



The AIDAnova in Kristiansand, Norway. Many passengers occupying limited space – a prerequisite for sustainable, affordable cruises.  
Photo: Felix Kolbeck

# Tourism and the Climate

## Experiences and reflections as illustrated by cruises



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Both tourism and climate change are – seen individually – singularly complex phenomena, fields of research and spheres of political activity. Both are infused with a wealth of emotions. Many a time forming the foundations for tourism are emotionally charged products for periods of recreation, while discussions on climate change are to a great extent at a very emotional level. In many cases this complicates a rational approach to discussions revolving around progressing sustainable tourist concepts, products and destinations.

It is for this reason that I decided to give precedence to a personal experience and personal reflection in this piece and am taking the cruise industry as an example. A cruise liner does, after all, unite a multiplicity of tourist products and characteristic features, for it is a destination, hotel, event platform, attraction, means of locomotion, the starting point for excursions and, seen legally, a holiday offered by a tour operator all rolled into one. As such, the points of reference for tourism with regard to the climate and sustainability can be found here in a very condensed form. I then go on to widen the scope to in-



clude some fundamental aspects of the interaction between tourism and the climate.

### **Intro: cruises and the climate – interests, innovations and ideologies**

Just a few weeks ago I returned with my family from a cruise on the Baltic Sea – my first one. One should really be acquainted with and experience tourist products too if one not only wants to form an impression of them but also wishes to be capable of making distinctions when passing judgement on and talking about them.

Brought into service in 2018, our ship, the AIDAnova, is typical of a relatively modern type of vessel with LNG propulsion and supply connections for onshore electric power. It measures 337 metres in length and can accommodate up to 6,600 passengers. For its overall design aimed at a more sustainable cruise industry, the ship was awarded the ‘Blue Angel’ seal of the Federal Ministry of the Environment when it was commissioned.

6,300 passengers were on board during our voyage and all the cabins were occupied, albeit not all of them to their full capacity, of course. It goes without saying that such a large number of passengers also

means an appreciable, perceived sacrifice in terms of comfort for some target groups. The other side of the coin is that a high number of guests per metre of ship does result in the ship operating more sustainably since the relevant key figures for each guest, such as for emissions, are more favourable. An initial important realisation: with such a product, sustainability means paying the price – either less comfort or less money, for the alternative would translate into significantly higher prices.<sup>1</sup> The higher prices would then have to be paid on considerably smaller ships with more space for each guest, for example, if these vessels are engineered to the standards required for more sustainable cruises.

Over the entire voyage it was only from other ships that we saw and smelt exhaust fumes in the ports and at sea – above all from freighters, trawlers, old ferries and docks. The media hardly ever has anything bad to say about them even though when compared with the cruise business they account for the mammoth proportion of pollutants damaging the climate. But more on that later.

In spite of the industry’s palpable endeavours and the fact that it is beyond the realms of reality that everything can be completely changed and paid for overnight, cruises are beset with an extremely poor image in the vast majority of the media when it comes to ‘sustainable tourism’. The impression is that some journalists in particular project their own preconceived negative attitude towards cruises and their clientele into their articles. The articles’ messaging and ‘results’ seem to be fixed beforehand and the ‘research’ is then carried out accordingly.

With a ship like the AIDAnova, it is not only the shipping line that is taking a risk with its investment just short of one billion euros. With the many years of development and financing of innovative ship concepts involved, the shipyard contracted, in this case the Meyer Werft in Papenburg in the Emsland region, has for quite some time put much of its existence on the line. And by no means does it end when a new ship is delivered. Work was still continuing on the AIDAnova for another power connection to the shore the day before we put out to sea in Kiel and fuel cells are also to be tested on the ship. This hybrid propulsion development will be going into series production in 2023 with the Meyer Werft’s next new vessel, the Silver Nova.<sup>2</sup>

But no matter what the cruise industry verifiably conjures up, plans, risks, finances and does to make

<sup>1</sup> Cf. Salzburger (2023)

<sup>2</sup> Cf. Meyer Werft (2023)

its product more sustainable yet nevertheless reasonably affordable, it can be sure of mostly getting a bad press across the board.

If, as a keen traveller, you try to stay clear of the vituperative blanket castigation levelled at the sector and to calculate the CO<sub>2</sub> emissions of a certain cruise with the help of one of the standard emissions calculators, you will get only a few, albeit consistently inconclusive results: the Ministry of the Environment's calculator<sup>3</sup> is totally unsuitable for such purposes because you can only enter the duration of the cruise but no other parameters. The calculator of myclimate has as its largest category of ship only '> 4,000' passengers. Moreover, it doesn't distinguish between different propulsion systems, ship speeds, capacity utilisation, routes, types of arrivals and departures, power connections to the shore etc., but just takes the average figures in each case.<sup>4</sup> What this in effect means is that myclimate prevents potential cruise ship passengers from making a more conscious decision regarding climate-friendly offerings because everything is just lumped together. Having said that, the myclimate emissions calculator is still a good indicator – a calculator making greater differentiation possible would, though, be desirable. By contrast, Atmosfair stopped offering its emissions calculator for cruises back in 2019 – too great was the media's criticism of Atmosfair due to its compensation cooperation with the AIDA shipping line.

Bearing these points in mind, one can only recommend the cruise companies to offer their own emissions calculators so that potential passengers can work out the carbon footprint of a very specific cruise they are planning on a specific ship on a specific route.

3 Cf. Federal Ministry of the Environment (2023)

4 Cf. myclimate Deutschland (2023). Most of the data sources given there do seem to be obsolete, however, the most recent being from 2020.



The really big sockets. The AIDANova connected to onshore electric power on 26 August 2023 before putting out to sea from Kiel. Photo: Felix Kolbeck

## Tips for an ideally climate-friendly cruise:

- Choose as new a ship as possible engineered to today's standards and with a high passenger capacity.
- Choose a route which – as far as you can find out – offers onshore power supply (OPS) and on which the ship can maintain slow and efficient average speeds.
- Do not fly to and from the cruise liner's point of departure and arrival.
- Try to combine e.g. a one-week cruise with one week in a holiday home in the wider environs of the port of departure. This way you will effectively be using the journey to and from the port twice and it will lower the average emissions of the whole holiday.

Two other important aspects are much too seldom brought up in the discussion about the impact cruises have on the climate:

1. What emissions are there compared with a cruise if the holidaymaker DOESN'T go on his cruise but instead stays where he lives and pursues the leisure activities offered there or decides to go somewhere else on a different type of holiday?
2. A cruise is a multi-purpose product made up geographically of several separate trips and with various recreational pursuits. The alternative for some tourists might be to make a special trip to each of the ports and cities the ship berths at – probably flying to them like on most city breaks. The holidaymaker would pursue each of the activities offered on the cruise (diving, biking, climbing, wellness) in isolation and would thus need to travel to and from each of those particular places where the activity is offered. Seen from this angle, the overall carbon footprint would then probably be greater.

(Deliberately?) disregarding these points gives rise to uncritical notions. It leads to the media coming out with banal to nonsensical, at times one-sided, ideologically motivated assertions, for instance by eye-catchingly and simplistically comparing sizes, as is so often found: *'Large cruise ships are like small floating towns and use the energy to match. Their dirty emissions – fine dust, particulates, nitrogen oxides and sulphur oxides – are a danger to health, the climate and biodiversity.'*<sup>5</sup> Yet it is beyond question that the large cruise ships sail the seas more sustainably than the small ones.

Why don't we simply turn such assertions around: *'Small towns are like stationary cruise ships and use the energy to match. Their dirty emissions –*

5 Cf. Naturschutzbund Deutschland (NABU) (2023)



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fine dust, particulates, nitrogen oxides and sulphur oxides – are a danger to health, the climate and biodiversity.’ Do we see any sort of question mark over small towns because of this?

*‘A cruise liner produces as many emissions as 5 million cars’*, as the headline ran of Germany’s nature and biodiversity conservation union ‘NABU’ in 2012 as part of a campaign. This specious claim was exposed in scientific circles as patently wrong shortly afterwards<sup>6</sup> – a ‘dirty trick’ however you see it.

I personally gained the impression during this summery voyage that the carbon footprint – which would include the 6,300 tightly packed passengers on board the most environment-friendly ship of this size worldwide and travelling to and from the port by train or car – is in fact bigger than if the same 6,300 people had stayed at home in their more or less well-insulated homes and/or had chosen different types of holidays, trips and leisure activities. However, by no means to the extent that it is generally claimed to be but has not been shown to be the case in specific and comprehensive comparative studies.

As is to be expected, the picture changes dramatically to the detriment of a cruise if holidaymakers first of all fly to the ports of departure and then back home again after the cruise. But then it is generally the flight which is the ‘problem’ and creates the greater footprint, not the cruise as such.

### ‘Mass tourism’ and the climate

For decades and thus since long before the boom in cruises, the politically correct language which much of the media has availed itself of has also included regularly laying into so-called ‘mass tourism’ and its impacts. Mass tourism is a ‘term with negative connotations used to show tourism to be a mass phenomenon, together with its concomitant impacts, including how tourists behave.’<sup>7</sup> But actually why is it exclusively loaded with only negative connotations? After all,

6 Cf. Watter (2011)

mass tourism basically just means that the ‘population at large’ have the ways and means to travel. In no way does it include how they do that.

Many people also make such negative comments about cruises because they see them as a symbol for ‘mass tourism’. And they can be beautifully simply, and symbolically to iconically illustrated with large vessels, crowds of people and the like.

Mass tourism is – seen objectively – nothing more than realising an achievement whose connotations are all the more positive: the freedom to travel. It is part of freedom of movement of persons, which in turn is one of the four basic freedoms of the European Union. Have we already suppressed what happened at the press conference in the International Press Centre (IPK) in East Berlin on 9 November 1989 at 6.53 pm?<sup>8</sup> The stammered ‘To my knowledge, this comes into effect immediately, without delay ...’ of the unprepared Politburo member Günter Schabowski was initially just a tiny spark which then like a wildfire went on to ignite the powder keg of the wish to travel freely. Only then did the floodgates bringing political freedom open too.

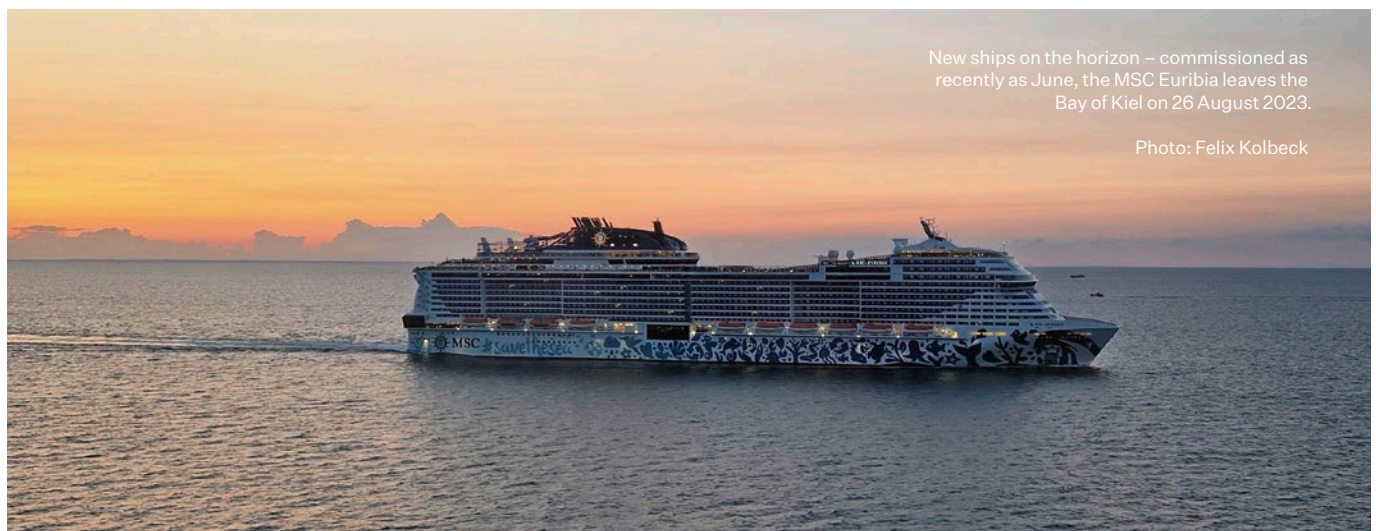
Much in the discussions surrounding tourism and climate change indicates how little we in sated affluent societies actually still appreciate the value of travelling. This then sees us becoming accustomed to absurdly low prices for flights eating up resources, for instance, which in turn leads to even less appreciation of the precious gift of being able to travel – a dangerous downwards spiral!

### Hectic overreaction instead of long-term responsibility

An example of exactly how much we are caught up in it came to light in the spring of 2022. At that time the prices for petrol and diesel were rising sharply as a result of the Russian invasion of Ukraine. From the point

7 Cf. Spektrum.de (2023)

8 Cf. Federal Minister of Justice and for Consumer Protection (2019), pp. 10-15



New ships on the horizon – commissioned as recently as June, the MSC Euribia leaves the Bay of Kiel on 26 August 2023.

Photo: Felix Kolbeck

of view of protecting the climate, perhaps to price ranges which at long last reflected the external effects of consuming fuel better than before. The public outcry was huge – or was it just in some of the media? At any rate the autobahns were just as full as in 2021, if anything even more so as a result of some post-COVID catch-up effects. All the same, the Federal Government's reaction was hectic with a 'fuel-price brake' in the form of a discounted price valid from 1 June to 31 August 2022. It was completely unnecessary and sent a completely wrong and fatal signal, for the behaviour which the population then saw expected of them was, putting it simply: if the prices for energy and raw materials increase, then it's not ME who has to change my behaviour because the state will 'help'. No way will this bring about the energy transition.

### **Naïve faith in consumer behaviour changing voluntarily**

Sending out inappropriate price signals to the public at large is even more disastrous considering the fact that only if two conditions are fulfilled and coincide together can consumers ultimately be put on track towards climate-sensitive consumer, mobility and travel behaviour:

- higher prices for products and for behavioural patterns which are harmful to the environment;
- sufficient availability of alternatives.

People around the world have been interviewed as part of hundreds of more or less scientific papers and studies in the last 30 years as to if, and in what circumstances, they would choose more sustainable forms of travelling and holidays in the future. And as is so often the case many of the interviewees gave the 'socially desired' replies that they – putting it simply – were already thinking in terms of more sustainability. But actually doing anything? The counters and terminal are bursting at the seams in 2023 – no matter whether at ports, airports or hotels – despite inflation, a drop in real wages and worries about the future. The reality is shown by them voting with their feet, not in questionnaires. There is hardly any need for further research into sustainable consumer behaviour but above all instead the need to recognise failed policies, unfortunately. The electorate have made it more than abundantly clear to the powers that be how important travelling and mobility are to them. There is plainly room for manoeuvre here as regards paying higher prices.

### **The moral cudgel: muddling up issues and blurring responsibilities**

We will not be doing climate change mitigation any favours if we start muddling up perspectives of ecologi-

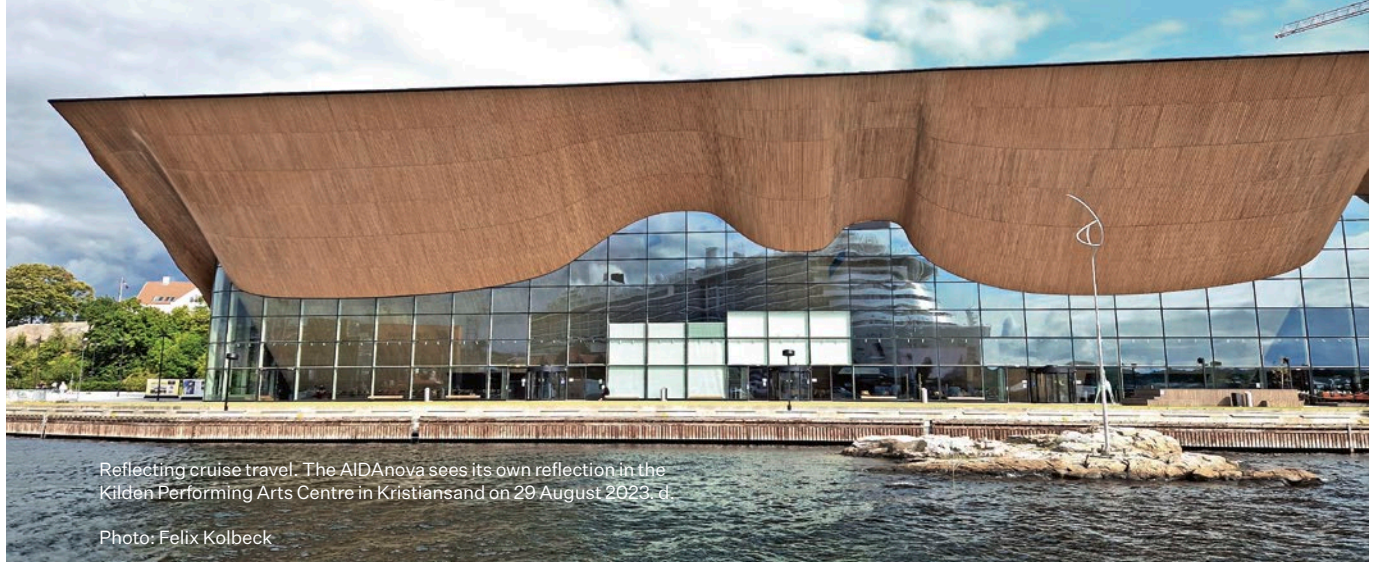
cal sustainability too much with issues of social sustainability. We can meanwhile determine and structure aspects of ecological sustainability very well worldwide with key indicators. This is true for social sustainability only to a very limited extent, for it requires a normative basis founded on social ethics which can, however, differ widely from region to region.

If you have too strong a mix of a well-structured, numbers-based case and an ethical-social-normative one, it will automatically become 'chewy' and leaden and sometimes unbearably moralising. The critics of the cruise industry also argue, for example, that ever more ships which are too big are docking in cities which are too small, which are then 'inundated' or 'swamped' and the like by the passengers – and allegedly without generating that much local added value. Just to remind ourselves: the greater the number of passengers on board, the lower the carbon footprint per guest is. Going unmentioned is the democratic principle that it is the local populations where the vessels call at and the local authorities who themselves have control over regulating the number of ship movements, over demanding much higher prices from the shipping lines for berths and durations, and over imposing variable levies on those disembarking. But we relentlessly like to presume that we have to explain to other countries and regions around the world what is good for them instead of, say, creating here in Germany reliable and suitable mobility choices apart from cars.

### **Questionable prioritisation: naivety needs straightforward images of the enemy**

According to the statistics of the Cruise Lines International Association CLIA, the emissions of the cruise industry account for a paltry 1% of global shipping emissions.<sup>9</sup> Before we adopt our goody-goody manner and start doubting this figure of an industry's lobby association: it is neither here nor there whether it is 0.5%, 1% or 2%. For the other approx. 99% of shipping emissions can also increasingly be attributed to the fact that we import from China on vessels powered with heavy oil the cheap and 'oh so good' wind turbines, electric cars, batteries and what have you. It is in China that these products for our 'energy revolution' are manufactured using 60% of the electricity needed from often filterless coal-fired power stations and partly in questionable production and environmental conditions, while the German manufacturing industry with its more stringent environmental stand-

9 Cf. CLIA (2023)



Reflecting cruise travel. The AIDA nova sees its own reflection in the Kilden Performing Arts Centre in Kristiansand on 29 August 2023. d

Photo: Felix Kolbeck

ards is collapsing under the high electricity prices for 'green energy'.

Instead of getting to grips with these real, much bigger and more complex challenges, we distract ourselves with straightforward but over-the-top images of specific enemies, such as those of the 'evil

cruises', so that we feel good. It may be possible to explain this behaviour psychologically because it eases our conscience and as a critic we high-handedly self-aggrandise ourselves over a clientele of guests or products which we don't like in the first place. But we cannot allow ourselves to be content with that from the scientific and political perspective.

Tourism as a whole is facing huge challenges with regard to climate change. This article has hopefully made it clear that isolated finger-pointing is of little use. Because travelling offers so much potential and this not only in terms of the more sustainable forms it can take but also that we can and must again appreciate better and more clearly what mobility, recreation and experiences are worth to us. ■■■

## CLIMATE-RELEVANT RESEARCH AT THE DEPARTMENT OF TOURISM:

### Millionaire spending incompatible with 1.5°C ambitions

- Cleaner Production Letters
- 2022-12 | Journal article
- DOI: 10.1016/j.cpl.2022.100027
- CONTRIBUTORS: Stefan Gössling, Andreas Humpe

### A global review of marine air pollution policies, their scope and effectiveness

- Ocean & Coastal Management
- 2021-10 | Journal article
- DOI: 10.1016/j.ocecoaman.2021.105824
- CONTRIBUTORS: Stefan Gössling, Christiane Meyer-Habig-horst, Andreas Humpe

### The global scale, distribution and growth of aviation: Implications for climate change

- Global Environmental Change
- 2020-11 | Journal article
- DOI: 10.1016/j.gloenvcha.2020.102194
- CONTRIBUTORS: Stefan Gössling, Andreas Humpe

### EU Research Project C3-Alps: measures for adapting to climate change in the Alps

- The aim of the research project was to bring together the existing knowledge on adapting to climate change in the Alpine Space (e.g. using results of previous EU projects on climate change) and to review and make it available for practical application.
- Funded by the Bavarian State Ministry of the Environment and Health (StMUV); completed 2014.
- Participants: Prof. Dr. Thomas Bausch
- <https://www.stmuv.bayern.de/ministerium/eu/foerderung/c3alps.htm>

### ClimAlp Tour

- The research project looked at the impacts of climate change on summer and winter tourism in the Alpine Space.
- Funded by the EU Alpine Space Programme; completed end of 2011.
- Participants: Dipl. Betriebswirtin (FH) Ilka Cremer, Prof. Dr. Felix Kolbeck
- Final report: Alber, K. et al. (2011): CLIMALPTOUR: Climate Change and its impact on tourism in the Alpine Space

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# Weather, Climate and Tourism

A look at their interactions and the high relevance for destinations





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*Bruno Abegg, Marius Mayer, Robert Steiger*

## Introduction<sup>1</sup>

‘On Sunday morning, as the eastern half of the country endured driving snow and frigid winter winds, Donald Trump asked on Twitter how climate change could be real if it was so cold outside.’

The Atlantic, January 20, 2019

Distinguishing between weather and climate is either an unknown quantity for some policy-makers or it is used in the political discourse on climate change as an argument to relativise it. Since the political perspective on these matters can be highly relevant for the tourist sector – one only needs to think of approvals, funding schemes or of various, strict climate protection strategies –, this article aims to bring clarity to the terminology and to shed light on the interrelationships between weather, weather conditions, climate and tourism.

## Terminology and definitions

‘Weather’ denotes the present state of the atmosphere as interactions of meteorological measured variables (e.g. temperature, cloud cover, wind, precipitation) at a specific location. ‘Weather conditions’ means the general character of the weather pattern over a longer period of time (from just a few days to months), for example mild winter weather conditions such as a thaw over Christmas.

<sup>1</sup> Parts of this article are advance extracts from a textbook chapter currently being written by the same authors.

Empty beaches yet it's the high season: poor weather is a major factor in the numbers of visitors.

Photo: Marius Mayer

‘By “climate” we understand the average state of the atmosphere over a particular place on the Earth in relation to a particular time period, allowing for the average and extreme changes to which the temporally and locally defined atmospheric conditions are subject’.

Conrad 1936: <sup>1</sup>

Climate is, thus, the usual weather pattern over longer periods of time which can be shown in diagrams with the monthly average temperature and precipitation. On account of the natural fluctuations, the mean values are formed over several decades (e.g. 30-year standard periods; Glaser 2011).

The explicit reference to time in Conrad’s definition factors in the variability of climate. Thus, if there are cooler periods in times of global warming, this does not disprove the longer-term warming tendency, for the climatic ‘normal state’ is also subject to a natural fluctuation band, e.g. around 6°C for Austria in the summer (difference between very hot and very cool summers) and in winter even 10°C (Olefs et al. 2021).

Frequently confusing weather and climate is also due to the fact, however, that climate as such is not di-

Reliable warmth and sunshine in the summer months make the Mediterranean region a predestined seaside resort.

Photo: Marius Mayer



**Table 1: Aspects of climate and weather relevant for tourism**

Source: own illustration

Thermal	Physical	Aesthetic
<ul style="list-style-type: none"> <li>influences the thermal comfort felt (warmth, cold, the body's regenerative powers)</li> <li>air temperature, humidity, wind, sunlight and long-wave radiation make the exchange of heat between the human body and the environment easier or more difficult</li> <li>e.g. wind-chill effect*</li> <li>has an effect on the comfort felt, physiological stress and physical regeneration</li> </ul>	<ul style="list-style-type: none"> <li>weather factors physically affecting people</li> <li>e.g. strong winds on the beach blow sand into the eyes and send sunshades flying away</li> <li>e.g. rain soaks clothing</li> <li>e.g. suntanned skin from ultraviolet radiation (positive feeling) but also sunburn from the same (negative feeling)</li> </ul>	<ul style="list-style-type: none"> <li>sunshine duration, degree of cloud cover, length of the day and visibility</li> <li>e.g. length of the day in Levi, Finland: on 1 January just 51 minutes (~60% of the pistes floodlit)</li> <li>e.g. good visibility also influences the perceived attractiveness of the scenery, for instance when out hiking</li> </ul>

\* Wind is perceived as unpleasant in cool temperatures because too much energy is lost due to heat being dissipated more quickly through the skin.

rectly perceptible to us. This being the case, it is natural indicators which are of such great importance for perceiving climatic changes in addition to clearly presented climate data, such as the condition of forests (Garms 2021) or glaciers (Salim et al. 2023). These examples can be easily documented in the course of recreational pursuits and tourism activities. To a certain extent, tourism and recreation can thus contribute to understanding climatic transformation processes and their consequences.

### The weather, climate and tourism correlation

Weather and climate are major, traditional attractors of many destinations. They are at the same time a resource (e.g. snow for winter sports) but also a limitation (e.g. rainy weather on the beach) for tourist products. Some activities and forms of tourism are reliant on this climate resource (e.g. skiing on snow) while for others it is not the absolute prerequisite but it does raise the perceived quality of the experience and the sense of well-being (e.g. sunshine and views into the distance when hiking). Weather and climate are accordingly also designated as basic or additional resources for tourism (Gomez-Martin 2005). Moreover, extreme weather events, such as tropical cyclones, pose a danger.

Weather and climate can be push or pull factors for travelling. Push factors see people wanting to escape from the present weather, for example overcast and cold winter weather, by going away, while a pull factor is when the climate at the destination is the main reason for their choice. This does present a number of difficulties, however: if the primary motivation for going away is 'fleeing' from the wintery cold and the desired destination has a mild climate (e.g. the Canary Islands), is it then a push or a pull factor or both at the same time? Weather can be a pull factor as well, such as bluebird days in skiing (first day of fine weather after a fresh snowfall).

When it comes to weather and climate, we can distinguish between three aspects relevant for tourism: the thermal, physical and aesthetic aspects (de Freitas 2017, Table 1). The thermal aspect influences the thermal comfort felt in relation to warmth or cold and also the body's regenerative powers. High humidity when there is no wind impedes the evaporation of sweat on the skin, for instance, and as a result the cooling function. We can adapt to these external influences by wearing the right type of clothing or by using air-conditioning or heating systems or closed means of transport. The extent to which we are physically active also has an influence on the exchange of heat necessary.

The physical aspect comprises weather factors having an effect on the human body, such as wind and precipitation. These can result in (dis)satisfaction, injuries, and damage to buildings and infrastructure, and make certain activities possible (e.g. wind for windsurfing) or prevent them (e.g. funicular railways closed because the wind is too strong).

The aesthetic aspect comprises how long the sun shines or the degree of cloud cover, the length of the day and the visibility.

### Dimensions of weather and climate as key elements of tourism

Weather and climate as key elements of tourism vary in three dimensions: geographically, both at the local (micro) and the global (macro) level. At the local level these are such things as great differences in temperature in mountainous regions at different altitudes within a short distance, sunny vs shady side, lee vs windward side, in a forest vs outside a forest, right by the water/sea vs 100m in the hinterland. At the global level there are differences between the climatic zones and the northern and southern hemisphere: timewise, in the course of the day and the week and even in the seasons.



Summery temperatures and wonderful weather are often the main reason for choosing a destination.  
Photo: Marius Mayer

This can also be a special push factor for the motivation to travel, as, for example, in the case of guests from Central and Northern Europe who in winter head for the south of Spain, the Canary Islands or south-east Turkey for extended periods. Weather conditions in the past are a major consideration when planning a holiday, e.g. if a destination at a certain time of the year can even be entered into the equation. Along with school holidays, the time dimension is one of the primary determinants of the seasonality of many destinations, above all non-urban ones.

The third dimension comprises how would-be travellers rate weather and climatic elements. There is a very high degree of variation between individuals due to general preferences (sensitivity to heat, cold, humidity etc.), age, physical fitness, health and the type of activity done. Striking differences were found, for instance, between visitors to various types of destinations, from different cultural areas and regions of origin as to what they perceived to be the ideal temperature (Steiger et al. 2023).

### **Modi operandi for rating the climatic suitability of destinations**

There are several methodological modi operandi for rating the climatic suitability of destinations: expert-based, revealed preferences and stated preferences.

The expert-based approach sees meteorological variables combined to a 'climate index' or 'weather type'. Such indices show for the Mediterranean region, for example, very good to excellent suitability in

the summer months. Selecting and weighting the measurable variables and dividing the index into suitability classes is based on the experts' subjective assessment. This evaluation is not checked against data from tourism statistics or guest surveys, however. This weakness is manifested by the fact that popular summer destinations such as the Alps are rated as not very suitable to unsuitable (Steiger et al. 2023).

Revealed preferences analyse the influence of weather variables on tourist demand data (generally guest arrivals or overnight stays). Due to the coarse temporal resolution (only seasonal or monthly levels available), only protracted or very exceptional weather phenomena can be investigated. Looking at winter tourism in the Alps, it was found that the overnights in winters with little snow go down and in snowy winters they rise. However, the scale of this effect is rather small and appears to have dwindled over time (Falk 2010). One reason for this is seen in today's widespread practice of using artificial snow cannons (Steiger et al. 2022). Studies with daily visitor numbers, e.g. so-called first entries in ski resorts, reveal a tendency for weather and the general weather pattern to have a greater impact on the demand (Mayer et al. 2018). Guests arriving in Oberstdorf on short breaks are manifestly influenced by the weather but those on longer trips not, for example, because such arrangements are mostly connected with inflexible school or other holidays (Bausch et al. 2021). Another weakness of this approach is that hardly any information and data as to tourists' short- and longer-term adaptive behaviour can be gleaned from it.

In studies on stated preferences, tourists are quizzed as to their climatic predilections. When summer visitors to the Bavarian Alps were surveyed, they rated temperatures between 21 and 25°C as ideal, above 30°C as too hot and below 15°C as too cold. Up to two days of rain are still acceptable during a one-week holiday (Steiger et al. 2016). Interviewees are frequently also sounded out as to how they would react (mostly hypothetically) if the conditions were not ideal, such as a lack of snow. In a series of studies on this topic, the most frequent response ski guests gave was that they would change the destination, followed by moving their skiing holiday to a period in winter when they can be sure of more snow. Only a few interviewees would decide not to go skiing. A weakness of this approach is that the actual behaviour can be at very considerable variance with that given in the survey. Moreover, it is arguable whether the respondents can really assess the weather parameters accurately as well (Steiger et al. 2019).

Assessing elements of the weather/climate is socially construed and therefore changeable. Right into the 19th century in Europe for example, a pale skin was both an ideal of beauty and indicated social affilia-

tion. It was the lower social working classes who had a tanned skin (e.g. farmers) while the (pale) aristocracy didn't have to work outdoors. This perception changed in the 20th century with the working class now in factories or underground. Suntanned skin, which could mainly be achieved on holiday, which in turn had long been reserved for the upper social classes, was now regarded as a sign of wealth (Mundt 2013).

But it is especially in tourism that it depends on the marketing, so 'poor weather' can also be turned into something positive. Illustrative of this is storm watching in autumn and winter on the rainy west coast of Canada's Vancouver Island. This dilutes the seasonal focus on the summer months and means there is work for the tourist industry throughout the year (Vannini 2013).

### Conclusion

Weather and climate are extremely important for many tourist activities and destinations. The interactions of these highly complex atmospheric processes with tourist supply and demand result in an even greater complexity and thus precludes us from hastily making sweeping generalisations. It depends very

Anzeige




## Resilienz als Erfolgsfaktor im Tourismus

Beiträge aus Wissenschaft und Praxis zur Entwicklung von Destinationen

Herausgegeben von Christian Eilzer, Dr. Tim Harms und Manfred Dörr

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## Was widerstandsfähigere Destinationen auszeichnet

Resilienz ist heute eines der zentralen Zukunftsthemen im Tourismus. Unter den Bedingungen anhaltender Krisenlagen und rasanter Veränderungsprozesse sind Fragen der Widerstands- und Anpassungsfähigkeit immer stärker in den Mittelpunkt gerückt. Wie die notwendige Transformation der Branche gelingt, untersucht dieser innovative Band. Neben aktuellen **Praxiseinblicken aus unterschiedlichen Regionen** wird z.B. behandelt:

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much on how people weigh up weather and climatic conditions and on their particular preferences and activities. A major factor is also how flexible the holiday-makers are. All these considerations allow us to conclude that we on no account may speak of weather or climate determinism in tourism.

Climate and weather are not the same thing but they are linked. As the climate changes, so do the daily weather conditions. Bausch et al. (2021) therefore recommend the following for destinations largely reliant on offering outdoor activities:

- Since weather uncertainties may make people opt for other resorts, destinations should ascertain their vulnerabilities in this respect and also in terms of climate change (as part of overall risk management) in order to devise response strategies.
- The destinations impacted the most by changing weather patterns should expand their portfolio and marketing efforts to include activities which are less dependent on weather conditions or climate forecasts. What reasons are there for going to the destinations which have nothing to do with the weather or which activities can be pursued regardless of what the weather is like?
- Destination marketing frequently uses photos showing perfect weather conditions in all seasons. This might distort the holidaymakers' expectations, which could be the wrong strategy in times of the weather increasingly diverging from what we have been accustomed to.

Destinations have it within their power to influence these aspects but not what the weather is actually like, of course, and long-term climate change only very indirectly and marginally. ■■

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# Millionaire Spending Incompatible with 1.5°C Ambitions



Luxury residential area in Monaco on France's Côte d'Azur: energy-intensive forms of transport such as private luxury yachts are causing the carbon emissions of the wealthiest to spiral. .

Photo: PantherMedia/lena\_serditova@mail.ru

The goal laid down in the Paris Climate Accords was to limit the global rise in temperature to 2.0°C above pre-industrial levels and to continue pursuing endeavours to restrict the increase in temperature to 1.5°C (UNFCCC 2018). The Intergovernmental Panel on Climate Change (IPCC) puts the numbers of the remaining carbon budget for achieving 1.5°C, 1.7°C and 2.0°C limits in the order of 400 Gt CO<sub>2</sub>, 700 Gt CO<sub>2</sub> and 1150 Gt CO<sub>2</sub> (67% chance; IPCC et al. 2021). At the current emission levels of some 40 Gt CO<sub>2</sub> per year, the remaining CO<sub>2</sub> budget will be used up, which would then lead to the threshold of 1.5°C global warming being exceeded in the early 2030s (IPCC et al. 2021).



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*Andreas Humpe*

Since there is a marked correlation between income/assets and emissions, it is commonly known that the very wealthy's contribution to greenhouse gas emissions from burning fossil fuels is inordinately high (Chakravarty et al. 2009; Chancel/Piketty 2015; Oswald et al. 2020). Chancel and Piketty (2015) have shown in a study that a mere 13% of the global CO<sub>2</sub> emissions are caused by the 50% making up the smallest polluters of the world's population while the 10% forming the largest emitters account for some 45% of the total CO<sub>2</sub> emissions worldwide.

### Millionaires' adverse impact on climate change is disproportionately high

It is, thus, that a lot of data indicate that the richest people contribute disproportionately to climate change. In a study (Gössling/Humpe 2023) we looked at the impact on emissions of a sustained increase in the number of millionaires and with it the remaining carbon budget for limiting global warming to 1.5°C (approx. 400 Gt CO<sub>2</sub>) being used up as a result. To this end, a model was devised to extrapolate the observed increase in the number of millionaires (1990-2020) and the changes in emissions which this will bring up to 2050.

Going by the results, the proportion of the 2020 US-dollar millionaires vis-à-vis the world population

**'A constant rise in super emitters' CO<sub>2</sub> footprint will make a transition to a low-carbon economy more unlikely [...].'**

might increase from today's 0.7% to 3.3% in 2050 and result in cumulative emissions of 286 Gt CO<sub>2</sub>. This corresponds to approx. 72% of the remaining carbon budget and significantly reduces the chance of stabilising climate change at 1.5°C.

A constant rise in super emitters' CO<sub>2</sub> footprint will make a transition to a low-carbon economy more unlikely because the acceleration in the energy consumption of the wealthiest may well surpass the system's decarbonising capabilities. This begs the question whether measures such as progressive taxes aimed at the largest emitters will be sufficient. ■■



In addition to luxury yachts, luxury private jets are also the cause of disproportionately high emissions among the wealthiest.

Photo: PantherMedia/kantver

The complete study 'Millionaire spending incompatible with 1.5°C ambitions' is available at: <https://doi.org/10.1016/j.clpl.2022.100027>

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# The Evolution of Glacier Skiing Areas in the Alps

An insight into a long-term research project

Hintertux glacier with a view  
to the Olperer 3476m (back  
left).

Photo: Marius Mayer



The glacier skiing areas in the Alps are in many ways a fascinating and productive object of research which the department member Prof. Dr. Marius Mayer working closely together with Dr. Bruno Abegg of the University of St. Gallen has been putting his energies into for quite some years now. These skiing areas are important destinations in Alpine tourism, being visited each year by millions of guests in all seasons and a not insignificant number having quite considerable relevance for the regional economies.



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*Marius Mayer, Bruno Abegg*

The glacier skiing areas of such resorts as Zermatt, Saas-Fee, Engelberg, Sölden, Stubaital, Hintertux, Kitzsteinhorn, Marmolada, Tignes and Les Deux Alpes are among the best-known in the Alps. At the same time, glacier skiing areas throughout their existence have been a focal point of public attention – on the one hand being criticised as the ‘desecration’ of the ‘last untouched peaks of the Alps’ and for having a serious impact on ecosystems and landscape aesthetics, and on the other hand acclaimed as technical achievements allowing non-mountaineers as well to experience and appreciate the Alps’ glacier regions. From a geographical perspective of tourism, glacier skiing areas are also so interesting because the link to glacier retreat induced by climate change is so plain to see and evidence of the direct adverse effects of climate change on tourist activities here is abundantly clear. Are glacier skiing areas effectively ‘the first victims of climate change’?

We are following up on this and other research questions by tracking the development of the Alpine glacier skiing sites from their beginnings to the present day, researching the earliest histories of and reasons for summer ski slopes closing and being abandoned, modelling the influence of temperature and glacier development on the operating days, probing into the operators’ strategies and measures, and analysing discourses in the media.

### **Days of skiing down by 45%**

The first fruits of this research are two articles published in the autumn of 2022 and the spring of 2023 respectively. They bring to light that across the Alps the number of skiing days in the glacier skiing areas fell by 45% in the summer half-year between 2011 and 2022. Summer skiing days in the meteorological and calendar summer fell even more sharply at 63% and 70% respectively. Austria saw the number of glacier skiing sites operating each day in the 2022 summer period averaging 2.74; in 2002 – the beginning of our time series – it was still 6.6<sup>1</sup>. The time-series regressions for nine Austrian destinations make it clear, however, that temperature and glacial development can only partly explain the drop in the number of skiing days, for it is precisely the operators’ strategies and adjustment measures that also play a not insignificant role. In other words: climate warming may have a major influence but it cannot be regarded as the only determining factor.<sup>2</sup>

### **Students also involved in the research project**

Students’ theses are also being supervised within this research project, currently, for example, the analysis of online comments on video clips from the remaining summer ski areas showing skiers ‘waterskiing’ in the meltwater streams of glaciers.

1 Cf. Abegg/Mayer 2023

2 Cf. Mayer/Abegg 2022



Are glacier skiing areas effectively ‘the first victims of climate change’? Department member Prof. Dr. Marius Mayer working closely together with Dr. Bruno Abegg of the University of St. Gallen has been following up on this and other research questions for quite some years now. (Hintertux glacier, mid-June 2022) Photo: Marius Mayer

### Literature review on the Alpine glacier skiing areas

The next step will see an exhaustive literature review for the first time bringing together the state of research on the Alpine glacier skiing sites since the 1950s. Important in this review is the fact that – in contrast to many contemporary literature reviews – not just English-language sources will be drawn on but also books and papers in German, French and Italian are to be consulted. This is of paramount importance in order to cover the first decades of research into glacier skiing areas, for it is only since the turn of the millennium that there have been papers penned in English on this subject to any sizeable extent.

Despite all the focus on glacier ski tourism, it should nevertheless not be overlooked that tourism at places where glaciers are found but not used for skiing are also an

important, long-established segment attracting tourists to the Alps (primarily in the summer) and this has likewise been hit by climate change and glacial shrinkage, as has been shown by another current study.<sup>3</sup> ■■

3 Cf. Salim et al. 2023

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# The Other Side of Paradise



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## A virtual reality experience for more sustainability in tourism.

*Marion Rauscher*

Travel and the tourist sectors involved are globally important economic factors but ones which often entail unwelcome ecological and social consequences as well. CO<sub>2</sub> emissions caused by air traffic or other forms of transport, land consumption, soil surfaces sealed, litter and noise, and in some cases an even more undesirable impact on the living space local communities call home are just a few examples illustrating this. How things thus stand, sustainable travel is becoming increasingly important. The term doesn't only refer to the ecological aspects; rather, the UNWTO actually defines sustainable tourism as 'Tourism that takes full account of its current and **future economic, social and environmental** impacts, addressing the needs of visitors, the industry, the environment and host communities' (UNWTO 2023).

### **Raising awareness for sustainability**

Despite a host of activities centred on communication, muddled ideas about sustainable travel often still prevail among holidaymakers. Their understanding is vague, inconsistent or simply non-existent (Kreilkamp et al. 2017). Only 5% of the travellers in fact named sustainability as a decisive factor when choosing their holiday in 2021/2022 (Schmücker et al. 2023). This phenomenon of the so-called 'attitude-behaviour gap' can be found time and time again (Cohen et al. 2013; Hibbert et al. 2013; Juvan/Dolnicar 2014). So even though sustainable tourism is perceived as something positive and to be aspired to, very few people behave accordingly when planning their own holiday trip. The question thus arises as to which alternative communication measures would involve customers more emotionally so that they would then develop greater motivation to actually travel sustainably. This is not just a matter of concern for those positioning themselves professionally in the tourist industry but ultimately also for each and every traveller in order that a greater holistic awareness of sustainability in tourism may be achieved.

### **Incentivising behavioural change**

These deliberations gave rise to a project at the Department of Tourism in the field of virtual reality. In collaboration with the organisation ThirdXEye (<https://www.thirdxeye.de/>), a virtual reality learning environment (VRLE) was developed, the prototype of which was successfully tested with students in the 2023 summer semester and its effectiveness empirically evaluated. The results obtained were presented at the 8th International XR-Metaverse Conference of the International Association of Immersive Technology Innovation (IAITI).

### Avatars informing about features of sustainability

Based on constructivist learning principles, the VRLE is designed to serve as a communication and educational tool for sustainability communication in order to incentivise behavioural change. Various sustainability issues are presented with the VRLE in different destination scenarios and the users can visit them according to their own particular interests. Examples of such scenarios are a beach hotel, the beach itself, a site of cultural interest, an aeroplane, a nature reserve and an Alpine tourism environment. An avatar embedded in the program explains to the users in the introductory set-up that they can choose between two doors. One door will take them to an idealised tourist environment – one which is just like the customers would wish to experience. The other door, however, allows a look behind the scenes of the same surroundings, where avatars, images, 360° videos and information boards provide details on selected features of sustainability; these are to be understood as the prelude to a closer, in-class consideration of the issues. Users generally spend 20 to 25 minutes in one or two scenes of the VRLE. Several users can and also should visit these simultaneously, the idea being that this will get them to compare notes with each other.



The beach in the VR environment: users learn about features of sustainability.

Photo: own illustration

### Scenarios of the sustainability environment

To help provide an insight into the VRLE, the points below illustrate three scenarios.

1. **Beach:** the VR environment shows a beach where users find litter, witness how other tourists disturb animals in their natural habitat or take corals with them as souvenirs. The issue of sand replenish-

ment is also brought up or the problem of the local community being excluded from the benefits of tourism.

2. **Aeroplane:** this scene focuses on aspects of mobility against the backdrop of sustainability. It is not meant to dissuade people from flying but rather to have them discuss the idea that the onus is on each individual to make a responsible choice regarding their destination, how they are to travel there and also their forms of mobility once they are at the destination. The fact that the users are moving on a flying aeroplane in this scenario – an experience which is not possible in real life – brings home the potential of VR worlds.
3. **National park:** aspects such as land utilisation, the threats caused by deforestation, preserving native animal and plant species, but also the dependence of local communities on income from tourists are explored within a stylised rain forest. The observations are designed to initiate consideration of conservation areas and their different manifestations, including their impact on tourism.

It is planned to gradually build on ‘The Other Side of Paradise’, especially for the purposes of including information in even greater depth and enhancing the interactive features. Accompanying research on different aspects of the VRLE is likewise envisaged. ■■

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