdoors, considerable health problems can arise from increased heat. This particularly applies to city tourism and events in summer.

For many activities, climate change will lead to a prolongation of the season, which is an advantage for destinations focusing on hiking, biking, swimming, water sports, air sports and golf. However, it can be shown that climate-induced phenomena will have a strong impact on many of these activities, such as climbing and alpine touring, fishing, golf, and water and air sports. Here, the impacts may even lead to a change of destination or activity. Adaptation opportunities are rather limited in these cases. For other activities, adaptation measures can be applied to maintain the existing tourism offer. Irrigation can be increased in the case of golf courses, the construction of pools is feasible to compensate for deteriorated lakes, and destroyed trails and other hiking infrastructure, such as alpine

hazard protection, could be reconstructed. However, all these measures are cost-intensive and may have a negative influence on the overall holiday experience. An early warning system via media (based on heat, thunderstorms and heavy rain) would be important to enable adaptation measures for companies and guests.

The discussion over different adaptation strategies is of great importance for tourism management. The presentation will focus on four major strategies:

- Adaptation of the natural conditions: In this case, vulnerability can be reduced by improving the natural conditions, e.g. saving water by redesigning golf courses to improve fish habitats.
- Technical adaptation of the infrastructure: Technical solutions such as

irrigation, artificial pools, artificial canoe routes or the reconstruction of trails maintain the important tourism functions.

- Technical adaptation of the equipment: the goal is an improvement of the equipment in order to continue the activity (e.g. type of boat, type of hang glider).
- Awareness raising, information and early warning systems: For many activities, an early warning system would be helpful to avoid risky situations due to flooding, rockfall, thunder storms or extreme heat.

References

Pröbstl-Haider, U., Lund-Durlacher, D., Olefs, M., Pretenthaler, F. (eds.) (2020) Tourismus und Klimawandel; Österreichischer Special Report Tourismus und Klimawandel (SR19), Springer Verlag, Berlin, 258 p. Rudel, E., Matzarakis, A., Koch, E., Endler, C. & Neumcke, R. (2007) Sommertourismus in Österreich unter den Aspekten des Klimawandels. Zentralanstalt für Meteorologie und Geodynamik, Wien, Meteorologisches Institut, Universität Freiburg.