

Will Alpine summer tourism benefit from climate change? A review.

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Abstract

In the respective tourism industry, as well as in the media, Alpine summer tourism is often regarded as a potential “winner” of climate change. What about the scientific evidence for such a claim? A review of the scientific literature shows that detailed information is rather limited. Most studies are exploratory and highly speculative. Methodological issues and knowledge gaps make it even more difficult to draw convincing conclusions. More research is needed to better understand the relationships between climate (change) and Alpine summer tourism. Otherwise, the claim will remain what it actually is: some sort of wishful thinking based on very little scientific evidence.

Keywords: climate change, summer tourism, Alps, Mediterranean

1 Introduction

Climate change will challenge tourism in the Alps. The potential impacts on winter tourism, in particular snow-based tourism, have received considerable attention in the scientific community, the affected ski industry and the general public, whereas the potential impacts on summer tourism have been hardly addressed. While the impacts on winter tourism are expected to be largely negative, summer tourism is often considered as a potential “winner” of global climate change.

The reasoning is usually as follows: The Mediterranean – by far the most important summer destination in Europe – will become too hot and lose its climatic attractiveness. In more temperate European regions, including the Alps, where the climatic suitability for summer tourism may improve as a result of climate change (warmer and maybe also drier conditions), the tourism industry expects (or better: hopes) to benefit from the adverse future climatic conditions in the Mediterranean. Schweiz Tourismus (2010), for example, published a brochure called “Re-Inventing Swiss Summer” saying that „Mit der Klimaerwärmung wird es in vielen Ländern unerträglich heiß. Unsere Seen laden dann zum Bade und die Berge zum Genießen der Bergfrische.“ Literally: Many countries will become unbearably hot with global warming. Then, our lakes will be perfect for bathing, our mountains perfect for enjoying cooler temperatures. Key message is to suggest a revival of Alpine summer tourism (see also OeCC/ProClim 2007 and Schweiz Tourismus 2008).

Such claims that make up a good story for the media are well received by tourism stakeholders. At first glance, these claims seem to be plausible, but what is the scientific evidence for such claims? In this paper, we analyze the existing literature, focusing on 1) direct climatic impacts, 2) indirect environmental change impacts

and 3) impacts on demand. Furthermore, we identify important knowledge gaps and methodological challenges for assessing the impacts of climate change on Alpine summer tourism.

2 Direct climatic impacts

Climate is an important resource for tourism: it is a principal driver of seasonality and co-determines the attractiveness of destinations for certain tourist activities. Thus, any changes in the length and quality of climate-dependent tourism seasons would have significant implications for the relative competitiveness between destinations. Several studies indicate that the locations with attractive climatic conditions for (summer) tourism will shift towards higher latitudes and altitudes. As a consequence, the competitive position of a destination such as the Mediterranean is expected to decline, whereas other areas (e.g. Western and Northern Europe) are anticipated to improve (UNWTO/UNEP/WMO 2008).

Amelung & Viner (2006), for example, used the Tourism Climatic Index (TCI) (Mieczkowski 1985) to examine the current and future climatic attractiveness in the Mediterranean region, including Western and Northern Europe, which generates the largest flow of tourists to the Mediterranean. TCI values were calculated based on a global grid-based climate data set (0.5° lat x 0.5° long) and extrapolated to the future with climate change signals from a global climate model (GCM) using four IPCC emission scenarios. They found that the climatic conditions for summer tourism in the Mediterranean will change from very good or excellent (up to the 2020s) to good, acceptable or even marginal in the 2080s. Apart from generally “becoming too hot”, negative impacts on Mediterranean summer tourism may also result from a change in the frequency and/or intensity of extreme events such as heat waves, droughts and fires (Perry 2006). Northern Europe, in contrast, will change into a region with very good or even excellent summer conditions. One sentence directly refers to the Alps: “While this region currently achieves low TCI values in summer, it will have one of the highest score by A1F’s 2080s” (Amelung & Viner 2006: 356).

Of course, the projected redistribution of tourism flows is not restricted to Europe (Scott et al. 2004; Amelung et al. 2007), and within Europe the Alps are not the only region hoping to benefit from this change (Nicholls & Amelung 2008). Similar expectations are held in the UK, Scandinavia, the Baltic Coast and many other places. Furthermore, the resolution of the models used for the global assessments are too coarse to depict the spatial peculiarities of the Alps. A detailed assessment of the future climatic attractiveness of the entire Alpine region is still missing. Existing studies cover only parts of the Alps and are site-specific. Matzarakis et al. (2007), for example, calculated several indices for selected locations in Austria and showed how the values of these indices (e.g. the number of days with heat stress defined as physiologically equivalent temperature $> 35^\circ\text{C}$) may change as a result of global warming. Methodological problems (e.g. measured and simulated data do hardly match), however, make it difficult to draw convincing conclusions. The general notion that Alpine summer tourism may benefit from climate change is also supported by Kra-

jasits & Schöner (2008) who – in a mostly descriptive way – developed scenarios for four selected Alpine summer destinations in Austria. Fleischhacker & Formayer (2007) conducted a sensitivity analysis showing that lake tourism may benefit most from global warming, exemplified in two Austrian destinations.

3 Indirect environmental change impacts

Mountain ranges are considered to be particularly sensitive to climate-induced environmental change. Glacier retreat, permafrost melting, changes in hydrology, flora and fauna and increased geomorphic processes etc. will all impact tourism to varying degrees and are thought to be largely negative (UNWTO/UNEP/WMO 2008). On the one hand, there is a large and ever growing body of literature on climate-induced environmental change in the Alps. On the other hand, there is hardly any literature focusing on the impacts of these changes on Alpine tourism. Most available information is based on anecdotal knowledge. Selected outdoor activities such as mountaineering got a little more attention. Different authors tried to assess the implications of climate-induced environmental change, in particular glacial retreat, permafrost degradation and increased geomorphic processes, on tourism infrastructure, supply and demand in high mountain environments (e.g. Behm et al. 2006; Pröbstl & Damm 2009). Lieb et al. (2010), for example, created vulnerability maps for the years 2010 and 2030 by overlaying geomorphic hazard maps (rockfall and other denudation processes only) with trail and route network information, covering the Großglockner-Pasterze area in Austria. They found a small increase in potential risks for mountaineers and suggested several adaptation measures such as protection works and new organizational forms of trail maintenance. Speaking of high mountain environments, Ritter et al. (2010) used a transdisciplinary dialogue combining expert and experiential knowledge to deal with the potential impacts of climate change – an interesting approach to get a more comprehensive and holistic picture.

Further insight is available from a few north-American studies. Several authors (e.g. Richardson & Loomis 2004; Scott & Jones 2005; Scott et al. 2007) investigated the potential impacts of climate change on nature-based tourism in Rocky Mountain national parks. First, regression analyses were used to examine the implications of changes in seasonality (i.e. an extended and climatically improved summer season). Second, visitor surveys were used to examine the implications of climate-induced environmental changes on tourist perception and park visitation. Scott (2006: 69) summarizes the results as follows: “Although seasonality changes may be favourable to increased visitation, environmental change may reduce the attractiveness of the mountain landscape to such an extent that these impacts override the opportunities provided by an improved climate for tourism.”

However, the climatic conditions that would lead to a significant reduction in mountain attractiveness are several decades away. By this time, some of the environmental changes (e.g. disappearance of glaciers) may have already occurred, and the sense of loss felt by a today’s visitor may not be shared by a future visitor born in 30 or 50 years from now, simply because the latter will never experience the landscape

attributes that current visitors use to define and measure the quality of mountain experiences. It remains therefore very uncertain whether the negative impacts of environmental change would occur to the extent existing studies suggest.

4 Impacts on demand

Direct climatic and indirect environmental change impacts will have an influence on destination choice and tourism demand. Tourists are mobile and will adapt to changing circumstances: they may change the timing of travel and avoid negatively affected destinations.

Weather and climate act as pull and push factors. Hamilton et al. (2005a) found that locations that are cool (warm) at present would attract more (fewer) tourists under global warming. The changes in the strength of the pull effect of international destinations will be accompanied by changes in the strength of the push effect of the home country. Domestic tourism is expected to increase in temperate regions (where the current climate is sub-optimal) and to decrease in warm regions (where the current climate is good). Higher (lower) latitudes and altitudes would therefore become more (less) attractive to international and domestic tourists alike (Hamilton et al. 2005b).

Ehmer & Heymann (2008) used a scoring model to detect “winners” and “losers” of climate change in 2030. Within Europe, northern destinations such as Denmark, Germany and the UK received the highest ranking. At the bottom of the list are Mediterranean countries only: Spain, Portugal, Turkey, Greece, Cyprus and Malta. According to Hein et al. (2009), Spain may lose up to 26% of its international summer guests by 2060. The authors argue that the climate of North-western Europe is becoming much more favourable for tourism, and that the tourists from this part of Europe (these are the main source markets for Spanish tourism) are more likely to stay at their home countries. Hamilton & Tol (2007) analyzed the impacts of climate change on tourism in Germany, Ireland and the UK. Using a simulation model, they found an increase in domestic tourism, and – after an initial decline – a progressive increase in the number of international tourists (as tourism demand from increasingly rich tropical countries grows). The demand in Ireland and UK shifts from the south to north. In Germany, the pattern is the opposite, with demand increasing in the south of the country (as the continental interior warms faster than the coast).

The expectation that temperate destinations may benefit from climate change is further substantiated by (analogue) studies focusing on the impacts of short-term climate variability on tourism. Smith (1990), for example, found that a poor summer in the UK persuades more British residents to take a holiday in Portugal the following year. In the anomalously warm and dry summer of 1995, however, the traditional British seaside holiday experienced a revival (Giles & Perry 1998) and the UK domestic tourist industry earned an extra £ 309 million relative to mean climate (Agnew & Palutikof 2006). More generally, a summer warming of 1 °C is estimated to increase domestic holidays in the UK, the Netherlands, Germany and Italy by 0.8–4.7% (Agnew & Palutikof 2001).

The extraordinary summer of 2003 had a positive impact on Alpine tourism. In Switzerland, the number of day trips increased (OcCC/ProClim 2007). In Austria, the number of overnight stays increased by 1.8% in comparison to the average of 2002 and 2004 (international tourism: +1.4%, domestic tourism: +2.7%). Lake tourism (+4.4%), climate resorts (Luftkurorte) (+3.0%) and nature protection areas (+2.8%) benefitted most (Fleischhacker & Formayer 2007). More generally, Serquet & Rebetez (2011) found significant correlations between the number of nights spent in Swiss mountain resorts and hot temperatures at lower elevations concluding that it seems likely that tourists will choose to stay at alpine resorts more frequently and for longer periods if heat waves become more regular. Furthermore, Müller & Weber (2008) have shown in a scenario analysis for the Bernese Oberland (Switzerland) that future gains in Alpine summer tourism may compensate for potential losses in Alpine winter tourism.

5 Knowledge gaps and methodological challenges

Given the heterogeneous character of both climate and tourism in the Alps, a number of knowledge gaps and methodological challenges can be identified for the assessment of climate change impacts on Alpine summer tourism:

5.1 Spatial resolution

The spatial resolution of the climate models is often too coarse to accurately reproduce Alpine climate. Even with regional climate models (RCMs), significant differences between models and biases between measured and modelled climate data can be observed over the Alpine arc (Christensen & Christensen 2007). When transferring climate variables to indices (as in Amelung & Viner 2006 and Amelung 2007) the spatial resolution of the grid is crucial as temperature – and to a lesser extent precipitation – greatly varies with altitude. Relying on the grid resolution of existing GCMs (>100 km) and RCMs (25–50 km) is therefore hardly feasible for assessing the climate suitability as Alpine tourism covers – over short distances – an altitudinal range that extends from the valley bottoms to the highest peaks.

5.2 Tourism climate indices

Climate indices are used to assess the suitability of climate for tourism. Most assessments refer to ideal climatic conditions and average tourists. Both terms, ideal and average, are rather misleading, given the fact that the climatic preferences of tourists are highly individualistic. The often applied TCI – although easy to use and suitable for assessing the current and future climatic attractiveness of destinations in a very general way – suffers from important limitations, including subjectivity (in terms of the selection, weighting and rating of the climatic parameters used), reliance on climate means and disregard of over-riding effects (de Freitas et al. 2008). With regard to the last point, the TCI – as many indices – is “temperature-driven”.

Although temperature was found to be an important variable in several surveys, potential over-riding effects of factors such as high wind speed and heavy precipitation events should not be neglected (de Freitas 1990). In mountain environments, for example, the absence of rain was higher rated than comfortable temperature (Scott et al. 2008). Furthermore, the TCI is activity specific. In its original version, the TCI refers to light outdoor activities only (Mieczkowski 1985). Perceived ideal climatic conditions, however, are likely to vary for different activities. Scott et al. (2008), for example, found that preferred median temperatures for beach, mountain and urban environments differ by 7 °C. Further differences are related to the nationality of the people surveyed. As a consequence, the authors conclude that “the use of universal indices for all tourism segments (...) appears conceptually unsound” (Scott et al. 2008: 71).

5.3 Mediterranean: “too hot”?

Most impact studies are dealing with beach tourism only. However, Mediterranean tourism, an even coastal Mediterranean tourism, goes well beyond the typical sun, sand and sea tourism (Moreno & Amelung 2010). Furthermore, recent studies suggest that the projected negative impacts of global warming on Mediterranean beach tourism may be exaggerated. Based on a survey of 850 university students in Austria, Germany, the Netherlands, Sweden and Switzerland, Ruttly & Scott (2010) defined temperature thresholds for beach tourism in the Mediterranean. These thresholds (< 22 °C = unacceptably cool; 27–32 °C = ideal; > 37 °C = unacceptably hot) were then compared against thermal conditions (temperature and humidity) in a baseline climate, and an early, mid and late century climate change scenario (A1B) for five beach destinations. During peak summer months, two beach destinations (Antalya/Turkey and Larnaca/Cyprus) were already found to be “too hot” at present (making it somewhat difficult to explain the current success of these two destinations); another two (Milos/Greece and Nice/France) will become “too hot” by the 2050s, and one, the Costa Brava in Spain, will not exceed the “unacceptably hot” threshold at any time in the 21st century. Moreno (2010) made a survey of Belgian and Dutch tourists (n = 115) flying to the Mediterranean and explored, among others, the effects of five potential climate change impacts on tourists’ satisfaction. The most negative impact was “risk of diseases”, while “heat waves” was ranked as the least negative. Both studies are exploratory and subject to several limitations, e.g. composition and size of sample, but they suggest that climate change impacts on Mediterranean summer tourism may be more complex (and probably less negative) than previously assumed.

5.4 Relative competitiveness

Even if the notion that the Mediterranean will become “too hot” holds true, the relative competitiveness of destinations is not only depending on climatic suitability but also on factors such as the activity profile of holidays. In other words, it is unknown how many “former” Mediterranean tourists would still go the Mediterra-

nean, spend their future beach holiday at, for example, the Baltic Sea, or switch from beach to mountain holiday in the Alps. According to Moreno's small sample of Belgian and Dutch tourists, they would be rather persistent: "72% of the respondents would still travel to the Mediterranean even if the "ideal weather conditions" they assigned to beach tourism would occur in Northern Europe" (Moreno 2010: 262). There is some data from Austria too: Fleischhacker et al. (2009) conducted an online survey and found that a rather large number of Austrian beach tourists may think about switching destinations after a series of extremely hot summers in the Mediterranean: 28% would go to the domestic lakes, another 16% would change the holiday activity and, for example, would go hiking in the mountains instead ($n = 617$). Speaking of demand, most studies focus on international holiday tourism. From an Alpine perspective, domestic (or given the relatively small size of countries such as Austria, Slovenia and Switzerland: short-distance) and short-stay tourism may be equally or even more important. The Alps are surrounded by very dynamic metropolitan areas (e.g. Milan, Munich, Vienna and Zurich). In a warmer future, the growing population of these areas may travel to the mountains more often to temporarily seek relief from the heat in the cities making the city people an increasingly interesting target market for Alpine destinations.

5.5 Increasing uncertainties with time

Most studies have a long-term focus. From a scientific point of view, it is well worth analyzing the potential changes until the end of the century. The tourism industry, however, has a different and much shorter time horizon. In other words, projections for the 2080s are irrelevant for the industry. Moreover, uncertainties, e.g. the future pathways of CO₂ emissions and the corresponding temperature changes, increase with time. Aspects that have not been addressed in this article, for example the potential impacts of mitigation policies on tourist mobility and the wider consequences of societal change on tourism in general (UNWTO/UNEP/WMO 2008), will further enhance complexity, making it even more difficult to assess the impacts of climate change on tourism in a given region.

6 Conclusions

There are numerous studies dealing with the impacts of climate change on summer tourism. Only a few, however, focus on the Alps. The Mediterranean was declared a destination vulnerability hotspot (UNWTO/UNEP/WMO 2008) and received much more attention. The existing assessments, however, suffer from important limitations. Methodological issues and some serious knowledge gaps make it difficult to draw convincing conclusions. Nevertheless, key message is that future tourists will shun the Mediterranean in summer. In addition, the studies hypothesize about the potential that the same tourists will stay in their home or neighbouring countries if climate change brings more suitable conditions in the respective regions. However, as the projected negative impacts on Mediterranean tourism may be exaggerated, the

expectations to benefit from adverse climatic conditions in the Mediterranean may also be too high.

Interestingly, deteriorating climatic conditions in the Mediterranean are the main reason to explain why Alpine summer tourism may benefit from climate change. Focus is therefore on the weakening of the Mediterranean climate as a pull factor for international tourism. But what will happen with Alpine climate as a pull factor for tourism? The existing literature dealing with this question is particularly limited. Moreover, very little is known about the weather and climate sensitivity of summer tourism in general. This is true for Mediterranean (Moreno & Amelung 2010) and Alpine tourism alike. What different tourists engaged in different activities perceive as ideal, acceptable or unacceptable needs to be determined if we are to assess the potential impacts on climate change on tourism. As this basic knowledge is mostly missing, the majority of the existing studies are highly speculative.

Much more research is needed to answer the question whether Alpine summer tourism will benefit from climate change. First, the weather and climate sensitivity of different segments of Alpine summer tourism should be determined. Second, impact assessments should have a spatial resolution that is able to reproduce the climatic heterogeneity of the Alpine space. Besides and to name just a few, the relative competitiveness of different destinations should be taken into account, as well as the importance of domestic short-term travel (day trips and weekends) for future Alpine summer. In order to do so, existing methodologies, e.g. the vulnerability assessment methodology for coastal tourism (Moreno & Becken 2009; Moreno 2011) may be adopted and adjusted for Alpine areas.

The possibility that Alpine summer tourism will benefit from climate change is still conceivable. Without further research, however, it will remain what it actually is: some sort of wishful thinking based on very little scientific evidence.

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