Tourism
by
Tanja Cegnar
Meteorological Office
Environmental Agency of the Republic of Slovenia
Ljubljana
Slovenia

Abstract

The relationships between segments of tourism and climate have been established and are the basis for any study about the possible impacts of climate change on tourism. Weather and climate are essential factors influencing tourism, which is important not only economically, but also in terms of human entertainment, relaxation, and recreation. In some parts of the world, the climate itself is the main feature promoting tourism, and for further development of tourism it is important that climate remains favorable for particular pleasurable activities. The tourist industry is also very vulnerable to natural disasters, and tourists tend to be more vulnerable than local residents because of their lack of familiarity with the places they are visiting. Tourists, for example, may disregard warning signs of impending disaster which the local population tend to heed. Frequency and intensity of severe weather and extreme events may also affect destination choices, but may also damage or destroy infrastructure. Travel for recreation and pleasure is also significantly influenced by climate and weather circumstances, and tourist destinations will be forced to respond and adapt to the impacts of climate change by adapting infrastructure and programs. Furthermore, because of climate change, some present popular destinations will lose their appeal, while others might increase their potential to attract many tourists. Some of the presently popular places could even become dangerous or associated with a high health threat. Climate change and variability might also affect the availability of vital resources, like drinking water, and may impact the propagation of diseases like malaria, dengue fever, the situation is already forcing the tourist industry to develop and adapt.

1. Introduction

Tourism is important economically, but also in terms of human entertainment, relaxation and recreation, and without a doubt, climate is one of the essential factors influencing tourism. Of course, changes in global climate are beyond the control of the tourism industry, however, and may have far-reaching consequences for many current tourist destinations as well as for places contemplating future development of tourism. Understanding how climate and weather influence tourism is necessary if the impacts of climate variability and change on tourism is to be accurately estimated.

Despite the evidently close inter-relationship of vacation choices (type, destination and duration) and climate and weather conditions, there is no consensus in the published literature on the measures of interdependency. There is some inconsistency in assessing the weather sensitivity of particular types of tourism and recreation activities, and in measuring comfort levels, but underlying these inconsistencies are characteristic ways to consider purpose, method and regional study. At least three approaches deserve mention.

Deleted: TOURISM
Formatted: ... [1]
... [2]
... [3]
... [4]
... [5]
Deleted: Glossary¶
Deleted: Summary
... [8]
... [9]
... [10]
... [11]
... [12]
... [13]
... [14]
... [15]
... [16]
... [17]
Deleted: ... [18]
Deleted: is
... [19]
Deleted: ... [20]
Deleted: the ... T ... [21]
... [22]
Deleted: with
... [23]
Deleted: It could be that
... [24]
Deleted: s
... [25]
Deleted: of the
... [26]
Deleted: would
... [27]
Deleted: and...some ... [28]
... [29]
Deleted: will
... [30]
Deleted: masses...of ... [31]
... [32]
Deleted: could possibly
... [33]
Deleted: also...for exa... [34]
... [35]
Deleted: will...have or ... [36]
... [37]
Deleted: on
... [38]
Deleted: dangeo
Deleted: etc. But
... [39]
... [40]
... [41]
... [42]
... [43]
... [44]
... [45]
... [46]
• development of a tourism climate index and climate derived tourism activity zones;  
• attempts to determine suitable days for particular recreation or activity; and  
• assessments of weather sensitivity for tourism activity.

It can be expected that climate variability and change will have some effect on:
• desire and necessity of people to travel to places with different climates;  
• mobility (concerning available transport means, transport safety, and convenience);  
• safety (weather extremes are expected to become more frequent and intense and natural disasters are likely to endanger more tourists than local population; also, the potential spread of vector borne diseases);  
• appeal of tourist destinations (some new destinations may appear and some traditional destinations may lose their present appeal or could even disappear (for example, some islands in the Pacific ocean)); and  
• frequency of particular weather conditions suitable for different sports at selected tourist destinations

Needs and desires to travel can be divided from the point of climate into:
• people like to spend some time in a more pleasant climate or they will like to avoid oppressive weather conditions at home (for example, heat waves);  
• travel to enhance health in places with well-known healthy climates; and  
• searching for climate features that will enable selected recreation forms and sports.

The impact of climate and weather on mobility and transport can be roughly divided into:
• impact on infrastructure (roads, airports, etc); and  
• impact on speed, convenience and safety.

There is no doubt that climate variability and change is going to affect the economy, and environment, but it will also affect human health. The scope of this article is to describe some of the most important relationships between tourism and climate variability and change and to point out the potential changes in the patterns of mass tourism due to climate change. Due attention is paid to expected increased risks for the tourism industry, for individual travellers, and for the environment at the tourist destinations. Projected climate change, as a result of global warming, is likely to provide new opportunities for the tourism industry in some areas, but will restrict both the supply and demand for outdoor recreational facilities in others.

2. Tourism in the future

Every year more than half a billion people cross international borders. In Europe, the number of international travellers has grown tremendously over the last few years, and the growth is expected to continue. This enormous mobility of people brings an increase in health risks for travellers and host populations, as well as greater risks for the environment and for the cultural identity of the world's population.

What are the motivations of travellers and temporary migrants to get away? They are different, very numerous, and often multidimensional. Traditionally, the search for more resources, more food, more security, and a more pleasant and comfortable climate drove people from their places of birth – and such reasons are not uncommon even today. Such movement could also be driven by the search for commercial profit or the conquest of more attractive places, though many people have also moved to escape from such conquest. And
what about the curiosity and the pleasure of discovering new landscapes, new people and new cultures? People travel so that they can narrate, write or film uniqueness, urged on by the thrill of adventure. But people also travel for reasons of work or to look for different markets that offer different treasures. Others travel to escape, looking for liberty in unrelatable exotic climates. Some people travel for motives of faith, on pilgrimages or visits to see sanctuaries or oracles. Yet another reason for travel is to study and research. In the future, the motivations for travelling will remain the same, but the possibilities and opportunities for doing so will likely increase.

The World Tourism Organization (WTO) predicts that in this century tourism will be the antidote to high-tech living. By the year 2020, we will see the penetration of technology into all aspects of life, and people in the high-tech future will crave more and more human touch and interaction. Tourism, it is believed, will be the principal means to achieve this. Upscale, luxury services that pamper and spoil customers are expected to have a bright future in this century. At the same time, good prospects for low-budget destinations and packages, like self-catering holiday facilities that offer plenty of opportunities for socializing among families and friends, will flourish. The number of tourists visiting foreign countries will continue to increase, with tourist arrivals expected to grow increasingly over the next decades. Along with its phenomenal growth and size, in the twenty-first century, however, the tourism industry will also have to take on more responsibility for its extensive impacts, not only economically but environmentally, socially, and culturally.

Environmental values, economic well-being, and tourist health are interdependent. Many actual and potential tourist destinations are concerned or associated with safety and security problems derived from social unrest, delinquency, terrorism, natural disasters and health hazards. At a minimum, natural disasters and health hazards are closely related to climate variability and climate change.

Global climate and regional geographic environments are evolving. These changes can create situations and conditions that favour or support new or different disease patterns. A classic example is demonstrated by change in the habitat or location of vectors of human disease as a consequence of climatic or geographic change. If changes in the distribution of vectors or disease hosts take place in regions affected by or subject to population movements, the introduction or re-emergence of non-traditional diseases can be expected. Examples include the spread of malaria into areas that were previously malaria-free.

Given the enormous increase in international travel, doctors today find themselves being increasingly asked to advise their patients on vaccinations and prophylaxis and having to diagnose exotic diseases. With climate change, some diseases are expected to spread even more, so it is reasonable to expect an increased need for information on preventive measures and to learn what personal behaviour should be adopted in order to avoid diseases transmitted by arthropods, food, or sexual contact, as well as what health documentation or medicines to carry.

There are several risks of travelling to be kept in mind:

- accidents occurring on roads and in public places during travel;
- disturbances of biorhythms caused by shifts of time zone and sleep deprivation during the journey;
- natural disasters and severe weather that can represent threats to health, property and lives of tourists;

Environmental values, economic well-being, and tourist health are interdependent. Many actual and potential tourist destinations are concerned or associated with safety and security problems derived from social unrest, delinquency, terrorism, natural disasters and health hazards. At a minimum, natural disasters and health hazards are closely related to climate variability and climate change.

Global climate and regional geographic environments are evolving. These changes can create situations and conditions that favour or support new or different disease patterns. A classic example is demonstrated by change in the habitat or location of vectors of human disease as a consequence of climatic or geographic change. If changes in the distribution of vectors or disease hosts take place in regions affected by or subject to population movements, the introduction or re-emergence of non-traditional diseases can be expected. Examples include the spread of malaria into areas that were previously malaria-free.

Given the enormous increase in international travel, doctors today find themselves being increasingly asked to advise their patients on vaccinations and prophylaxis and having to diagnose exotic diseases. With climate change, some diseases are expected to spread even more, so it is reasonable to expect an increased need for information on preventive measures and to learn what personal behaviour should be adopted in order to avoid diseases transmitted by arthropods, food, or sexual contact, as well as what health documentation or medicines to carry.

There are several risks of travelling to be kept in mind:

- accidents occurring on roads and in public places during travel;
- disturbances of biorhythms caused by shifts of time zone and sleep deprivation during the journey;
- natural disasters and severe weather that can represent threats to health, property and lives of tourists;
disturbances with changes of pressure; exposure to different kinds of diseases; and changes of environmental temperatures, problems related with thermoregulatory mechanisms and hydric balance, adaptation of those balances and acclimatisation.

Many of the above mentioned risks are closely related to climate and weather.

### 3. Climate and its components

#### 3.1. Solar radiation

Solar radiation is the main source of energy for the atmosphere. The amount of solar energy reaching the ground level depends on the amount of clouds. What changes in cloudiness and consequently in the amount of solar radiation reaching the earth’s surface we can expect in the future, if any at all, is not yet clear. Solar radiation is an important natural factor because it forms the earth’s climate and has a significant influence on the environment. Visible solar radiation has a significant impact on human’s mood, too, which is why for people nice and sunny weather are synonyms.

Sunny weather is a very important factor determining how attractive the place seems to an average tourist, but in the last years the public has paid more attention to ultraviolet (UV) radiation. The ultraviolet part of the solar spectrum plays an important role in many processes in the biosphere. It has several beneficial effects, but may also be very harmful if it exceeds safe limits. If the amount of UV radiation is sufficiently high, the self-protection ability of some biological species is exhausted and the subject may be severely damaged. This also concerns the human organism, in particular the skin and the eyes. To avoid damage from high UV exposures, both acute and chronic, people should limit their exposure to solar radiation by using protective measures such as sunscreen and sunglasses.

Most of the UV-B radiation (solar radiation with wave lengths between 280 and 315 nm) is absorbed in the stratosphere by ozone molecules and only a small percent reaches the surface of the earth. Therefore, at the surface of the earth, solar radiation is composed of a large amount of UV-A radiation (solar radiation with wave length between 315 and 400 nm) and only a very small amount of UV-B radiation. UV-B radiation is known to be biologically damaging, whereas UV-A radiation is much less damaging, but is known for its ability to tan the human skin. As ozone is the main absorber of UV-B radiation, the UV-B radiation at the earth’s surface depends strongly on the total amount of ozone in the atmosphere, and therefore on the thickness of the ozone layer.

UV solar radiation is a highly variable environmental parameter that differs widely in time and space. The need to reach the public with simple-to-understand information about UV and its possible determinant effects lead scientists to define a parameter that can be used as an indicator of UV exposures. This parameter is called the UV Index. It is related to the well known erythematous effects of UV radiation on human skin, and it has been defined and standardised under the umbrella of several international institutions such as the World Meteorological Organization (WMO), World Health Organization (WHO), United Nations Environment Programme (UNEP) and International Commission on Non-Ionizing Radiation Protection (ICNIRP).
Under cloudless conditions, each 1 per cent reduction in ozone results in an increase of about 1.3 per cent in the UV-B, which, after reaching the surface of the earth, affects the skin tissue. It is very difficult to predict with any certainty when the ozone layer may recover. It is estimated that the peak global ozone losses have been already achieved, but the recovery of the ozone layer will be slow. The international measures to save the ozone layer seem to be efficient, but as ozone-depleting substances, chlorofluorocarbons and halogens (CFCs and halogens) and are quite stable and long living, in the next decades the ozone hole is expected to grow in some years more extensively than in others, mainly depending on climatic conditions. Thus, the need for understandable and standardised information about UV solar irradiance will remain in the coming decades. Tourists should be informed about the variability of the UV Index in Europe and in the World, as the information such as UV Index will also remain among the most important biometeorological information in the next decades.

UV radiation increases with altitude because the amount of absorbers in the overlaying atmosphere decreases. Measurements show that the UV irradiance increases by six to eight per cent for every 1,000 m increase in altitude. Thus, tourists visiting high-altitude destinations should be aware of the fact that the exposure to UV solar radiation is much higher than in lower elevations. Tourists should be informed that sometimes, for example in the presence of fresh snow or sandy beaches, reflected UV radiation increases the dose of UV radiation sizeably. Information about UV Index should be upgraded with descriptions of protective measures and healthy ways of sun bathing. See also guidelines on human biometeorology and the UV index.

### 3.2. Temperature

Temperature indirectly influences water resources, food production and the spread of diseases. Extreme temperatures can also have a negative influence on traffic. Costs for heating or cooling increase for each degree of temperature change, and this increase is not linear. Health as a focus reflects the combined impacts of temperature change on the physical environment, ecosystems, the economic environment and society. Long-term changes in global temperature may affect many requisites of good health, including sufficient food, safe and adequate drinking water and secure housing. Current large-scale social and environmental changes mean that a much higher priority must be assigned to population health in the policy debate on climate change.

Outdoor temperature conditions are determinant for many outdoor activities and sports. For some winter sports, low temperatures are necessary, but not too low, especially if accompanied by strong winds. There is an optimal range of temperature for nearly each recreation and sports activity which enables development of the activity in its full form. Sport in too hot a weather, especially if accompanied by high humidity, becomes unpleasant or even dangerous to health.

The thermal environment plays an important role in human health and well-being. It is of outmost importance to provide tourists with complex and easily understood indices describing thermal comfort on the basis of a body energy budget model, such as, for example, the universal thermal climate index (see also chapter on human biometeorological indices and measures to describe thermal comfort). Temperature extremes can cause physiological disturbance and organ damage, leading to illness or death. The increase in mortality during hot weather can be very significant. Mortality in many temperate cities, such as New York,
Shanghai, Chicago, Philadelphia, Rome, Paris and many others, where hot weather is severe but infrequent, increases sharply during unusually hot weather conditions. It is likely that the adverse effects of such heat waves will increase with global warming. Probably, intermittent regional temperature variations will have more direct effects on health than long-term climatic trends to which populations tend to become adapted.

It is important to increase awareness of the potential health effects of heat waves, and every reasonable effort should be made to diminish their adverse effects. There are several ways to adapt to their adverse effects.

With global warming, some winter sports-related infrastructure will extend towards higher altitudes and towards previously unexploited regions. This has happened with winter resorts in the Alps. Some regions, on the other hand, could become unpleasantly hot. For example, the Mediterranean is likely to become less attractive for health reasons in summer. Apart from the dangers increasingly associated with skin cancer, many Mediterranean beach resorts may simply become too hot for comfort in the peak season, with a much higher frequency of severe heat waves. The Mediterranean area is likely to face other climate-related problems, too, such as increased insect-borne diseases, marine water pollution and scarcity of fresh water supplies.

Air temperature is supposed to increase in the next decades, but not uniformly in all parts of the world and not at the same rate throughout the year. Notably, minimum air temperature seems to increase faster than the maximum one. It is not clear yet what will happen with extremes: will they become more extreme or will they become more frequent. There is still too much uncertainty in the climatic models, but the fact is that societies throughout the world are becoming more and more vulnerable to severe weather events. This is especially true for tourists, as they are not adapted to particular climates of tourist destination and are often unaware of how to act in case of unfamiliar weather extremes. Possible impacts of weather extremes are discussed in the next subsection.

3.3. Weather extremes

The tourist industry is quite vulnerable to natural disasters and tourists tend to be more vulnerable than local residents because of their lack of familiarity within the places they are visiting.

In climate projections for the next decades, some scenarios predict an increased frequency and intensity of extreme events. It is impossible to make more accurate predictions because these events are often quite rare and exceptional. As societies all over the world are becoming more and more sensitive and vulnerable to extreme weather events, and the damages caused by natural disasters, particularly those related to weather, increase from year to year, this aspect should be considered in greater details. It may affect the destination choice, but may also damage or destroy infrastructure, which could result in negative publicity and a decline in the popularity of those particular destinations being frequently affected by extreme weather. As is well known, horrific images of post-disaster victims tend to draw more media and public attention than preventive measures or early warning systems.

Sudden natural disasters of hydrometeorological origin are tropical cyclones (including hurricanes and typhoons), storms, flooding, strong winds, tornadoes and extremes of weather (heat or cold); on the other hand, drought develops gradually. Closely related to
meteoro\al conditions can be also avalanches, landslides, insect infestations, and epidemic
diseases.

Science provides the means for appraising and understanding the characteristics of many
natural hazards. Adequate knowledge of these characteristics, such as location, duration,
magnitude, frequency, trajectory and extent and their interrelationship contribute to success in
forecasting. This knowledge also contributes to disaster mitigation, so that structures such as
buildings, bridges and sea defences can be designed better. But these designs may be rendered
obsolete in the future by the possibility of climate change and sea level changes that could
alter some of the characteristics of disasters. For example, tropical and mid-latitude storms
may become more frequent and extreme while the frequency and extent of droughts may shift.
There is also the growth of population and changes in land use, such as deforestation and
urbanization, which may also redefine these relationships and modify the basis of the design
of preventive measures.

A shift of attention to proactive preparedness against disasters and away from the current
concentration on reactive relief and rehabilitation is the goal. This objective requires fatalistic
attitudes towards disasters to be replaced by the realization that disasters are not inevitable. In
case of public awareness, the emphasis is on informing the public about the benefits of
adaptation and the measures involved. There would be considerable economic, to say nothing
of human, benefits in concentrating resources on preparedness rather than on emergency relief
in the aftermath of a disaster. It should be also kept in mind that a significant amount of loss
in life and property damage is avoidable through accurate forecasts and timely warnings.

The essential feature of weather hazards is that they occur with a certain frequency, are
characterized by a sudden onset, and, hence, could easily catch populations unprepared, though
they are amenable to forecasting and prediction. Information should be gathered on the
vulnerability of buildings and infrastructure in tourist areas, and anticipation of future
hazards or disasters will be the key to effective planning. Therefore, as risk assessment is
undertaken, links should be established and maintained between physical scientists working
on hazard assessment and land use and other national planners involved in the development of
tourist areas.

The application of the concept of disaster preparedness to tourism will involve a number of
measures. First, tourists and, above all, tour operators who arrange visits for international
tourists to different and often remote areas should be involved in the information and
education process. Second, tour operators and the tourists should be involved in:

• the process of dissemination of warnings;
• the process of response to warnings; and
• any evacuation process.

While tourists may learn on repeated visits, there is a considerable danger that, through lack
of experience, they may disregard warning signs of impending disaster which the local
population would tend to heed. This is a matter that must be taken into account in developing
educational material and warning services for tourists. It will be especially important in the
case of the risk of avalanches, flash flooding and tropical storms. The provision of easy to
understand guidance (flags on beaches or exposed coastal areas, avalanche warnings to
mountaineers, meteorological warnings for campers and other tourists whose activities are
likely to be affected by dangerous weather conditions or sudden floods) will assist in filling
this particular communication gap.
What this means is that warnings should be communicated in a form and language that tourists can understand while tour operators should be given the opportunity to cooperate in contingency planning. Because tourists do not necessarily speak the language of the country they visit, prompt communication with them of essential, with sudden onset disasters raising a particular problem; awareness creation among tourists before their visit to a country concerning sensible precautions in the event of a sudden onset disaster raises issues of public education. Should tourists become victims of a natural disaster, the negative impact on the image of a tourist destination could be both serious and long lasting. Evacuation plans should include the cancellation or postponement of inbound tourism to a region threatened by a natural disaster.

Media have the power to educate and inform, and they will play a central role in the future development of tourism. Media could raise the general awareness that long term measures should be carried out to attenuate the effects of climate change. Booklets and posters will also be helpful. A short, high quality video or film clip produced by a communication professional on severe weather events and their adverse impacts along with possible mitigation measures will attract additional attention. Planners, local authorities, architects and town planners should join their efforts to make the conditions during the oppressive weather upsurges less stressful and safe.

Several destinations in the Far East that presently attract charter flights predominantly in summer are already prone to severe storms and hurricanes. As sea surface temperatures are likely to rise further, there is a possibility that current hurricane zones may experience greater activity in the future and that such storms may spread to other coastal areas. Even the perception of increased hazards might harm developing tourism in countries such as Malaysia or northern Australia as well as the more established tourist areas like Florida.

Rising sea levels will produce increased inundation and erosion along the coast. These processes will affect entire natural and cultural systems along marine shorelines, many of which are tourism related. Some important historic sites are already under threat from rising sea levels and storm surge. Tourism development is frequently located in areas which are exposed to, or are likely to be exposed to, suddenly onset disasters, particularly in beach and coastal areas, river valleys and mountain regions.

The severity of a natural disaster determines the intensity needed to maintain or relaunch tourism after the event. Actions to reassure the travelling public are often more significant than physical plant repair. Letting the public know the resort is open, ready for business and continuing to offer the attractions that make it a desirable tourism destination are essential elements in recovery from a disaster. It is not possible to overstate the importance of marketing the tourist destination, even after a small storm or flood. A single negative rumour can destroy the marketability of the area, especially if there is no countering statement from the community of tourism venues at that destination. Thus, preparations for dealing with the media and with tourists scheduled to arrive after the disaster event are critical.

A final consideration in what must necessarily be a tentative discussion of sociopsychological issues is that some tourists may, as more active forms of tourism become popular, expose themselves to greater risk (for example, surfing, water skiing, winter sports, hang gliding, base jumping), which make them particularly vulnerable. The fact is that no tourist season is complete without the sad news of accidents befalling tourists engaged in some particular form
of sporting or mountaineering activities and who are surprised by a sudden onset disaster or simply an adverse change in weather conditions.

4. Climate and weather impacts on humans

Humans are continuously confronted by changes in the atmospheric environment. Adaptive reactions, therefore, can be taken as a response to variations in the environment. Healthy persons notice this adaptation only when the environment stimulus exceeds comfort thresholds. Children and the elderly, however, are more sensitive to changes in the environment, but illness and other kinds of stress can weaken the resistance of anyone to environmental stresses.

Atmospheric phenomena, in general, are not considered in isolation but in terms of their combined effects on humans. Therefore, meteorological events are combined with atmospheric to produce complexes – thermal, actinic or chemical – all people encounter everyday.

The thermal effect complex is the most important. The parameters of the thermal complex affect human’s thermoregulation. Radiation, convection, conduction and evaporation conduct human heat exchange between the body and the environment. Important meteorological parameters for heat balance of the human body with its environment are air temperature and humidity, wind speed relative to the body and solar radiation. In order to assess the body heat balance, other non-meteorological parameters should be taken into account, for example human activity and the insulating role of clothing. Several models have been developed to assess the human body energy balance, some of which take into account physiological differences between individuals, such as gender, weight, height and age. The most sophisticated of these models are even able to reproduce specific flows during the adaptation period to varying meteorological conditions, but even with such tools it is not possible to include all factors that affect our thermal comfort. It is also well known that emotions, physical conditions, acclimatization, initial state and expectations regarding the thermal environment play an important role in thermoregulation.

Past analysis of the effects of heat waves has shown that most casualties occur among people over 65 years. Heat waves usually occur in synoptic situations with pronounced slow development and movement. Synoptic situations causing an intensive and prolonged heat stress for inhabitants of city areas are usually forecasted correctly.

The impact of a heat wave greatly depends on the ability and willingness of a population to take into account recommendations and develop adaptive strategies. People living in hot regions cope successfully with excessive heat through adaptations in lifestyle, physiological acclimatization and adoption of particular mindsets. Cultural or social adjustments, including design of houses for conditions of sustained heat, are the most effective ways to adapt to a very hot climate. Individual lifestyles, clothing habits and occupational conditions also influence exposure levels. Heat stress can be aggravated by inappropriate behaviour or, conversely, can be ameliorated by the use of more adaptive capacities, as awareness of the effect of heat increases. This is manifested in habits and customs.

Thus, tourists should be warned in advance and advised how to avoid the adverse effects of hot weather. A distinction should be made between the heat stress for a population and that for an individual. Population is looked upon as expressing an average adaptive capacity.
Individuals with a low adaptive capacity suffer first and most from *a* heat load of any magnitude. The relative degree of risk associated with heat load is particularly high for individuals with failing functions of the cardiovascular, respiratory, renal, endocrine or immune systems, for those with immature regulatory systems, such as infants and children, and for those with reduced adaptive regulatory functions, such as the elderly and physically handicapped.

Within certain limits of mild heat stress and physical activity, thermal comfort can be maintained by appropriate thermoregulatory behavioural responses, and physical and mental work can be pursued without *deterrence*. Heat acclimatization will develop after several days of heat exposure and this will help to alleviate the effects of heat stress; however, severe heat stress can result in deterioration of health, including heat illness, with effects ranging from mild reversible cardiovascular disturbances to severe tissue damage and death. Of primary concern are certain high-risk groups in whom even mild heat stress may produce abnormal heat strain and heat-related disorders.

The initial physiological adjustments to heat, involving changes in cutaneous vasodilatation and fluid balance, often produce mild swelling of the feet or ankles. Syncope can be precipitated by a sudden change in posture or by venous stasis in the legs during prolonged standing. Skin disorders, such as prickly heat and skin rashes, may *also* occur when sweat is allowed to accumulate on unventilated skin. *At times*, sweat losses are not always completely replaced, resulting in dehydration. Heat exhaustion and heat intolerance can, in extreme situations, lead to heat stroke, which is characterized by hyperthermia with core temperatures of 41°C or more, central nervous system disorders leading to convulsions and coma, and often marked anhydrosis, with hot, dry skin. For the physically unfit and vulnerable, increased cardiovascular strain is the main threat imposed by environmental heat.

Weather and climate are also well-known as having considerable influence on asthma, hay fever and other respiratory disorders caused by various allergens, pollens and pollutants, so spending a holiday in places with healthy climate could result in enhanced work efficiency and help to prevent illnesses.

### 5. Winter and summer tourism

Climate change may affect some traditional summer or winter resorts, including extensions or reductions of peak seasons, or the provision and choice of recreation and sport activities available at the resorts.
Winter holidays are now an important part of tourism. The period suitable for hiking may extend due to global warming, but the period suitable for winter sports (downhill skiing, skating, snowboarding, cross country skiing) may be reduced. With global warming, some winter sport related infrastructure will extend towards higher altitudes and previously unexploited regions. This has already happened with winter resorts in the Alps. Unfortunately, increased instances of avalanche in that region have already caused several casualties. Of course, there is a possibility to predict quite accurately the probability of avalanches and issue warnings and guidelines or even to close endangered areas temporarily, but tourists often do not speak the language of the country in which they are vacationing, so they may not know the local signs of danger. Even worse, some tourists do not respect warnings and prohibitions for entering danger zones.

Warmer winter conditions will reduce the reliance on sufficient snow conditions (the probability of snow cover at particular times during the season will decline), which will have several consequences, including the inability to use expensive facilities and equipment like piste grooming machines. Important to note is that the economic effects of recent snow-deficient winters have been greatest on the resorts at low altitude, adversely impacting both transport and accommodation. Ski clients now delay bookings until a few days before arrival in order to be sure that there is snow on the ground; reduced sales and hire of ski equipment have followed in this situation.

In the middle latitudes, tourism has a marked seasonality and weather sensitivity. Within seasons, the prevailing weather conditions become progressively more influential in affecting tourism as the amount of atmospheric contact necessary for each activity increases. For example, during wet weather, conditions unfavourable for walking or camping, such activities may be replaced by visits to nearby towns. Such switches may even generate additional income for the local economy through visits to shops, restaurants and other indoor facilities. This demonstrates that poor weather is a relative term and that weather sensitive winners and losers will always exist.

Periods of summer heat stress and associated poor air quality in urban areas may make large cities less desirable places in which to spend leisure time. This could lead to a weekend flight to the countryside and to the coast where surface temperatures will be moderated by sea breezes during the day. Such a pattern could increase urban residents’ ownership of second homes along the coast and in rural areas.

5.1. Mountains

Climate change will shift vegetation belts higher; also, the region of permafrost will be slowly pushed upwards. This could have some impact on the landscape and fauna, and, consequently, on the appeal of those tourist destinations.

Generally, milder conditions, especially in the winter and shoulder months, could attract more people into the uplands for hill walking, creating opportunities and threats for agriculture and nature conservation. Mountaineering may provide some partial compensation for reduced skiing opportunities, but there will be a greater risk of snow avalanches in the warmer conditions.

Avalanches are a danger in all mountainous areas of the world where a large proportion of precipitation falls as snow and where people are living or spending their leisure time under or...
on steep mountain slopes. Many avalanche prone areas are popular tourist resorts, like the Alps, the Rocky Mountains, and the Himalayas. As a result of the increasing number of people, mostly tourists on winter sports holidays, are exposed to danger in these areas, so avalanche warning systems and control measures have become vitally important. In more crowded and developed areas, such as the Alps, the avalanche control procedures, like avalanche forecasts, emergency measures and prevention information, are well established. In developing areas, such as the Himalayas, there are only minimal avalanche control mechanisms, so tourists should always use a guide for winter sport activity and mountain climbing unless they are experts. Increasing pressure on land resources leading to deforestation may increase the avalanche risk in these areas.

Many avalanche problems arise from ignorance. With proper planning and precautions the avalanche threat can be reduced to an acceptable level of restriction on tourist activities.

6. Health resorts

With increased ecological movement and revival of holistic approaches, travelling for health reasons will gain popularity. More and more people are willing to spend at least part of their vacation in health resorts in order to cure chronic diseases or improve their general health. A pleasant stay at a health resort depends on climatic conditions and the experience of weather guests while there. Climate is even more important at health resorts that claim to offer a healthy climate or climatotherapy.

Could some of the present climatic conditions necessary to carry out climatotherapy be compromised by climate change? Of course, as some resorts are already even now on the brink of pleasant thermal conditions during the hot period of the year.

At the beginning of the century, the establishment of health resorts in many parts of Europe allowed people to take advantage of climate's healthy influence. The sites for the health resorts were chosen based on the empirical data from the areas that indicated a therapeutic influence of the climate. During the first half of this century, many of these health resorts were closed. Now, the interest in climatotherapy is increasing noticeably among our health resorts, and tourists seem to appreciate the impacts of healthy climate.

What is climatotherapy about? The basic principle of all kinds of climatotherapy is based on two points: rest (or relief) and adaptation to natural environmental factors. Treatment should last at least three weeks in order to achieve measurable lasting beneficial impacts on health and general well being of the patient.

The circulation is involved in all forms of heat exchange, as blood carries internal heat to the skin. Relief from warm and humid air is one of the basic principles of climatotherapy. At high temperatures, the most important mechanism of heat exchange is the evaporation of sweat; however, its capacity is limited by absolute water concentrations in the air. In a warm environment, the body has to increase the activity of climatotherapy to allow for necessary heat exchange between the body and the environment, but evaporation is automatically limited by high air humidity, which is why a warm and humid environment is an additional strain and should be avoided.

A cool environment forces adaptation and is an ideal basis for all forms of climatotherapy, enabling hardening, which is supposed to increase the ability to compensate for external conditions.
stresses like cold stimuli and is one of the most important goals of climatotherapy in terms of prevention. Each cold stimulus causes an immediate effect; the therapeutic goal of hardening is achieved by adaptation to repetitive stimuli. It results in optimization of local blood circulation and an increase of unspecified immunological response. Not all the questions regarding the physiology of hardening and the health-improving effects of hardening have been answered, but it is a basis of many climato-therapeutic applications.

Rest and relief are promoted by staying in a climate free of air pollution, allergens or stressful atmospheric conditions like high heat. Stimuli, which trigger adaptation, are UV radiation, visible light, the lowered oxygen at high altitudes, high wind speeds and low temperatures. The terms stimulus and relief are relative. For example, wind in mountains could be a strong stimulus, but on a hot day wind's cooling has a relieving effect.

The traditional view of climatotherapy is that existing complaints could be reduced or an existing disease could be cured simply by exposing the patient to a particular climate. This applies mainly to diseases of the skin and the respiratory system and their treatment by climatotherapy in high mountain areas or at the seaside; however, in most health resorts situated at medium altitudes, patients will indeed be relieved from stressful environmental conditions, though the intensity of the physiological stimulus resulting from the climatic conditions may not be sufficient to directly influence their clinical prognosis. In this situation, climatotherapy has to be carried out as indication-oriented health resort therapy, that is intentionally supported by a particular climate ("climate cure") (that is climatic terrain-treatment, fresh air, rest-cures, air baths and heliotherapy).

High mountain climates exist at locations over 1000 m above the sea level, including valleys. The most important factors of high mountain climate are increased UV radiation and wind speed, and reduced oxygen, air temperature, air humidity and air pollution.

In Swiss high mountain areas, climatotherapy was already practised at the turn of the century, particularly for treatment of tuberculosis. Today, "high-altitude climate therapy" is used for dermatological diseases, like psoriasis or neurodermatitis, taking advantage of the strong UV radiation, and also for patients with allergic reactions of the respiratory system, making use of the complete absence of allergens, like pollen and house dust mites.

The greatest difference between alpine and lowland climate is the absence of heat load, mainly because of the altitude but also because of the presence of valley and slope breezes, and the presence of woods with their characteristic microclimates. Another very important feature of the alpine climate is its clear, non-polluted air because the local sources of pollution are limited to those related to household heating. Certainly, the presence of air pollution transported from cities and industrial zones cannot be excluded, but because of the relatively narrow valleys with different orientation, is the presence of such pollution rather low compared to other sites.

For those suffering from hay fever, the absence or relatively limited presence of pollen may be an important feature of the alpine region health resorts, but climate change could cause the shift of vegetation belts towards higher altitude.

There is the chance that more of the places interested mainly in promoting tourism will develop programs offering guided recreation in a healthy climate for those willing to improve their physical resistance in a beautiful natural environment.
### 7. City tourism

The heat island effect in the big cities is already of the same magnitude as the expected climate change in the next hundred years. The urban heat island effect may exacerbate the impact of weather on heat-related mortality. If temperature is going to rise as predicted, cities in the tropics and middle latitudes are likely to become more unpleasant for tourists during the hottest months. In middle latitudes, we can expect heat waves to become more intense and more frequent. Interest in the impact of weather on human health has increased dramatically in recent years, mostly due to notable tragic events such as several hundred and sometimes thousands of deaths during heat waves in developed and developing countries. These events are usually confined to densely populated urban areas. With this in mind, a number of interested international agencies, such as the WMO, WHO and UNEP, have decided to promote and financially support several "Showcase Projects" dealing with the impact of extreme heat events on human health, to develop a coherent set of warning systems, improve mitigation measures and ultimately save lives. The goal for these Showcase Projects is the development of heat watch/warning systems for several selected cities, which will enable local health officials to implement more efficient mitigation actions. In addition, guidelines will be developed for local meteorological agencies to improve their services to various local stakeholders, including local departments of public health, local utility companies, media outlets, and many others. The first city selected for system development was Rome, Italy.

The health impacts of hot weather have been studied predominantly in relation to death. A major reason for this is that mortality datasets are readily available for a large number of urban areas. Because heat can contribute to mortality from a large number of causes, the number of heat-related deaths is determined by the number of deaths that occur in excess of the number that would have been expected for that population in the absence of the heat wave (the "baseline" level).

The development of these systems follows general guidelines proposed at the meeting of a group of WMO officials and health rapporteurs, a representative from UNEP, and representatives from WHO in Freiburg and confirmed in December 1997 in Geneva.

Heat waves present special problems in urban areas because of the retention of heat by buildings, especially if ventilation for cooling at night is inadequate. The number of casualties increases with duration of exposure. Forced air movement by using fans is generally beneficial, but may be associated with increased thermal discomfort when ambient temperatures exceed 38°C. Early behavioural signs of prolonged heat stress in densely populated areas include increasing discomfort, social intolerance, irritability, and industrial accidents. Among the indirect effects of heat waves are effects on sleep patterns.

It is extremely important to give a population all the necessary information about how to act when the heat load will increase over a critical threshold, and intervention plans should be tailored to local needs through coordination between local health agencies and meteorological officials. Health and other agencies and organizations can conduct intervention activities, including media announcements, to provide information about how to avoid heat-related illnesses during oppressive weather conditions. The information should be clear and provide concrete recommendations and advice without inducing panic and should reach everybody in the city, including tourists and occasional visitors. Tourists must be especially targeted because they are often under stress after long travel, have jet lag and are unaccustomed to different foods, all of which can make them more vulnerable to heat hazards.
8. Seasonal migrations

The belief that the atmospheric environment affects human health can be traced back almost to the dawn of civilization. In the early periods of history seasonal migration was prompted by two forces: first, elite social groups travelled to avoid the discomfort of excessive heat and oppressive urban conditions, especially in tropical and subtropical latitudes; second, similar groups travelled to locations where the general circumstances of climate and weather favored congenital working conditions, recovery from ill health, or were free from pollution. The seasonal exodus of the rich from the squalor of cities to the cleaner and more comfortable environment of their country estates occurred also in Rome, Babylon and other ancient metropoli. For example during the peak of summer, Rome was notorious for its unhealthy conditions. The city was deserted by all but the poor. During summer months the upper class moved to their country villas in the nearby Apennines. Though the mountains were not particularly high, they were high enough to lower temperatures sufficient by to make summer living quite pleasant. As the society developed, an increasing proportion of the population became able to afford travel and visits, which were expected to provide opportunities for recreation, respite or recovery.

Nowadays many people who can afford to leave home for several weeks or months tend to escape the stress of hot summers or cold winters at their permanent residence. Winter in polluted cities is unpleasant and unhealthy; hot summer weather with high ozone levels in dense urbanized areas is as well unpleasant and unhealthy. As the number of people being able to temporarily move to milder and healthier climate is constantly increasing, the number of seasonal migrants is expected to grow in the future. Climate change will probably enhance this trend.

9. Tourism and climate change

There is a two-way relationship between tourism and climate change. On the one hand, tourism has an obligation to minimise its adverse impact on the environment and thus on the emission of greenhouse gases which in turn contribute to climate change. On the other hand, it is obvious that changes to the world's climate will have a direct impact on many tourism destinations, which could have significant implications, not just for the tourism industry, but for other economic sectors.

In coastal zones and mountain regions climate change puts tourism at risk and important market changes could result. Seaside tourism seems likely to suffer damage from most of the effects of climate change, especially beach erosion, higher sea levels, greater damage from sea surges and storms, and reduced water supply. However, while some regions may see a diminution of demand from the leisure traveller, others may see an increase.

In mountain regions, it seems very probable that ultimately demand for winter sports will diminish. The season will shorten, opportunities for young people to learn the sports will diminish and demand pressures on high altitude resorts will increase. Summer seasons, meanwhile, could lengthen and generate increased demand.

The balance of costs and benefits is illustrated by the situation in the Arctic, where a longer summer season might benefit cruise tourism and activities such as whale-watching, but shorter winters could reduce the range of Arctic fauna and flora which attracts some visitors.
Tourism cannot be seen in isolation as major changes in the pattern of demand will lead to wider impacts on many areas of economic and social policy, for example in employment and labour demand and in regional policy issues such as housing, transport and social infrastructure. Knock-on effects could influence other sectors, such as agriculture supplying tourism demand, handicraft industries and local small business networks. However, with the apparent exception of winter sports, unless climate change leads to a net loss in demand for leisure tourism, a loss of demand for a given destination or type of destination may well lead to increases in demand for alternative destinations.

Climate change predictions cover the long term, but the tourism industry tends to have much shorter time horizons, even in the context of physical investment in infrastructure. This gap will need to be bridged by emphasising that climate change is already having an impact on the tourism sector. Also in future there will be a need for further studies and research into the impact of climate and climate change on tourism.

10. Tourism as a polluter

Concern about tourism's polluting effects covers all aspects of a tourist's activity, but the primary issue relates to travellers' consumption of transport services, notably road and air transport. The use of road and air transport by travellers contributes significantly to greenhouse gas emissions. There is evidence from countries such as the UK and New Zealand that carbon taxes of one kind or another are increasingly being placed on the political and environmental policy agenda. It seems inevitable that, at some future date, serious consideration will be given to additional environmental taxes targeting the air transport sector specifically.

The concentration of tourism in certain regions of the world places stresses on the local flora and fauna, which in many cases are what tourists, come to see; such stresses themselves may exacerbate the adverse effects that climate change is already having on the ecology.

11. Conclusions

It is evident that tourism is dependent on weather and climate. In some parts of the world, it is the climate itself, which is the main feature promoting tourism. For further development of tourism, it is important that climate is favourable for particular pleasure-related activities. Travel for recreation and pleasure will be significantly influenced by the climate and weather circumstances; and this nexus has been described as weather-sensitive tourism. Some of the new forms of environmental tourism (eco-tourism) will be climate dependent.

In general, destinations with a great reliance on their natural resource base to attract tourists may be at most risk, although some high-latitude destinations may become rather more attractive. Enhanced uptake of many outdoor pursuits ranging from gardening to water based sports is to be expected in middle latitudes.

The desire to maintain comfort levels, or to avoid climate related discomfort, remains a significant determinant of where to go and what to do in the decision making process of tourists. However, with advances in medical practices, and in the design and manufacture of appropriate equipment, tourists and travellers are able to withstand conditions which would be almost impossible without those supports. The range of tourism activities and destinations is being extended as tourists seek to challenge their own ingenuity and capacity to withstand levels of discomfort; this is especially so in the new fields of alternative tourism.
In future tourism could take advantage of seasonal forecasts, especially for the tropical regions they are already reaching the scores that guarantee economic profit if they are used properly. In the next decade, considering rapid development and improvement of seasonal forecasts reasonable reliability could be expected also for subtropical regions and mid latitudes. Seasonal forecasts will allow tourist industry to make a projection of the general climatic conditions and anomalies during the next seasons and to undertake the proper measures to adapt to the expected conditions. Tourist industry could also benefit from more reliable and more detailed climate projections, especially those taking into account regional differences and fluctuations.

Tourism is a continuously adapting industry, responding to changing demographic and economic conditions as well as to new demands and technologies. In view of the fragmented structure of the industry, adaptation to climate change is likely to be gradual with new investment in tune with other strategic decisions. Recreation and tourism impinge on many other sectors. For example, it is estimated that, globally, tourism accounts for at least 60 per cent of all present-day air travel.

New research initiatives are urgently needed as to the observed and perceived effects of climate on tourism, which will require more collaboration between applied climatologists and tourist specialists. The challenge will be to draw direct links between weather and climate conditions and the behaviour of tourists.

References


Pasini W., 1999: Proceedings of Mobility and Health: From hominid migration to mass tourism, THC, San Marino, 380 pp. [This book is a collection of papers presented during the international conference on mobility and health]


Schuh, G., 1993: Climatotherapy, Experientia 49, Birkhauser Verlag, Basel, pp. 947-955 [This article is presenting the concept of climatotherapy, therapeutic techniques and conditions necessary to implement climatotherapy]

Task Group WHO, WMO, UNEP, 1996: Heat, cold and air pollution, Climate Change and Human Health, WHO, Geneva 1996, pp. 43-70 [This booklet is providing an overview of the relationship between human health and climate change]

Vanicek K., Litynska Z., Schmalweisser A., 2000: UV–Index for the Public, COST–713 Action UVB Forecasting, Brussels, 27 pp. [This booklet is describing the concept of UV
index, recommendations for public are included, an overview of the most common questions and answers can be found in the attachment.


World Meteorological Organization, 1997: Report of Meeting of Experts on Climate and Human Health in Freiburg, Germany, January 1997, WMO/TD-No. 822 (WCASP-42), WMO, Geneva, Switzerland, 50 pp. [This booklet is describing the concept of a show-case project on the impacts of climate on human wellbeing, health and mortality]

World Tourism Organization, 1998: Handbook on natural Disaster Reduction in Tourist Areas 121 pp., World Tourism Organization [This booklet is describing the relationship between natural disasters and tourism and mitigation measures]

World Tourism Organization, 2003: Climate Change and Tourism, Proceedings of the 1st International Conference on Climate Change and Tourism; Djerba, Tunisia, 9-11 April 2003

Include references to chapters of the World Meteorological Organization Guidelines on:
Human Biometeorology
Building Codes
Weather and Sport and Recreation
Weather and Climate and Transportation
An overview of the impacts of climate and weather on tourist industry is presented.
branches of economy, but y, it is important, which it is, which the
and some masses of also for example will have some already now the fashion
The tourist industry is very vulnerable to natural disasters, and tourists tend to be more vulnerable than local residents, because of their lack of familiarity within the places they are visiting. Tourists may disregard warning signs of impending disaster, which the local population would tend to heed. Frequency and intensity of severe weather and extreme events may affect the destination choice, but may also damage or destroy infrastructure. Weather hazards occur with a certain frequency, are characterized by sudden onset and hence could easily catch populations unprepared.
Tourist destinations are already and will be forced also in future to respond and adapt to the impacts of climate change with adapting infrastructure and programs. It could be that some of the present destinations would lose appeal, and some others will increase their potential to attract masses of tourists. Some of the presently popular places could become dangerous or associated with a high health threat. Climate change could possibly also affect the availability of vital resources, for example drinking water, and will have some impact on propagation of diseases like malaria, dengue fever, etc. But already now the fashion is forcing tourist industry to develop and adapt constantly.
it could be – and it is the same today, 

a war or another frightening situation

, 

P

can

, 

king

ing

A

can be

, and it is also possible to travel out of sheer curiosity

What about the spirit of adventure?

--

, P

--

for

and t

their

there are

--


Tourism in the 21st century is one of the most prosperous industries.
per

Page 3: [60] Deleted  User  4/10/2009 8:28:00 AM
s,

Page 3: [60] Deleted  User  4/10/2009 8:29:00 AM
and

Page 3: [61] Deleted  Jaakko Helminen  11/30/2006 3:25:00 PM
from

Page 3: [61] Deleted  Jaakko Helminen  11/30/2006 3:25:00 PM
travel

Page 5: [62] Deleted  User  4/10/2009 8:38:00 AM
%

Page 5: [62] Deleted  User  4/10/2009 8:38:00 AM
%

–

Page 5: [63] Deleted  User  4/10/2009 8:39:00 AM
the C

Page 5: [63] Deleted  User  4/10/2009 8:40:00 AM
are ozone–depletion substances

Page 5: [63] Deleted  User  4/10/2009 8:39:00 AM
(CFCs and halogens)

Page 5: [63] Deleted  User  4/10/2009 8:40:00 AM
, it is still expected

Page 5: [63] Deleted  User  4/10/2009 8:40:00 AM
appear,

Page 5: [64] Deleted  User  4/10/2009 8:41:00 AM
The

Page 5: [64] Deleted  User  6/1/2009 9:25:00 AM
6–8

Page 5: [64] Deleted  User  6/1/2009 9:17:00 AM
%

Page 5: [64] Deleted  User  6/1/2009 9:24:00 AM
per

Page 5: [64] Deleted  User  6/1/2009 9:25:00 AM
all the

Page 5: [64] Deleted  User  4/10/2009 8:42:00 AM
–elevated

Page 5: [65] Deleted  User  4/10/2009 8:42:00 AM
the low land noticeably,

The climate could end in the

, but it could also
in a permanent state of confrontation with the elements as ed phenomena, the perspective the elements in effect es:
some

Page 9: [76] Deleted User 4/13/2009 7:56:00 AM

on

Page 9: [76] Deleted User 4/13/2009 7:56:00 AM

es

Page 9: [76] Deleted User 4/13/2009 7:57:00 AM

taking

Page 9: [76] Deleted User 4/13/2009 7:57:00 AM

m

Page 9: [76] Deleted User 4/13/2009 7:57:00 AM

the

Page 9: [76] Deleted User 6/1/2009 9:24:00 AM

per

Page 9: [76] Deleted User 4/13/2009 7:58:00 AM

ing

Page 9: [77] Deleted User 4/13/2009 7:59:00 AM

A

Page 9: [77] Deleted User 4/13/2009 7:59:00 AM

in the past pointed out

Page 9: [78] Deleted Jaakko Helminen 11/30/2006 3:44:00 PM

cites

Page 9: [78] Deleted Jaakko Helminen 11/30/2006 3:45:00 PM

greatly

Page 9: [79] Deleted User 4/13/2009 8:07:00 AM

greatly

Page 9: [79] Deleted User 4/13/2009 8:07:00 AM

the

Page 9: [80] Deleted User 4/13/2009 8:08:00 AM

a

Page 9: [80] Deleted User 4/13/2009 8:07:00 AM

mental approach

Page 9: [80] Deleted User 4/13/2009 8:08:00 AM

the

Page 9: [80] Deleted User 4/13/2009 8:08:00 AM

, ,

Page 9: [80] Deleted User 6/1/2009 9:18:00 AM

, , etc

Page 9: [80] Deleted User 6/1/2009 9:18:00 AM

Page 11: [81] Deleted User 6/1/2009 9:29:00 AM

Page 11: [81] Deleted User 6/1/2009 9:24:00 AM
(downhill skiing, skating, snow boarding, cross county skiing)

, towards before some very extensive snow

, the region . B many times spending

; do Or e of them to
areas

. Poor snow conditions

−

. R

will

will

will

will

will

will

By

The

by

stimulate a rise in the

per

Page 11: [85] Deleted  User  4/13/2009 8:24:00 AM
Page 11: [85] Deleted  User  4/13/2009 8:24:00 AM
Page 11: [85] Deleted  User  4/13/2009 8:27:00 AM
Page 11: [86] Deleted  User  4/13/2009 8:28:00 AM
Page 11: [86] Deleted  User  4/13/2009 8:28:00 AM
Page 11: [87] Deleted  User  6/1/2009 9:24:00 AM
Page 11: [87] Deleted  User  4/13/2009 8:31:00 AM
Page 11: [87] Deleted  User  4/13/2009 8:28:00 AM
Page 11: [87] Deleted  User  4/13/2009 8:24:00 AM
Page 11: [85] Deleted  User  4/13/2009 8:23:00 AM
Page 11: [84] Deleted  User  6/1/2009 9:30:00 AM
Page 11: [84] Deleted  User  4/13/2009 8:22:00 AM
Page 11: [84] Deleted  User  4/13/2009 8:22:00 AM
Page 11: [84] Deleted  User  4/13/2009 8:23:00 AM
Page 11: [84] Deleted  User  4/13/2009 8:21:00 AM
Page 11: [84] Deleted  User  4/13/2009 8:20:00 AM
Page 11: [84] Deleted  User  4/13/2009 8:19:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:18:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:18:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:17:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:17:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:16:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:16:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:15:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:15:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:14:00 AM
Page 11: [83] Deleted  User  4/13/2009 8:14:00 AM
Among the most known are Rome, Paris, London, New York, Venice. However, urban climates are characterized by the well-known urban heat island effect, which may exacerbate the impact of weather on heat-related mortality.
It is extremely important to give the population all the necessary information when the heat load will increase over a chosen threshold and how to act.