

# Climate change as a chance for Alpine health tourism?

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## Abstract

It is assumed that within the next decades tremendous changes in the world climate will happen, which also includes the Alps. Although these perspectives seem to be negative from the standpoint of winter (less snow, shorter season) and summer (increasing temperatures of air and water, poor water quality of lakes and seas) people that work in the tourism industry will have to create new offers for tourists including Alpine health tourism. There are at least two options where Alpine tourism may profit from climate changes: a) lower temperatures in the Alps as compared to low altitude and b) increasing incidence of allergic diseases in the Western community and the known health benefits of the Alps for this specific group.

**Keywords:** climate, allergy, asthma, health tourism

## Introduction

Along with the discussion on “global warming“, climate change managed to obtain vast media attention throughout the last years. This does not concern the Climatic change in a global sense only, but also regional discussions about possible consequences of the climatic change. The number of reports regarding climate change in Alpine regions increases constantly, while many reports put forward and deeply emphasise horror scenarios for the Alps. Especially people working in the field of tourism fear negative impacts on the mountains. Will skiing be possible just at higher altitudes in the future, or is the primary solution to that problem the development of artificial snow that can be produced even above freezing-level? The very high-quality health tourism that has been developed in the Alps in the last years could be effected by the climate change too. The following presentation shall point out that the climate changes in the Alps can be of use for the Alpine health tourism if recognised in time. This is to be specified on the basis of two examples, a) Benefit of the global warming for the Alpine tourist, and b) climatic change and allergic illnesses.

## Heatwaves and morbidity/mortality

Studies of the Intergovernmental Panel on Climate Change (IPCC) indicate that a dramatic increase in global average surface temperatures of 1.4–5.8°C is to be expected over the period from 1990 to 2100 (Intergovernmental Panel on Climate Change 2005). Extreme weather conditions with extremely high daily maxima may influence human's health negatively. E.g., extreme heat in summer has been demon-

strated to increase mortality in persons suffering from cardiovascular diseases (Basu & Samet 2002, Curriero et al. 2002). These negative thermal developments may also affect Austria. Hutter et al. report about an increase in average seasonal temperature for May to September by 1.7°C during the last 35 years (Hutter et al. 2007). Heat-wave days in Vienna were associated with a significantly increased relative mortality risk, which was more pronounced in the elder population over 65 years. In the hot summer of 2003 approximately 130 persons died in Vienna caused by high temperatures. What are the consequences of such data? Hutter et al. conclude that preventive programs are warranted during heatwaves, Austrian health professionals and public health services should be prepared for this task in the future. Although the average temperatures in summer will also increase in the Alps, they will still be decreased as compared to low altitudes. According to these data health tourism in summer needs to be re-evaluated in several aspects. Health programs focusing on hiking and biking at low altitudes will be questionable during hot summer days in June, July and August. Relaxation at the pool side, at the seaside or close to lakes cover the risk of heat related problems in persons with worsened thermoregulatory mechanisms. Moreover, as a consequence of high ambient temperatures the quality of lakes at low altitudes may be compromised in the future. What does this mean for Alpine regions at moderate and high altitude? Lower temperatures in summer could be a medical and commercial argument for health promotion in the Alps. Hiking, biking and Nordic Walking are still very popular leisure activities which should be possible in the Alps in the following decades also during warm summer days. Health tourism offers and products have to be established for mountain regions focusing on this “aspect of temperature”. Beyond daytime recreational sleep is dependent on convenient night time temperatures which should also be guaranteed in Alpine regions.

## Alpine climate

For the individual, the ascent up to Alpine mountain regions means to be exposed to a variety of meteorological and climatic changes. What are these changes like at Alpine altitudes (i.e. moderate altitudes 1500 m–2500 m)? The most important factors are summarised in table 1. The main relevance for patients with atopic/allergic diseases is to be found in the reduction of allergens and air pollution at moderate altitudes. In comparison to sea level locations, the concentration of allergens is significantly reduced in Alpine regions as a consequence of lower temperatures over the year, reduced humidity and vegetation. For example, the concentration of mite allergens in house dust samples is below the threshold values for the provocation of asthma symptoms as compared to low altitude. Respective data were published from different European Alpine regions: Briançon, France, 1326 m, Misurina, Italy, 1756 m, Davos, Switzerland, 1600 m (summary see Schultze-Werninghaus 2006). A pronounced reduction of allergens was also measured for spores (*Cladosporium spp.* spores, *Alternaria spp.*). For the next decades, a spreading of plants inducing allergic diseases is expected at low altitude, e.g. *Ambrosia artemisiifolia*. At present, plants with the potential for allergic reactions cover about 11% of the Austrian ground surface,

*Table 1: Meteorological and climatic changes in Alpine climate*

		Increase/decrease per 100 m
<b>Increase</b>	Global radiation	+20–30%
	UV radiation	+20–30%
	Electromagnetic radiation	
	Wind velocity	
<b>Decrease</b>	Inhaled allergens	
	Barometric pressure	–12%
	Oxygen partial pressure	–12%
	Air temperature	–6°C
	Water vapour pressure	–25%
	Air pollution	

which could increase up to 80% until the year 2100, mainly (StartClim Report 2005). Thus, Alpine regions could be an important destination for people suffering from allergies in the future.

## Alpine climate and allergic/atopic diseases

Asthma is a chronic inflammatory disease, characterised by recurrent episodes of wheeze, variable airways obstruction and bronchial hyperreactivity. One of the major causes of asthma lies in the sensitisation to house dust mite (HDM) allergen, spores and mildews. In patients suffering of HDM asthma clinical markers of asthma severity are correlated to the number of allergens in their bedding. Thus, the main goal of HDM-induced asthma is the avoidance of mite allergen exposure. Although these recommendations are valid, in reality to achieve a low allergenic environment at home is difficult. The results of measures like the use of bedding covers, regular vacuum cleaning, weekly washing of the bedding at high temperatures, removing the carpet in the bedroom etc. are often disappointing. One possibility to reduce HDM exposure is to stay at moderate altitudes. At moderate altitudes, the number of HDM is extremely reduced mainly caused by the lower relative humidity in Alpine regions (Vervloet et al. 1982). In the past decades, a variety of clinical studies were published showing the benefit of a sojourn at moderate altitude on patients with HDM-induced and even intrinsic asthma. Relevant studies are presented in the following section

### Prevalence of asthma in mountain regions

The effect of Alpine climate on the prevalence and morbidity of childhood bronchial asthma was evaluated recently (Gourgoulis et al. 2001). Based on questionnaires regarding history and symptoms of asthma, the prevalence of childhood bronchial asthma was in the mountains (800 m–1200 m) twice as low as compared to sea level. This reduced prevalence was paralleled by a lower morbidity as meas-

ured by less days of absence from school per year and fewer nights with dyspnea per year in the children living in the mountains.

An inverse association between the prevalence of asthma symptoms and living altitude was reported by Weiland et al. (2004) in the *International Study of Asthma and Allergies in Childhood* (ISAAC).

### **Benefits of sojourns in the Alps for asthma patients**

In the last two decades, several research projects were done in the Istituto Pio XII, Misurina, Italy, 1756 m: A several week exposure of asthmatic children in 1756 m led to a reduction of immunological markers for allergic asthma and an improvement of bronchial hyperresponsiveness (Piacentini et al. 1993). A continuous exposure of 9 month at 1756 m could reduce allergen-induced bronchial hyperresponsiveness in children with moderate and severe asthma with positive effects measured already after 3 months (Peroni et al. 1994). Respiratory function was improved in HDM-sensitive asthma children during a 12 weeks sojourn at the same research centre at 1756 m (Valletta 1997). Peroni et al. (2002) investigated asthma children during a long term stay (9 month) at 1756 m with a 2 weeks interruption (Christmas holidays). Residual volume, which is increased in asthma patients, improved at moderate altitude, increased during the stay at home and improved again at altitude. Similar data were obtained by measuring exhaled nitric oxide, as sensitive marker of airway inflammation.

That even a short-term stay in the Alps may be beneficial for asthma patients was demonstrated by Simon et al. (1994). After only 3 weeks in an altitude clinic in Davos, 1600 m, immune activation was reduced, after 5 weeks also lung function presented evidence for clinical improvement. Similar results were reported by a Dutch group (van Velzen et al. 1996) after exposure of children with asthma for one month at 1560 m.

Grootendorst et al. (2001) investigated the influence of 10 weeks of high altitude allergen avoidance (1560 m, Swiss Alps) in adolescents with persistent asthma despite treatment with high doses of inhalative corticosteroids. The main study result was that in adolescents with HDM-induced asthma, which was not optimally controlled by medical treatment, the altitude sojourn resulted in marked improvements of quality of life (as evaluated by a specific questionnaire) and bronchial hyperresponsiveness. The authors conclude that short-term high altitude allergen avoidance seems to contribute to long-term better control of asthma, possibly with reduced need of steroids.

Huss-Marp et al. (2007) studied the effects of an Alpine rehabilitation program (Bavarian Alps, 1200 m) on more than 300 asthmatic children. As marker of airway inflammation the fractional concentration of exhaled nitric oxide (FE-NO) was analysed. After 4–6 weeks at altitude there was a significant drop in FE-NO in patients with allergic asthma and even in children with intrinsic asthma. Thus, the benefits of the Alpine sojourn in asthma patients seem not to be related exclusively on allergen avoidance. Other positive factors like the absence of air pollutants and reduced stress have to be considered.

In a retrospective study including 860 asthmatic patients, who were treated in Davos, an absence of asthma symptoms or a significant improvement of asthma was measured in 65.2% of the patients the year after the altitude sojourn (Drzimalla & Wagner 1998).

Interestingly, there is some evidence that not only patients with allergic asthma profit from a sojourn in the Alps but also persons with other allergic/atopic diseases, e.g. atopic eczema and atopic dermatitis (Borelli & Chlebarov 1969, Gühring 1992).

## **The guest with allergic disease as a USP for the Alpine tourism?**

For decades clients visiting the Alps report on their wellbeing during and after their Alpine holidays. The effectiveness of Alpine climate to improve physical and psychological fitness was proven by our project AMAS (Austrian Moderate Altitude Study) (Strauss-Blasche et al. 2004, Greie et al. 2006). It is a shared belief that a prolonged stay in the Alps is effective in reducing clinical symptoms of allergic patients ("high-altitude climate therapy"). The multiple positive effects of the Alps for these patients are summarised in table 2. These benefits are not sufficiently known in the medical and tourism community, and specific health programs for guests with asthma visiting our Alps are scant. Thus, creating and offering evidence based vacation programs in Alpine regions for this specific target group should be a USP for the Alps and could be a big market for tourism providers in the future. However, to establish a specific health vacation for clients with allergic diseases means for the tourism providers a big challenge. Among these challenges the acceptance of such a program within a tourism region is a prerequisite for a successful offer.

*Table 2: Health effects of Alpine climate on allergic patients.*

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•	Reduction of symptoms of asthma within a few hours and maintenance for weeks/months after return
•	Improvement of personal wellbeing
•	Improvement of lung function and reduction of bronchial inflammation
•	Improvement of inflammatory markers
•	Reduction of anti-allergic therapy (e.g. cortisone)
•	Combination with hiking: Positive feedback on wellbeing and self confidence
•	Improvement of some allergic/atopic skin diseases

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## **Mountain vacation for guests with allergic disease. What is the reality!**

To detect the acceptance of such health vacation, however, products in tourism regions as well as to identify potential factors enhancing or inhibiting their implementation, a research project was conducted in the Oetztal during summer and autumn 2005 (Schuckert & Möller 2005). A total of 47 personal interviews with tourism entrepreneurs and health professionals were conducted based on a qualitative and quantitative guideline/questionnaire. For the tourism entrepreneurs, the main re-

search questions included potential possibilities to create and develop tourism products for people with allergic diseases and the readiness to cooperate with other tourism suppliers and with the medical professionals in the area. These, on the other hand, were asked to evaluate the medical supply in the research area, the readiness to cooperate with the tourism suppliers and actual benefits they could bring into and would expect from cooperation with the tourism sector.

The participants in the tourism industry showed a consistently high level of general knowledge concerning the subject of allergic diseases. Most already had first-hand experiences with guests in their own business, even if they did not advertise in the field. They also emphasised the desire for more specific knowledge, especially if they would address this target group in the future. Several features for people with allergic diseases were already part of the product portfolio (especially adapted food or furnishing of rooms), and the tourism entrepreneurs also showed a large overall readiness to further adapt to the needs of this target group, given the adequate demand. They also agreed in the rising importance of the subject and the future relevance of the target group, but emphasised the significance of a sound product development and a professional marketing.

The local physicians described the medical supply from adequate to good, especially during the tourism season and also emphasised their interest in advanced training in the subject of allergic diseases. Most of the doctors see a definite potential for tourism products in the field as well and are ready to bring in their knowledge. The willingness to cooperate was generally high. The medical professionals were ready to cooperate with the tourism entrepreneurs, who on the other hand were not only ready to cooperate with the medical branch, but also with other (competing) tourism companies.

## Conclusions

Climate change could be a chance for Alpine tourism mainly during summer focusing on Alpine climate (less maximal temperatures, optimal climate for allergic patients). However, big efforts are necessary from different parties (tourism providers, physicians, researchers etc.) in order to set up a health-oriented vacation program for specific clients. High willingness to cooperate fulfils major condition for a science-based product development and professional marketing.

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