

Climate, Tourism and Recreation

**Summary Report of a Workshop Held at Porto Carras,
Neos Marmaras, Halkidiki, Greece, 5 -10 October 2001.**

**Organised by the International Society of Biometeorology,
Commission on Climate, Tourism and Recreation (Commission 5).**

**Chris de Freitas and Andreas Matzarakis
December 2001**

Introduction

The ISB Commission 5, Climate, Tourism and Recreation (ISBCCTR), was re-activated during the 15th Congress of the International Society of Biometeorology (ICB-ICUC'99) held in November 1999 in Sydney, Australia. Chris de Freitas (University of Auckland, New Zealand) and Andreas Matzarakis (University of Freiburg, Germany) were appointed to chair the revived Commission.

In the weeks following ICB-ICUC'99 Congress the chairs put together a document flyer describing the ISBCCTR Commission 5, its scope, aims and objectives. The first version of this appeared on the ISBCCTR's newly constructed Website in January 2000. The decision to hold an ISBCCTR Workshop followed from this (see *Aim* below) and the chairs set about planning the event. Various sites were considered and possible sponsors canvassed. During November 2000 the decision was made to hold the Workshop at Porto Carras, Halkidiki, Greece from 5-10 October 2001.

Aim

The aim of the Workshop was to: a) bring together a selection of scientists and tourism experts to review the current state of knowledge of tourism climate; and b) explore possibilities for future work and, in particular, the role of the ISBCCTR in this.

Location

The Workshop was held in the well-known coastal resort of Porto Carras located two kilometres from the village of Neos Marmaras. The complex of hotels and recreational facilities is sited at the base of the Sithonia peninsular. Sithonia is the middle peninsular of three on the southern end of the picturesque Halkidiki area, the centre of one of the most important recreation and tourism regions in Greece. Sithonia is set between the Mount Athos peninsular to the east and the Kassandra peninsular to the west. Porto Carras is a large, well-established resort, built in the 1970s to cater for a broad range of activities, including swimming, boating, golf, coastal and inland touring.

Participants

A total of 25 delegates attended the Workshop. Their fields of expertise included bioclimatology, thermal comfort and heat balance modelling, UV-radiation, tourism marketing and planning, urban and landscape planning, architecture, and climate change impact assessment. Participants came from Australia, Austria, Bulgaria, Canada, Croatia, Germany, Greece, New Zealand, Poland, United Kingdom, USA and Switzerland.

Format

Business conducted during the Workshop was divided in three parts:

- Approaches to Tourism Climate Research
- Methods and Applications
- Tourism Industry/Climate and Weather Information for Tourism

Each day of the Workshop had two separate sessions. The morning sessions comprised of oral presentations from 0830 to 1300 hours. This was followed by an extended break for rest and recreation

through to 1700 hours, as is the custom in Greece. Evening sessions were held between 1700 to 1930 hours during which time the results of morning presentations were analysed, discussed and key points summarised. The results of this are summarised below.

The final day of the Workshop was dedicated to an extended field trip. Participants travelled by bus to the Petralona tourist cave and then through the mountain areas of Halkidiki including Holomontas mountain followed by visits to the traditional town of Arnea and the village Stagira, the birthplace of Aristotle.

Acknowledgements

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SUMMARY OF WORKSHOP PRESENTATIONS, DISCUSSIONS AND OUTCOMES

SESSION: APPROACHES TO TOURISM CLIMATE RESEARCH

Theory, concepts and methods in tourism climate research. Chris de Freitas, University of Auckland, New Zealand.

It is accepted that climate is an important part of the region's tourism resource base, but the role of climate in determining the suitability of a region for tourism or outdoor recreation is often assumed to be self evident and therefore to require no elaboration. Relatively little is known, other than in very general terms, about the effects or role of climate on tourism and outdoor recreation. And even less is known about the economic impact or significance of climate on commercial prospects for tourism. The whole area involving which criteria, including climate related-criteria, people use to make decisions about tourism and recreation choices is largely unresearched, but highly relevant to a variety of applications. Thus far, much of the research specifically on climate reported in the journal literature has been superficial in that relationships between climate and tourism are assumed rather than observed and seldom objectively tested. Moreover, the research is largely devoid of any clearly structured conceptual framework or frameworks that embrace important theory, paradigms, processes and interactions. These theoretical frameworks are important because they provide a basis for data generation, hypothesis testing and further theory generation. Without this, it is difficult to develop a coherent set of research methods; and perhaps more importantly, develop models that constitute a bridge between the observational and theoretical levels that can assist in building a coherent knowledge base for understanding, explanation and prediction. This paper reviews existing work in tourism climate research with a view to identifying what concepts and theoretical frameworks may already exist and speculating on ways these may be drawn together in future research.

Evaluating domestic tourists' attitudes to British Weather - a qualitative approach. Melanie Limb and Greg Spellman, University College Northampton, United Kingdom.

Previous research has attempted to develop and map quantitative measures of the climatic well being of tourists (eg Mieczowski's Tourism Climatic Index). These have been based on the assumption that a majority of tourists are entirely motivated by climatic conditions, of a certain and common nature. Mintel (1991) claimed that 73 percent of respondents to a UK survey cited 'good weather' as the main reason to go abroad. This study develops the idea that tourist decisions related to trips within the UK

by UK residents has a far more sophisticated relationship with climatic conditions and these cannot be adequately captured by simple quantitative indices. The paper develops a qualitative methodology using in-depth discussion groups to investigate the importance of tourist memories and experiences in relation to climate. It is found that definitions of 'bad' and 'good' weather are more complex than quantitative indices suggest. Some people show ambivalence in their attitudes towards weather conditions and their decisions involve trade-offs between the risk of poor weather and other aspects of the holiday experience

More heat and drought--- can Mediterranean tourism survive and prosper? Allen Perry, Department of Geography, University of Wales Swansea.

Summer heat-waves in southern Europe have become more frequent. They are forecast to increase even more in frequency in association with projected climate change as a result of global warming. The impact of very hot weather on the tourism industry of the Mediterranean is considered. The measures and responses that can be adopted to alleviate the impacts will be reviewed. Adaptive responses can be learnt from other areas that experience intense summer heat and from a consideration of the views of holidaymakers to the problems that can accompany excessive summer heat. The use of indices to measure the desirability of the Mediterranean in relation to other potential holiday destinations are explored. Future tourism scenarios in the Mediterranean need to consider also changing demographic and economic conditions. Climate change will present new challenges but also lead to new opportunities for tourist investment to capitalise on the new environmental conditions.

Climate impacts on the demand for tourism. Maureen Agnew, University of East Anglia, Great Britain.

Climate impacts on international and domestic tourism are examined using: (1) a quantitative approach of regression modeling, supplemented by (2) a qualitative approach using surveys of the perception of climate impacts and in particular of climate extremes. The optimal summer temperature for attracting tourists to a country is estimated to be 21°C, with little deviation from country to country. In hot years, tourists tend to prefer domestic to foreign beach holidays. For domestic tourism, the relationship with temperature is usually positive in the same month, except in winter sports regions. A summer warming of 1°C is estimated to increase domestic holidays by 0.8-4.7%. The climate impact depends on destination type; for example, coastal resorts in Italy respond more favourably to summer temperature increases than inland resorts. There is some indication that weather in the intermediate seasons (spring and autumn) has a greater influence on tourist behaviour than is the case in winter and summer. The public perception survey suggests that during an unusually hot summer, people are more likely to change their plans for day trips and short breaks than for their main holiday. Those that do change their holiday plans stay either at home or in their own country. The importance of weather/climate for short holiday trips, domestic trips and spontaneous trips is generally understood by management in the tourism industry. However, tour operators and managers plan their marketing strategies with very short time horizons and claim not to incorporate climate considerations. Nevertheless, tourism suppliers have shown some attempts to weatherproof the industry and tourism managers have a tendency to use bad weather as an excuse for poor tourism figures.

The bioclimatic diversity of Bulgaria: A resource or a limiting factor for recreation and tourism? Zoya Mateeva, Institute of Geography at Bulgarian Academy of Sciences, Sofia, Bulgaria.

Body-atmosphere heat balance indices applied to climate data for Bulgaria that show the bioclimatic diversity on the territory of Bulgaria varies from "thermal-neutral conditions" to "extreme heat stress". For any given period of the yearly climatic cycle there are places in Bulgaria with favourable bioclimatic conditions. The planning of an optimal recreational and tourist activity requires a close preliminary bioclimatic reference. In other cases a risk to fall in a discomfort bioclimatic situation is quite possible any time and at any place.

Using a modified 'Tourism Climate Index' to examine the implications of climate change for climate as a natural resource for tourism. Daniel Scott, Geoff McBoyle, University of Waterloo, Waterloo, Canada.

Using a modified version of Mieczkowski's (1985) tourism climate index (TCI) this study provides a quantitative measure of how the climate resource would change in a sample of tourism destinations in North America and the Caribbean for the 2020s, 2050s, 2080s using two climate change scenarios (CGCM1 and HadCM3). As one of the first empirical assessments of the implications of climate change for the tourism climate resource, this investigation raised interesting methodological questions. The paper discusses these methodological challenges and how projected climate change may influence North American tourism.

SUMMARY OF DISCUSSIONS

All agreed that the tourism climate index (TCI) or equivalent is a useful concept. Its value lies in the fact that it is simple, descriptive, uses standard data, includes a range of variables etc, but is arbitrarily constructed and has never been verified. A new TCI is needed, one that is better designed, and then tested and verified.

TCI or equivalent does not deal with assessment of catastrophic events. What is needed is something that does. Risk takers (resort developers) vs. risk accepters (insurance companies).

What risks are tourism companies taking? How do we assess this? A lot depends on the scale of development.

The significance and importance of qualitative (vs. quantitative) information in tourism climate research was discussed, as for example, in forecasting tourism demand.

What about tropical locations? Tourism in a tropical and equatorial environments – eg SE Asia, Indonesia, Darwin...?

Tropical coastal areas have a large amount of tourism development, but most research in temperate regions.

Long haul to the tropics is fastest growing sector for travel Europe.

We need to explore the distinction between impacts of climate on tourists vs. impact on the tourism industry (i.e. tourism development).

What do planners need? We (the scientists) need to translate the technical work of researchers (climatologists) into simple language and explain this in uncomplicated terms for use by planners, tourist operators etc. Methods used should be transparent but simply expressed **and** clearly explained.

Planners need to know how much climate will improve or deteriorate in the future. Good TCI index would show this.

Make the classic jump from theory to practice. Eg: global warming will result in the need for an increase in the number of air-conditioned hotel rooms. What are the costs of doing this vs. doing nothing? This is an example of a simple, straightforward translation of the significance of climate change.

What about sea level? Need to convey “scientifically correct” information to planners. For example, regionally detailed and highly accurate measurements show that sea level is not rising in the tropical Pacific. Do planners believe otherwise?

There is a need to provide potential tourists with probabilistic information on climate to be expected at various destinations. Leads to improved information and improved choice. Costs: to tourists (eg heat stroke) vs. costs to tourism operators. Already tourists and tourist operators can take out insurance on

likelihood of “bad” conditions occurring. This raises the point: How do insurance companies define “bad weather”? We need to look into this.

Climate derivatives (eg HDD) are currently being traded on stock exchanges (like commodity futures). Are there analogues in tourism climate work? Is the TCI for example a climate derivative?

SESSION: METHODS AND APPLICATIONS

Tourism in the land of the ozone hole: A perception study. L. Michael Trapasso, Department of Geography and Geology, Western Kentucky University, USA.

The Ozone Hole has been perceived as anything from „a serious threat to human existence“, to a „scare tactic by fantasists“. Like with other environmental issues, this is a matter of perception. Tourism professionals were more concerned than tourists themselves, insisting the threat of increased UV radiation has worsened through time. The tourists’ perceptions were divided between the apparently nonchalant attitude of Argentine tourists, and the more serious attitudes of foreign visitors. During the trip to the Antarctic Peninsula, passengers were interviewed and a range of perspectives was offered.

Assessing climate for tourism purposes: Existing methods and tools for the thermal complex. Andreas Matzarakis, Meteorological Institute, University of Freiburg, Germany.

With some modification, existing methods for assessing climate in human biometeorology can be used for the tourism climatology. For example, thermal indices that are derived from the energy balance of the human body can be useful here. The problem is that input environmental data required for these schemes are rather specialised and are not usually available. Standard climate data are air temperature, humidity and wind speed. However, the most important environmental factors for deriving modern thermal indices are the short and longwave radiation (and the derived mean radiant temperature). These can be determined using special techniques. The RayMan model that has been developed for urban climate studies is presented here. It is shown that this can be a helpful tool for the assessment of tourism and climate related questions. Sample analyses for different parts of the world are presented and discussed.

Analysis of a heatwave phenomenon over Greece and its implications for tourism and recreation. Balafoutis, Ch. J. and Makrogiannis, T. J., Department of Meteorology and Climatology, Aristotle University of Thessaloniki, Greece.

Climatic conditions is a very important one when someone planning a holiday in a certain country. Especially the analysis of extreme weather events helps the tourism, in general, very much. In this paper the heat wave phenomenon over the mainland of Greece, during the days 18 to 21 August 1999 has been studied mainly from a synoptic point of view.

The influence of the weather upon the recreational use of the Danube Flood Plains National Park, Vienna, Austria. Christine Brandenburg, Universität für Bodenkultur, Vienna, Austria

For one year, video monitoring was used to continuously register visitors of the Danube Flood Plains National Park at several entrance points from dawn to dusk. Data related to visitors, such as their overall number and the way they used the recreational area, were correlated with meteorological data. The influence of certain meteorological elements, such as temperature, clouding, rainfall, and indices like the Physiological Equivalent Temperature, upon the use of the National Park for recreational purposes was investigated with the help of statistical modelling. The calculation of the Physiological Equivalent Temperature was done by the program Rayman (Matzarakis et al. 2000). Among other things, one result of these endeavours is a model for the prognosis of visitor loads and the type of use depending on the two factors weather and day of the week.

Assessment of recreational potential of bioclimate based on the human heat balance. Krzysztof Blazejczyk, Bydgoszcz Academy, Faculty of Geography, Bydgoszcz, Poland.

The paper presents the new weather classification created for the needs of tourism and recreation. It is based on the human heat balance (HHB) analysis. The HHB is the complex method considering both, meteorological stimuli (solar radiation, air temperature and humidity, wind speed) as well as physiological responses of an organism (skin temperature, sweating). Man-environment heat exchange model (MENEX) was applied for the simulations of the HHB and the BioKlima ® software package was used for the calculations.

The classification was used for the evaluation of bioclimatic potential of several recreational areas of Poland. As an example the sites represented seaside (Baltic sea) and mountain regions (Carpathians) were chosen. There are observed significant differences between the sites compared. At the seaside the great seasonal variability of bio-thermal conditions is observed. The summer weather seems to be most useful for various recreational activity; in the spring and autumn active recreation and tourism is preferred, however the wintertime is rather useless. In the mountains the most favourable are autumn and spring months. In the Summer time the bioclimatic conditions are less favourable due to frequent occurrence of arduousness hygro-thermal stimuli. Relatively useful, especially for active forms of recreation and tourism is also winter season. However, in the mountain region great regional and local variability of bioclimate occurs.

Assessing the sensitivity of the alpine skiing industry in Ontario, Canada to climate variability and change. Daniel Scott, Geoff McBoyle, Brian Mills, Geoff Wall, University of Waterloo, Waterloo, Canada.

The historical sensitivity of five alpine ski resorts and the potential impacts of climate change (2020s, 2050s and 2080s) were examined. The validity of climatic thresholds in the literature (e.g., minimum temperature and snow depth needed for a suitable ski day) was examined by comparing modeled ski season length with observed ski season length (as determined by daily ski condition reports). The calibrated thresholds were then used to simulate the length of the ski season under climate change conditions. Climate change scenarios were developed by temporally downscaling climate variables from the CGCM1 and HadCM3 general circulation models with the LARS weather generator (parameterized to local climate stations) for input into a daily snow cover simulation model.

The increased development of snowmaking as an adaptation to climate variability throughout the 1980s and 1990s was found to have reduced the vulnerability of the ski industry. Under climate change scenarios, the average ski season was reduced by 25-39% in the 2020s, 37-57% in the 2050s and 60-70% in the 2080s. In contrast, the number of potential snowmaking days in the region was projected to decline by only 14-23% in the 2050s, with very little impact in the critical pre-Christmas holiday period. The findings raise interesting questions regarding the ability of alpine ski resorts to remain operational under climate change conditions through more intensive snowmaking. Preliminary modeling suggests ski resorts could remain operational in a warmer climate, but that the threshold for economical snowmaking costs may be surpassed.

Climate and bioclimate information for tourism in Greece. Andreas Matzarakis, Meteorological Institute, University of Freiburg, Germany.

Weather, climate and tourism are interconnected in many different ways. All of them are of local as well as global significance. Weather and climate information is of interest to both tourists and the tourist industry. Information on climate is useful for planning vacations. This information can be obtained via the popular media (e.g. tourist guides) or weather services. During the vacation period actual weather information is more important than climate information. In this period climate information does not play an important role. Examples of climate information that is often available are air temperature, relative humidity, precipitation, daily sunshine duration and water temperature on monthly basis. Additional information that is recommended (especially with high spatial resolution) includes data on UV-radiation, air pollution, noise and bioclimatic conditions. Climate, bioclimate and weather information for tourism in Greece is presented.

The effect of climate on the use of open spaces in the urban environment: relation to tourism. Marialena Nikolopoulou, Centre for Renewable Energy Sources, Pikermi, Greece.

The paper concentrates on the effects of climate on the use of outdoor spaces in the urban environment, which is particularly important for the activities that are carried out in the area and consequently for tourism too. Improved microclimatic conditions have major implications for the development of cities. By controlling sources of discomfort, sedentary activities, the use of public transport, cycling and walking, are promoted. Successful areas attract large numbers of people, which in turn attract businesses, workers, residents, and the area becomes economically profitable. Finally successful outdoor spaces can benefit the image of the city. Such issues are key parameters for tourism and operators organising recreational excursions. The underlying hypothesis is, that thermal and by implication comfort conditions, affect people's behaviour and usage of outdoor spaces. Responses to the microclimate may be unconscious, but they often result in a different use of open space in different climatic conditions. Indeed it has been revealed that microclimatic parameters strongly influence thermal sensations, as well as the use of open urban spaces throughout the year. Therefore, climate should be taken into consideration at the intermediate scale of the urban block (a scale which has received little attention in research), integral to user satisfaction and therefore to the success of the space. This issue is extensively examined in the research project RUROS (Rediscovering the Urban Realm and Open Spaces), whereas some of the early findings of the project based on the extensive monitoring of open spaces, across Europe will be presented. Consideration of such issues can ultimately assist tourism development and the tourism industry.

SUMMARY OF DISCUSSIONS

Points arising from presentations.

The day's proceedings showed up a surprising diversity of expertise among those attending the Workshop – especially a diversity of approaches that are likely to be mutually beneficial.

Interlinkages both of concepts and applications were commented on – e.g. thermal indices used in architecture and design considerations and in recreational park planning and management.

Importance of non-thermal facets (aesthetic) of climate - Christine Brandenburg (land-use/park planner) drew attention to importance of clear skies (sunny conditions) in assessments of recreation climates.

Importance of only using thermal indices that have been checked and verified using field data - Marialena Nikolopoulou (architect) drew attention to the fact that PMV (i.e. predicted thermal satisfaction) had little or no relationship with actual satisfaction.

Planners require climate data that is quality-checked, easy to use [i.e. well sorted]. Point raised by Christine Brandenburg, a land-use/park planner.

Role of climate in considerations of destination choice - especially in relation to increasing use of the Internet.

UV risk as related to ozone-layer thinning is not well understood, in Argentina.

Heatwave prediction – up to six-day forecast accuracy is good. Application of this?

Andreas Matzarakis stated that climate information available for tourists to Greece is inadequate.

Catastrophic events in coastal tropical areas – data/info on this for tourism.

What may be useful to develop is a tourism climate equivalent to *The Lonely Planet* guide.

Need to keep in mind that human behavioural response considerations are important in many applications.

The Workshop group acknowledged the importance of human body-atmosphere heat balance schemes and resulting indices to tourism climate research. These indices integrate the thermally relevant atmospheric, environmental and physiological variables. But they are often applied inappropriately. There is a need to settle on a base-standard for heat balance models used in tourism-recreation research. Suggested guidelines are summarised below:

Standard/typical/mean state for general application of heat balance models.

Body and environment

Metabolic rate: 80 W m^{-2}

Assume individual is acclimatised.

Body area (DuBois) 1.8 m^2

Posture: standing (approx equiv)

Clothing albedo: 0.30

Warm-season clothing insulation (amount) = 0.5 clo

Cool-season clothing insulation (amount) = 1.0 clo

Albedo of surroundings: 0.25

Sky condition: $n/N = 0$ (i.e. cloudless)

Mean radiant temp (longwave only) = air temperature ($T_{\text{mrt},l} = T_a$)

Application to climate conditions (i.e. with standard data)**

Daily “maximum” thermal condition:

Daily maximum air temp

Solar noon

Sky condition: $n/N = 1$ (i.e. cloudless)

Wind speed: 0.5 m s^{-1}

Longwave mean radiant temp (longwave) = air temperature ($T_{\text{mrt},l} = T_a$)

Daily “minimum” thermal condition:

Daily minimum air temp

Solar radiation = zero

Wind speed: 0.5 m s^{-1}

Longwave mean radiant temp (longwave) = air temperature ($T_{\text{mrt},l} = T_a$)

Standard (input) climate data:

Daily “maximum” thermal condition:

Maximum daily air temperature

Vapour pressure near middle of day

Daily “minimum” thermal condition:

Minimum daily air temperature

Vapour pressure at night or near sunrise

*** Note: Generate mean values from above real-time calculations.*

SESSION: TOURISM INDUSTRY/CLIMATE AND WEATHER INFORMATION FOR TOURISM

Links among climate, forest fire, and recreation in the US Southwest. Barbara J. Morehouse, University of Arizona, USA.

Forests rank among the foremost destinations for recreation and tourism, and are particularly valued in warm semi-arid areas such as the US Southwest. Yet, while these areas provide many recreational opportunities, forest fire can pose a serious hazard to visitors. In the US Southwest this hazard is

elevated due to high fuel-load buildups resulting from long-term fire suppression policies and to climatic influences. Tree-ring evidence indicates that large wildfires in the region are linked to synoptic climate processes, notably ENSO. Of particular note, the pattern of an unusually wet winter followed by two unusually dry winters correlates strongly with widespread fire activity during the following fire season. Ironically, these same dry warm conditions may stimulate greater recreational use of the forests, thus increasing human risk. Prescribed burning, designed to reduce wildfire hazard, can pose additional risk if the fire goes out of control, as occurred near Los Alamos, New Mexico last summer. Increased use of climate information and forecasts can provide a tool for addressing management issues at the climate-fire-recreation interface. Knowledge of how climate information is being used by tourism marketers, local recreation-oriented businesses, and visitors themselves, can also provide important insights for planners and managers. This paper explores management of tourism and recreation in the context of climate and forest fire.

Climatological basis for planning in mountain recreation. Marjana Gajic-Capka, Meteorological and Hydrological Service of Croatia, Zagreb, Croatia.

Mount Velebit is located along the eastern Adriatic coast 150 km in length with the highest summits of about 1700 m a.s.l. Its northern part has been proclaimed as National Park. This mountainous ridge presents the boundary between the maritime climate at the Adriatic coast and mountain continental climate over the inland. This area has been mainly intended for tourism and recreation. The specific mountain climate of Velebit under the strong maritime influence has been performed for the purpose of planning in mountain recreation by decade mean and frequency values of climatological elements, as well as probability and time distribution of snow data. It is supposed that ten-day period is much more convenient for holiday planning than most frequently used monthly interval. The data basis for this analysis are meteorological measurements at main meteorological station Zavizan established in 1953 on the northern part of Velebit Mountain on 1594 m a.s.l.

Biometeorological potential of Croatian Adriatic coast. Ksenija Zaninović, Meteorological and Hydrological Service of Croatia, Zagreb, Croatia.

This article deals with the analysis of biometeorological conditions in the period 1979-1998 at 8 meteorological stations along the Croatian Adriatic coast: Rovinj (Istra Peninsula), Crikvenica (Kvarner Bay), Šibenik (middle Adriatic coast) and Dubrovnik (southern Adriatic coast) at the coast, as well as at the islands Mali Lošinj, Vela Sestrica, Hvar and Palagruža. The most comfortable periods at the Adriatic coast are April and May as well as September and October. During the hottest summer months July and August it is warm in the morning and evening and hot in the afternoon. Due to the cooling effect of the sea and the wind, the excess heat episodes are rare and they happen mostly only in the afternoon. From the late autumn until the early spring, the biometeorological conditions are ideal for the sport activities.

Climate and tourism – an Australian perspective. Carol J. Skinner and Richard J. de Dear
Bureau of Meteorology, Melbourne 3001, Australia.

Visitors who come to Australia from cooler countries can experience problems. They are neither adapted to nor prepared for our warmer climates, they often have little information about thermal conditions in Australia and they tend to arrive in summer (our most thermally stressful season) in order to escape the Northern Hemisphere winter. In order to meet tourists' needs for information, a climatology based on thermal comfort considerations has been developed. Because heat stress is the major thermal problem in Australia, we divide the country into three main regions on the basis of January 3 pm temperature and vapour pressure. These zones are subdivided on the basis of summer severity (in the tropical north) or of winter conditions (in the southern and central regions). Climate-based conflict between tour operators and the Commonwealth government can occur. An example of this was when tour operators objected to a walking track in the Uluru - Kata Tjuta National Park (Ayers Rock and the Olgas) being closed by the National Parks and Wildlife Service on hot days, for safety reasons. There was a legal challenge to the track closures by a consortium of tourism operators in 1999. On-site field measurements of heat stress were written into a report for the NPWS, along with an assessment of the risk to tourists from heat stress. The litigation was settled out of court and the policy of track closures based on forecast maximum temperatures remains in place.

SUMMARY OF DISCUSSIONS

It is important to recognise that research methods in tourism climate have to be both transparent and consistent.

As far as possible we should adopt standard methods and indices.

Develop specialist tourism climate forecast indices, say for golf, skiing...

Overall, multipurpose regional (and city scale) scale index that guidebooks, govt advisory services etc could use.

Use same methods approach for both cold and warm tourist climate applications/conditions.

Future Research Topics

Climate therapy: Health climatology - climatic elements related to health therapy. Demand could be large – especially respiratory diseases. Include UV-related themes.

Bioclimate information for tourists and recreationists. Say, advisory services provided by local Meteorological Services for: a) day-trippers and vacationers planning weeks ahead.

Need for and usefulness of bioclimate advisory services for tourists – especially trampers and other outdoor pursuits.

Investigate precisely the type of bioclimate information that should be available to tourism decision-makers – what are their needs?

Commission consider the international standards for definitions for key terms: outdoor recreation, recreationist, tourism, tourist. See World Tourism Organisation Webpage.

The need for developing conceptual framework(s) for tourism climate research. Start by doing an inventory of research to date, and then categorise these. Conduct a review of and search for common approaches, methods...paying close attention to covers all disciplines that deal with tourism.

What about the globalisation of tourism?

Land use planners, architects, urban planners could have data that are useful to tourism climate assessment.

Publications on tourism climate information for travel industry for promotional purposes and marketing.

Tourist planners (including tourist industry) and tourists are two very distinct groups. The former are most interested in capturing/attracting the largest possible numbers of vacationers.

There are those interested in various aspects of tourism climate: climate as an asset, climate impacts and methods of climate assessment, so interactions need to be considered.

Future of the CCTR? All agreed that it should continue. In the meantime, list Workshop delegates on Website along with the area of specialism alongside name link to other websites.

Review usefulness of new label: "Impacts of climate on tourism."

Consider posting (this) Consider posting summary report on a) ISB Webpage; b) IJB c) Notice CLIMLIST d) other relevant journals or webpages, both disciplines and tourism industry.
Summary report on a) ISB Webpage; b) IJB c) Notice CLIMLIST d) other relevant journals or webpages, both disciplines and tourism industry.

PRIORITIES IN TOURISM CLIMATE RESEARCH

- Implications of climate change in heavily used tropical areas.
- Communication with the public on tourism-climate issues.
- Communication with the travel industry on tourism-climate issues.
- Is the info the public need on tourism-climate the same as what climate scientists think they need?
- What information do tourists need for their decision-making processes (eg prospect of extreme events - hurricanes)?
- Standard approach to thermal climate assessment - how do we handle spatial vs. temporal variability of climate and how we adapt to contrasts?
- How we handle, in context of tourism climate, physical and mechanical climate facets eg fogs, high wind, rain, sea-surface temp...?
- How we handle, in context of tourism climate, aesthetic climate facets eg sunshine, cloud...?
- Establish international tourism bioclimate information-base - eg TCI equivalent for world for main tourist activities.
- Verification of thermal index schemes using physiological field-testing and associated statistical testing.
- Tourists' health vulnerability indicators in relation to climate of destination (eg heat stress, vector-borne diseases...)
- Expand qualitative approach to include more tourism categories and extend to broader effects - eg moods, emotional responses (to understand the whole climate [personal] experience).
- Better understanding of what climate-related information that tourists want.
- Assessment of trends in tourists' choice of destination and projecting into the future.
- Recreational activities that exploit extreme climate conditions – what about information for this group? How do we present data and guidelines for this group? – noting that thermal comfort is not important here.
- Identify one bioclimate index simple and reliable for use globally in tourism climate research.
- Appropriate standard index needs to be convincingly “sold” to the public, and assess suitability and appropriateness in eyes of public.
- Decide among ourselves on appropriate methods and approaches - eg which indices can be used where and how and validating these beforehand.
- Identify and characterise the various interest groups we are trying to reach. Elements and methods to be used. Tourism industry; local communities; decision-makers and policy makers; scientist; and tourists.
- During holidays, weather forecasts have big influence decisions of recreations. Research is required in this area.
- Forecasts should be based on data from the region to which the forecast applied, as opposed to data from other nearby regions.
- Include biometeorological information and guidelines in standard weather forecasts – eg Canada uses wind chill and Humidex.
- Point was raised that national meteorological services should have a biometeorology branch. This would do much to assist future research in tourism climatology.
- New “TCI” is needed that is rationally based, verified and tested with real data.
- Our research need to deal separately with the meso and micro scale; results of our research need to be translated and presented in easily understood; consider in our research all of the facets of climate: thermal, physical and aesthetic.

- Need for a comparative study that investigates national-cultural differences in tourism climate preferences etc for a number of countries worldwide.
- Use website to provide tourism climate guide for travellers.

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