Will the Mediterranean Become “Too Hot” for Tourists?: A Reassessment

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Numerous studies emphasize that climate, particularly temperature, is one of the most important resources of a tourist destination. With the onset of climate change, this climatic parameter of tourist destinations may change, leading some scientists and the media to claim that some destinations, including the Mediterranean, will become “too hot” for tourist comfort by as early as 2020 or 2030. This study examines tourists’ perceived and stated ideal and unacceptable conditions for multiple climate variables (temperature, rain, wind and sky conditions) for two popular Mediterranean tourism segments; beach/3S and urban sightseeing holidays. A survey instrument was administered to university students (n=866) in five countries that represent source markets for the Mediterranean (Austria, Germany, The Netherlands, Sweden and Switzerland). The survey results were applied to a baseline climate (1961-1990) and a minimum and maximum climate change scenario (A1B emission scenario for 2080-2099). With the exception of Athens, Greece, the results suggest that the media’s claims are erroneous, with only one urban destination incurring “unacceptably hot” conditions by mid-century and only a few destinations becoming “unacceptably hot” by the end of the 21^{st} century. A more imminent threat could be the influence the media claims may have on tourists’ perception of the climate in the Mediterranean region. It is anticipated that these findings will hold important implications for critically assessing the potential impact of climate change in the study area and other destinations more broadly, and can be used to refine models intended to predict tourism demand and international tourism flows under climate change.

Keywords: Climate Change; Tourism; Mediterranean; Climatic preferences

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Dedication

This thesis is dedicated to my Momma.

Thank you for providing me with the gift of a higher education and inspiring me to continually challenge myself and work towards my utmost potential.

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Chapter 1
Introduction

1.1 Study Context

The world's leading tourism destination is the Mediterranean, a region comprised of 25 countries (Figure 1.1) that attract almost one-fifth of total international tourism arrivals (179.2 million) and over 30% of the world's total international tourism receipts (US$ 205 billion) (UNWTO 2007a). The largest single flow of tourists in the world is the flow of Europeans from the colder northern regions heading south to the Mediterranean, accounting for 116 million tourists, or approximately one in six tourists trips globally (UNWTO 2003).

One of the principal reasons behind the popularity of the Mediterranean is the demand for a sunny and warm destination. The world's major tourism flow highlights the fact that weather is an intrinsic tourism motivator, with 'sun-lust' and 'sunshine destination' packages boasting high demand (Bigano et al. 2006, Perry 2006). Studies that have included climate variables in assessment of tourist motivations, emphasize it as either the most (Mintel International Group 1991, Morgan et al. 2000, Kozak 2002, Gomez-Martin 2005, Hamilton and Lau 2005) or one of the most important factors (Lohmann and Kaim 1999, Maddison 2001, Lise and Tol 2002, Hamilton 2005, Gossling et al. 2006, Scott et al. 2008) for a tourist when selecting a travel destination.

While climate has been one of the most important natural assets of this destination, a number of researchers and the media have raised concerns over the implications of climate change for this tourism resource. There is now overwhelming evidence that the global climate is changing. The IPCC report (2007a) concludes with *very high confidence* (>90%) that the net effect of increased greenhouse gas (GHG) concentrations, as a result of anthropogenic activities, has been one of warming, with 11 of the last 12 years (1995-2006) ranking among the warmest years in the instrumental record of global surface temperature. Under an A1B SRES emissions scenario, global annual mean surface air temperature change is projected to increase 1.7 to 4.4°C by 2099 (Meehl et al. 2007). An increase in net costs or a decline in net benefits for temperature increases greater than 2°C is *very likely* (>90%), with economies tightly linked with climate-sensitive resources becoming one of the most vulnerable (IPCC 2007b). In the Mediterranean region, annual mean temperatures under an A1B SRES scenario are projected to rise 2.2 to 5.1ºC, with *likely* (>66%) increases in the risk of heat waves, wildfires and drought, which would intensify current hot and dry summer conditions (Alcamo et al. 2007, IPCC 2007b). Given the inherent value of climate for the region's tourism economy, altered weather conditions induced by climate change, particularly high temperatures and heat waves, may have adverse consequences for this sunshine destination.

Tourists have the greatest capacity to adapt to the impacts of climate change, with comparative ease and freedom to avoid undesirable climatic conditions by either altering the timing of their trip or avoiding the destination altogether (UNWTO-UNEP-WMO 2008). Recently, several academic articles and industry reports that discuss the link between tourism demand and climate change (Agnew and Viner 2001, Maddison 2001, Hamilton et al. 2005, Amelung and Viner 2006, Halifax Travel Insurance 2006, Perry 2000a, 2000b, 2001, 2006), have unanimously claimed that by mid-century or earlier, climate change will push temperatures above the threshold for human comfort resulting in the region becoming "too hot" during the summer peak tourism season. These articles are discussed in a report by UNWTO-UNEP-WMO (2008) and in the IPCC fourth assessment report (Alcamo et al. 2007, Wilbanks et al. 2007), which thereby maintains the contention that the number of summer tourists in the region may decrease as a result of warmer temperatures, with tourism demand shifting poleward to cooler, more northern destinations and/or demand changing to the Mediterranean's current shoulder season (spring and autumn). Media statements, sometimes based on statements by the above authors, have gone even further, pronouncing that "the likelihood [is] that Mediterranean summers may be too hot for tourists after 2020" (Guardian 2006 - based on Amelung and Viner 2006), and "by 2030, the traditional British package holiday to a Mediterranean beach resort may be consigned to the 'scrap-heap of history'" (Easier Travel 2006, BBC News 2006 - based on the Holiday 2030 report produced by Halifax Travel Insurance 2006).

While there has been recent progress in assessing which climate criteria tourists refer to when making their decision on when and where to travel, and the ideal climate conditions preferred by tourists (Gomez-Martin 2004, Scott et al. 2008, Moreno et al. 2009), to date there has been no known empirical research published on what tourists perceive to be "unacceptably hot" for any particular destination or tourism segment. Research that objectively examines preferred climates for tourism and climatic thresholds remains a crucial knowledge gap that must be addressed in order to more accurately project the possibility and timing of geographic and seasonal shifts in tourism demand as a result of climate change (Gossling et al. 2006; Scott et al. 2008; UNWTO-UNEP-WMO 200; Moreno 2009; Moreno and Amelung 2009; Perry 2006).

Figure 1.1 Map of the Mediterranean Region

Source: www.worldatlas.com/atlas/infopage/medsea.htm

1.2 Study Goals and Objectives

The overarching goal of this thesis is to reassess the claims in the scientific literature that the Mediterranean will become "too hot" for tourists in the summer as a result of projected climate change by the mid-21st century (or earlier), by collecting primary data via surveys distributed to tourists in the Mediterranean's major source markets. This thesis is the first known attempt to objectively seek to assess what tourists perceive to be "unacceptably hot" in two major tourism environments (urban and beach destinations). It is anticipated that these findings will hold important implications for critically assessing the potential impact of climate change in the study area and other destinations more broadly, and can be used to refine models intended to predict tourism demand and international tourism flows under climate change (e.g., Hamilton 2005, Bigano et al. 2006). In order to realize this goal, six objectives have been formulated to guide this research:

1) Explore the relative importance of climate parameters to tourists and evaluate whether these preferences vary between beach/3S (sun, sand, sea) and urban sightseeing tourism segments.
2) Assess tourists' stated ideal and unacceptable conditions for multiple climate variables (temperature, rain, wind and sky conditions) and evaluate whether these preferences vary between beach/3S and urban sightseeing tourism segments.
3) Investigate whether preferred climates for tourism vary among different activity groups and nationalities.
4) Compare respondents' perceptions of when (months) ideal and unacceptable temperatures exist for tourism in the Mediterranean with actual conditions, according to their stated climate preferences.
5) Reassess the claims in the media and literature that the Mediterranean will become "too hot" for summer tourism by 2020-2030 or by 2050.
6) Examine whether the media's coverage of the Mediterranean climate influences tourists' holiday planning

1.3 Structure of Thesis

This thesis has been organized into five chapters: Introduction; Literature Review; Methods; Results; Discussion and Conclusions. Chapter 1 provides the purpose and goals for this thesis and outlines the research objectives. Chapter 2 provides a review of the literature pertinent to the context of this study, including climate change, tourism, tourist motivation and preferred climates for tourism. Chapter 3 describes the method adopted for this study. Chapter 4 presents the results and key findings collected from the survey instrument. Chapter 6 discusses how the results met the research objectives, elaborates on potential implications for tourism and tourists, presents avenues for future research possibilities and concludes with final thoughts on the challenges of researching climate change impacts on tourism.

Chapter 2
Literature Review

2.1 Introduction

The major areas of research this thesis draws upon are climate change and tourism. This chapter is organized as follows. First, an overview of the science of climate change will be provided, including observed changes over the past 100 years and projections to the end of the 21st century. The projected impacts of future climate change on natural and human systems will also be briefly discussed. Second, the literature related to tourists' travel motivations and particularly climate as a motivating factor will be reviewed. Third, the broad implications of climate change for tourism will be introduced. This will be followed by a detailed discussion of the potential impacts of climate change on tourism in the Mediterranean region, including a summary of the claims by academics and the media that the Mediterranean will become "too hot" for tourism as a result of climate change.

2.2 Climate Change

Given the complexity and importance of understanding the magnitude and implications of human-induced climate change, as well as the urgency to identify adaptation and mitigation options, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988 (IPCC 2008). The IPCC (2008) is a scientific body that counts on the voluntary input of the world's scientific community in order to objectively assess scientific, technical and socio-economic literature from experts in all disciplines and regions of the world. From the periodic assessments planned every five to six years, the IPCC is then able to publish the most comprehensive climate change reports and inform decision-makers worldwide. The IPCC's achievements in bringing together and disseminating knowledge about human-induced climate change was recognized in 2007, with the awarding of the prestigious Nobel Peace Prize.

2.2.1 Observed Climate Change

Since the late 1800s, there has been a total global surface temperature increase of approximately 0.76ºC, with temperature increases rising even faster in the past 30 years (IPCC 2007a). Of the last 12 years (1995-2006), 11 have ranked among the warmest years in the instrumental record of global surface temperature (IPCC 2007a). The observed warming is *very likely* (>90%) due to increased greenhouse gas (GHG) concentrations in the atmosphere, the net effect of anthropogenic activities such as fossil fuel consumption and land use changes. While GHGs occur naturally, the global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have all increased substantially in the last 250 years. Between 1970 and 2005, GHG emissions have risen by 70% globally, with the atmospheric concentration of carbon dioxide (379 ppm in 2005) exceeding the natural range over the last 650,000 years (IPCC 2007a).

It is estimated that global oceans have absorbed more than 80% of the heat that has been added to the climate system because of increased GHG concentrations (IPCC 2007a). This has increased the average ocean temperature to a minimal depth of 3,000 metres, causing sea water to expand and sea level rise (IPCC 2007a). Rising temperatures have also resulted in the decrease of glaciers, snow cover and sea ice, thereby contributing to the IPCC's conclusion that anthropogenic warming has increased the rate of sea level rise from the 19^{th} to the 20^{th} century, with an approximate 3.1mm per year increase between 1993 and 2003 alone (IPCC 2007a). Moreover, scientific evidence from every continent show signs that terrestrial biological systems are responding to climate change. For instance, plant and animal species shifting poleward, earlier timing of spring events, such as fish and bird migration, and observed changes in phenological patterns such as earlier onset of spring events including leaf-unfolding and 'greening' of vegetation (IPCC 2007b).

Furthermore, the degree of climate change is *very likely* (>90%) to increase with GHG concentrations at or above current emission rates (IPCC 2007a). Even if rates of GHG were to be kept constant at year 2000 levels, the effects from prior emissions will ensure impacts persist for more than a millennium due to the time scales required for the removal of GHG from the atmosphere and the thermal inertia of the oceans (IPCC 2007a, b). It is therefore vital to not only recognize the climate change impacts the globe is experiencing today, but to anticipate and prepare for future climate change implications as well.

2.2.2 Projections for the 21st Century

The projected impacts of climate change will vary based on the degree of global economic growth, population change, and magnitude of climate change and adaptation and mitigation actions taken. The IPCC has defined four future GHG emission scenarios, referred to as the Special Report on Emissions Scenarios (SRES). These scenarios allow for numerous variables to be considered when examining how the climate system will respond to changes in GHG concentrations. These SRES scenarios are then inputted into General Circulation Models (GCMs) which create climate projections to the year 2100.

Over the next 20 years, a 0.2ºC increase per decade is projected for a range of SRES emission scenarios, with the greatest warming expected over land and in northern latitudes (IPCC 2007b). Global mean warming (annual mean surface air temperature change) under an A1B scenario is projected to increase by 0.69°C in 2011-2030, 1.75°C in 2046-2065, and 2.65°C in 2080-2099 (Meehl et al. 2007). It is *very likely* (>90%) that weather events and extremes, such as heat waves and heavy precipitation, will become more frequent, widespread and intense during the 21st century (IPCC 2007b). Snow cover, sea ice and permafrost are anticipated to continually melt and contract, with some SRES scenarios projecting a near disappearance of late-summer sea ice in the Arctic by the later portion of this century (IPCC 2007a). Millions of people are expected to be exposed to risks of sea level rise, causing coastal erosion, flooding and eventual immersion of some small island states. Further risks include increased deaths and injury as a result of storms, fires and droughts, as well as increased health risks as a result of greater exposure to vector and food borne deceases spreading into new locations (IPCC 2007b, Alcamo et al. 2007).

Hundreds of millions of people are projected to be exposed to water stress, with currently strained water resources becoming exacerbated as projected climate change will reduce water reliability and availability (Kundzewicz et al. 2007). For example, the IPCC projects with *high confidence* (>80%) that many dry tropic and semi-arid areas (e.g., the Mediterranean Basin and portions of the United States) will suffer from a decrease in water resources, with drought prone areas projected to increase, leading to potential implications for agriculture (decreased crop yields and related food security issues), energy production (reduced hydropower production) and human health (reduced water quality) (Kundzewicz et al. 2007). The most vulnerable industries and communities to these climate change risks are those located along coastal or river flood plains, prone to extreme weather events, and have economies that are closely tied to climate-sensitive resources (IPCC 2007b).

In Europe, it is apparent that climate change has and will continue to impact its countries. An assessment by Thuiller et al. (2005) of the future distribution of plant species revealed that more than 50% of the modeled species in Europe may become vulnerable, endangered, critically endangered, or extinct by 2080 under various SRES scenarios. According to the IPCC, Europe's projected climate will be most sensitive to extreme seasons such as mild winters, hot and dry summers, short duration weather events, and long-term changes such as pressure on coastal areas due to sea-level rise. Additionally, Woodworth et al. (2005) stated that due to regional influences within the continent, sea-level rise in Europe may be almost double that of the global mean sea level rise of 0.18 to 0.59 m by 2100 (IPCC 2007a).

Another distinct feature of climate change in Europe is the projected occurrence of a north-south divide, with regional differences becoming magnified. Temperature projections under an A1B scenario for the period 2080-2099 range from 2.3 to 5.3°C for Northern Europe, compared to Southern/Mediterranean Europe's projection of 2.2 to 5.1°C, which are both greater than the global mean temperature (Christensen et al. 2007). While the annual temperature change between Northern and Southern Europe may be similar, seasonal changes are distinctively different, particularly summer temperatures (1.4-5.0°C compared to 2.7-6.5°C, respectively). The IPCC projects with *very high confidence* (>90%) that Southern Europe will endure more impacts, such as a decrease in forests, crop productivity and annual mean precipitation, particularly due to the higher sensitivity of Southern Europe's natural resources and assets to climate change (Alcamo et al. 2007) .

The Mediterranean (Southern Europe) is already vulnerable to climate variability, with current hot and dry summer conditions projected to continually worsen. Under various

SRES scenarios, annual mean temperatures are anticipated to rise up to 5.1ºC by the end of this century (Alcamo et al. 2007), with the greatest warming to occur in the summer months (up to 6.5°C under an A1B emissions scenario) (Christensen et al. 2007). As a result, increased risk of heat waves and wildfires are *likely* (>66%) (IPCC 2007a). These warmer temperatures also threaten the region's plant and animal species. Conservation International has identified the Mediterranean as one of the most important for biodiversity in the world; with the Mediterranean basin home to more than four times the number of endemic species located anywhere else in Europe (Conservation International 2007). The IPCC has also projected a decrease in the region's mean precipitation and annual runoff, thereby reducing water availability, hydropower potential, creating increasing competition for water resources and an increased risk of drought (Alcamo et al. 2007; IPCC 2007b). The UNWTO has stated that the region's tourism sector is under major threat as a result of increased temperatures, concluding that the Mediterranean is a tourism vulnerability 'hotspot' (UNWTO-UNEP-WMO 2008).

2.3 Global Tourism Patterns

Given the rapid and sustained growth of international tourism over the last 50 years, it should be recognized as one of the most significant economic and social phenomena of the past century. Between 1975 and 2000, tourism grew at an average rate of 4.7% per year, which is approximately 1.3 times faster than global Gross Domestic Product (GDP), ranking growth in the tourism sector higher than any single category of goods or services including petroleum, automotive and telecommunications equipment (UNWTO 2001). International tourist arrivals have increased from 25 million in 1950 to over 903 million in 2007 (UNWTO 2008). This in turn generated an estimated US$ 856 billion in international tourism receipts and US$ 3.6 trillion in economic activity (UNWTO 2008).

Flows of tourists, in terms of volume of international arrivals, are heavily concentrated in a few regions: Europe (58%), North and South East Asia (16%), and North America (12%) (UNWTO 2003). The majority of international tourism takes place intra-regionally, as seen in Europe, where 86.5% of inbound tourism in 2005 came from within the region (UNWTO 2007a), which is in part due to the geography of many small countries in

Europe compared to regions such as North America with only Canada, the United States and Mexico. There are also six major tourism flows that dominate international travel and account for approximately 25% of total arrivals, the largest of which is Northern Europe to the Mediterranean (116 million) and North America to Europe (23 million) (UNWTO 2003). In terms of international tourism arrivals, the Mediterranean is also the world's single most important destination, outnumbering arrival numbers for entire world regions such as the Americas (UNWTO 2009). The importance of the Mediterranean as a tourism destination will be detailed in section 2.5.

2.3.1 Tourist Motivations

The decision on when and where to travel is based upon an assessment of external (economic, social and cultural factors, social class, family composition) and internal (age, risk, distance, perception, personality, attitude) variables (Maslow 1954, Cohen 1972, Plog 1974, Dann 1977, Crompton 1979, Pearce 1993, Gomez-Martin 2005). As this section will highlight, the literature on the variables that contribute to travel motivations is extensive, with an evident common thread; motivation is a dynamic concept that varies by person, market segment, destination, and from one decision-making process to another (Witt and Wright 1992, Uysal and Hagan 1993, Kozak 2002, Gomez-Martin 2005).

Maslow (1954) theorized that the existence of people's needs generates various motives in order to satisfy these needs. In turn, this inspired a number of researchers to suggest that tourists typically have multiple motivations to travel. Crompton (1979) argued that there are seven socio-psychological motives including escape from perceived mundane environment, exploration and evaluation of self, prestige, and enhancement of kinship relationships. Others suggest that motivations are relatively stable over time and can be linked to personality types (Cohen 1972, Plog 1974, Dann 1977, Uysal and Hagan 1993). In contrast, Pearce (1993) believes tourists have limited and continually changing motives which alter as the individual's personality matures.

The manner in which a tourist attempts to address these motivations is influenced by 'push' and 'pull' factors. Push factors are origin related and refer to the undesirable aspects of their home region and the positive desires the tourist feels towards the destination (desire to escape, rest and relaxation, prestige, climate). Pull factors refer to the positive attributes and attractions of the destination (natural resource base, facilities, cultural attractions, climate) (Crompton 1979, Kozak 2002). The destination choice process is therefore related to the tourists' assessment of these factors, as well as their motivation. Notably, climate can be both a push and pull factor.

2.3.2 Climatic Motivations

Throughout much of the tourism motivation literature, climate as a tourism motivation has either been missing altogether or afforded a minor role (Wall and Badke 1994, Perry 2000, de Freitas 2003, Gomez-Martin 2005, Scott et al. 2004 and 2008; Bigano et al. 2005 and 2006, Hamilton et al. 2005). Where climate has been included as a possible motivation factor or a factor in destination choice, it has either been the most (Gomez-Martin 2005, Hamilton and Lau 2005, Mintel International Group 1991, Morgan et al. 2000, Kozak 2002) or one of the most important factors (Gossling et al. 2006, Hamilton 2005, Lise and Tol 2002, Lohmann and Kaim 1999, Maddison 2001, Scott et al. 2008). Mintel International Group (1991) surveyed UK tourists and reported that over 70% of respondents cited 'good weather' as the main motivational factor for their travel, and over 80% of UK respondents in Perry's (2006) survey sited better weather than they can typically find at home as their primary reason for traveling. Over 40% of Germans surveyed by Lohmann and Kaim (1999) cited weather as a major influence on the choice of holiday destination, which was confirmed by Hamilton and Lau (2005) and Hamilton (2005). In addition to traveler surveys, a study conducted by Wall and Badke (1994) found that over 80% of the travel professionals at the national tourism organization believed that climate was a major determinant of tourism in their nation.

The world's major tourism flows highlight the fact that weather is an intrinsic motivator, with 'sun-lust' and 'sunshine destination' packages boasting the highest tourism demand (Bigano et al. 2006, Perry 2006). In Norway, more than 75% of the demand for chartered tours is to sunny destinations (Jorgensen and Solvoll 1996). In the United States, nearly 30% of total international tourism arrivals occur in the 3S destinations of Florida (20.7%) and the Hawaiian Islands (7.2%) (OTTI 2008). Perhaps the clearest evidence can be attributed to the eight million North Americans who annually travel south to the warm and sunny beaches of the Caribbean, and the world's largest flow, 116 million Northern Europeans to the Mediterranean (UNWTO 2003).

2.3.3 Climatic Preferences

While it is clear that climate is a key motivating factor during tourists decision-making process, our understanding of tourists' perception of climate remains very limited (de Freitas 2003, Scott et al. 2004, Bigano et al. 2006, Gomez-Martin 2006, Gossling et al. 2006, Scott et al. 2008). It is not certain whether tourists perceive the climate of a destination holistically or focus on specific attributes when deciding on the timing and destination of their trip (Scott et al. 2008). While some authors argue that temperature is the dominant climate variable (Mieckowski 1985, Becker 2000, Maddison 2001, Lise and Tol 2002, Hamilton et al. 2005, Bigano et al. 2006), other studies found climate variables such as sunshine, absence of rain and wind speed to be as important in some tourism settings (Moreno 2009, Moreno et al. 2009, Scott et al. 2008, Gossling et al. 2006, Mansfeld et al. 2004, de Freitas 2003, Meyer and Dewar 1999). Similarly, it is uncertain if climate preferences for tourism vary by culture or tourism segment. Both Bigano et al. (2006) and Lise and Tol (2002) conclude that temperature preferences vary little amongst nationalities, while Morgan et al. (2000), Scott et al. (2008) and Moreno (2009) found differences in both climate preferences and the relative rating of weather parameters amongst nationalities. Scott et al. (2008) have also found differences between destinations types, with climatic preferences varying between beach, urban and mountain tourism segments. Evaluating such tourism climate preferences has been approached via three types of studies: expert-based, revealed preference and stated preference (Scott et al. 2008). These three study types and their limitations will be discussed next, followed by a comparison across the three approaches (Table 2.1).

First, expert-based studies holistically assess the climate suitability of a tourism destination by evaluating several climate parameters and combining them into a single numerical index or weather types. The most comprehensive index to date is Mieczkowski's (1985) Tourism Climate Index (TCI), which encompasses five sub-indices that describe daytime thermal comfort, daily thermal comfort, precipitation, hours of sunshine and wind speed. Recent studies have begun to assess the potential impact of climate change around the world via the TCI (Scott et al. 2004, Amelung and Viner 2006, Amelung et al. 2007, Nicholls and Amelung 2008). Amelung and Viner (2006) utilize the index to explore impacts of climate change on Mediterranean tourism, stating that the region's climate will rank lower on the TCI under A1F and B1A SRES scenarios for the 2080s during the summer peak season and thereby lead to a drop in tourism demand.

While the TCI is theoretically grounded in biometeorological literature on weather and human comfort, caution must be heeded when using it. The weighting of the index's five climatic variables (e.g., thermal comfort has a 50% weighting) and the thresholds used to obtain the rating systems (e.g., optimal temperatures range between 21 and 27°C, with its rated value following an inverse U-shape curve), are secondarily derived and not objectively tested against the preferences of tourists (de Frietas 2003, Gomez-Martin 2005, de Freitas et al. 2008, Scott et al. 2008, Moreno 2009).

Besancenot et al. (1978) devised an expert-based ranking scheme, comprised of eight 'weather types' for summer tourism. This system is similar to the TCI in that it is also based on the subjective expert opinion of the authors. Gomez-Martin (2006) aimed to test the accuracy of this index by administering surveys to tourists in Catalonia, Spain. The survey sought to define some of the 'weather types' and refine climate thresholds by capturing tourists' impressions of what they considered to be an optimal climate. While the survey results helped to objectively specify some of the weather types used in the study, it still remains unknown how tourist satisfaction may vary among these types and therefore how tourism demand may change when these optimal climate preferences are not met.

Second, revealed preference approach relies on the statistical relationship between secondary measures of tourism demand, such as tourist arrivals, and climate data to infer the climate preference of tourists. While this approach is not based on the subjective expert opinion, the spatial and temporal resolution of the available data in some studies has been described as 'coarse' (Scott et al. 2008) and 'crude' (Hamilton et al. 2005). For instance, international tourism arrival data includes all tourists and thereby does not allow leisure tourists to be modeled separately from business tourists whose travel decisions are influenced far less by climate (Gossling and Hall 2006; Scott et al. 2008). Additionally, the climate data used in such studies, employed the capital city of each destination to represent the climate of the entire nation (Maddison 2001, Lise and Tol 2002), and therefore Washington, DC represents the climate of the United States and Sydney represents the climate of Australia (Scott et al. 2008), with attendant error introduced. An innovative approach to revealed preference studies was carried out by Scott and Jones (2006) and Scott and Jones (2007) which examined the influence of climate on national park visitation and golf participation in Canada, respectively, by developing a model that utilizes statistical regression analysis to examine the current relationship between climate and activity participation to project changes in seasonality and participation under various climate change scenarios. Another novel approach to revealed preference studies is the employment of webcams, which was used by Moreno et al. (2009) to examine crowd density on beaches based on daily weather conditions in The Netherlands.

Stated preference is the third approach to examining climate preferences of tourists. de Freitas (1990) and Mansfeld et al. (2004) surveyed tourists satisfaction with current weather conditions in situ, facing the common limitation that only a narrow range of weather conditions can be assessed without incurring high personnel research costs. Moreover, this method runs the risk of response bias, as surveys administered on days with marginal weather conditions may produce artificially high ratings since those visitors who are not onsite because they found the conditions unacceptable are not available to be surveyed (Scott et al. 2008). Moreno (2009) administered surveys to tourists departing on flights to the Mediterranean in a Belgian and Dutch airport during three days in May and June. Similar to the aforementioned stated preference studies, Moreno’s research runs the risk of bias or skewed results as those tourists who do not like the climate in the Mediterranean during the months the study was carried out, would also not be available to survey.

In an attempt to avoid some of these limitations, Scott et al. (2008) developed the first ex-situ study of tourists’ stated climate preferences, in which surveys were administered indoors, in a controlled climate setting, to tourists in Canada, Sweden and New Zealand. The

Canadian results from this study were also used in de Freitas et al. (2008), to empirically test a newly devised Climate Index for Tourism (CIT), which focused on 3S tourism.[1] The research approach utilized in this study is based on Scott et al. (2008), and therefore the limitations of this data collection approach will be discussed in section 3.7 of the methods chapter.

[1] de Freitas et al. (2008) note that the CIT has various limitations, in which future research is underway by the International Society of Biometeorology's Commission on Climate to validate its usefulness and applicability in tourism. Given the authors' disclaimer, it will not be analyzed in this study.

Table 2.1 A Comparison of Optimal Climate Conditions for Tourism

Study	Study Region [(a)]	Tourism Segment	Temporal Scale	Optimal Climate Conditions			
				Temperature	Precipitation	Sun/Cloud	Wind (km/h)
Besancenot et al. (1978)	France	General	Daily	25-33°C	0 mm	≤25% cloud cover or > 9 sunshine hours	<28.8
Mieczkowski (1985)	Global	General	Monthly	20-27°C [(b, c)]	<15 mm	>10 sunshine hours	<3
Maddison (2001)	United Kingdom	General	Quarterly	30.7°C	-	-	-
Lise and Tol (2002)	OECD Nations	General	T_{mean} for warmest month of the year	21°C	-	-	-
Gomez-Martin (2004)	Spain	Beach/3S	Daily	22-28°C	0 mm	≤25% cloud cover or >11 sunshine hours	<28.8
Hamilton (2005)	Germany	General	Monthly	24°C	-	-	-
Hamilton et al. (2005)	Global	General	Annual	14°C	-	-	-
Bigano et al. (2006)	Global	General	Annual	16°C	-	-	-
Scott et al. (2008)	Canada, Sweden and New Zealand	Beach/3S Urban Mountain	- - -	26.8°C 22.5°C 20.5°C	- - -	≤25% cloud cover ≤25% cloud cover ≤25% cloud cover	≤9
de Freitas et al. (2008)	Canada	Beach/3S	-	26.8°C		≤25% cloud cover	≤9
Moreno (2009)	The Netherlands and Belgium	Beach/3S	-	28.3	-	0% cloud cover or >8 sunshine hours	≤9

Source: Adapted from Scott et al. 2008

(a) Includes either location of study or origin of sample data.
(b) Effective Temperature
(c) 21-32°C when Relative Humidity of 0% and 19-24^{0}C when Relative Humidity of 100%

2.4 Climate Change and Tourism

Climate and tourism interrelate in complex ways. Numerous tourist destinations utilize climate as a natural resource asset, relying on its favourable conditions to attract visitors. Conversely, climate can pose as a deterrent, preventing tourists and tourism operators from engaging in their planned activities due to undesirable or anomalous weather conditions. Any change in climate will not only modify the quality and availability of the resource base upon which tourism activities depend, but also affect demand for certain destinations, inherently resulting in both 'winners and losers' in terms of tourism flows (UNWTO-UNEP-WMO 2008). Given this inherent relationship, tourism is considered a highly climate-sensitive sector, justifiably ranking climate change as a core challenge facing its sustainability in the 21st century (UNWTO-UNEP-WMO 2008). Despite the link, an overt focus on the implications of climate change for tourism has received far less attention by the research community in comparison to other economic sectors such as agriculture and forestry (Scott et al. 2004). Only in the last few years has concern for the tourism sector, regarding climate change, visibly increased (Hamilton et al. 2005, Gossling and Hall 2006, Becken and Hay 2007, Scott et al. 2007, Scott et al. 2008, Moreno and Amelung 2009, Moreno et al. 2009).

In 2003, the First International Conference on Climate Change and Tourism was held in Djerba, Tunisia, marking a turning point in terms of raising awareness for the complex inter-linkages between tourism and climate change (UNWTO 2007b). The Second International Conference was held in 2007, producing the Davos Declaration, a clear commitment for action by the tourism sector to address climate change issues through an array of concrete recommendations (UNWTO 2007a). The scientific community has further responded by advancing tourism's position in the IPCCs 4th Assessment Report (AR4) and by a twofold increase in the number of scientific publications between 1996-2000 and 2001-2005 (Scott et al. 2006, Gossling and Hall 2006). The general community consensus is that all supply and demand facets of tourism will be influenced by climate change (UNWTO 2003, Becken and Hay 2007, Gossling and Hall 2006, UNWTO-UNEP-WMO 2008). The integrated effects will generate both positive and negative impacts on the sector, including widespread impacts in countless areas of economic and social policy such as local small businesses, employment and transportation. It is projected that climate change will directly impact tourism by altering patterns of seasonal attractions and associated visitor flows, increasing natural hazards, and inducing environmental change.

2.4.1 Seasonality

Natural seasonality can be described as the destination's typical seasonal climate, including annual variations in variables such as temperature, precipitation, wind speed, humidity and snow depth (Butler 1994 and 2001). Climate can determine the length and quality of tourism seasons and the suitability of locations for a range of tourist activities such as traditional 'sun, sea and sand' (3S) tourism or winter sport holidays. Seasonality in tourism flows has been researched for decades (BarOn 1975; Soesilo and Mings 1987, Butler 1994 and 2001), continually being described as one of the most problematic and least understood features of the tourism sector (Hall and Higham 2005, Jang 2004, Higham and Hinch 2002, Butler 2001), with its relevance to climate change only recently being acknowledged (Butler 2001, Scott et al. 2006). Such studies have projected that climate change will result in a geographical and seasonal redistribution of tourists, with people visiting higher and cooler latitudes, as well as traveling during the shoulder or winter seasons, by mid-to late century (Lise and Tol 2002, Scott et al. 2003, Scott et al. 2004, Bigano et al. 2005, Amelung and Viner 2006, Amelung et al. 2007, Hamilton et al. 2005, Berrittella et al. 2006).

The seasonal contrast between the source of tourists and the travel destination also drives tourism demand. Since climate change will modify the conditions in both the origin and the destination location, it will change the present position between climate-related push factors in the generating regions and pull factors at the destinations (Scott et al. 2004, Wall and Badke 1994). For example, Giles and Perry (1998) discovered that an unusually hot summer in the United Kingdom coincided with a record-breaking year for the country's volume of domestic tourism and a decrease in demand for international packaged holidays. With climate change projections signifying improved climatic conditions in Northern Europe, a reduction in demand for the current summer peak season in the Mediterranean may become more common (Agnew and Viner 2001, Lise and Tol 2002, Hamilton et al. 2005, Amelung and Viner 2006, Bigano et al. 2006).

2.4.2 Warming Climate as a Hazard

One of the core impacts of projected climate change is the increase in both frequency and magnitude of extreme climatic events. This includes a higher incidence of high temperatures, which contributes to hazards such as heat waves, poor air and water quality, a shift in the geographic range of vector-borne diseases and an increase in the amount and duration of drought conditions. These events can negatively affect the tourism industry such that it interrupts business and increases operating costs via higher insurance premiums, the need for increased or alternative water and energy sources and additional emergency preparedness requirements. Extreme events also have implications for the tourists themselves, ranging from dissatisfaction with their vacation experience, to increased risk for injury and even mortality. All of these hazards are of particular concern for the Mediterranean, a region that has already incurred many of these events and is projected to increasingly face them throughout this century.

Heat waves are *very likely* (>90%) to become more frequent and severe (Alcamo et al. 2007), creating a risk for tourists who are more susceptible to harm because they are not acclimatized (Morabito et al. 2004). In the summer of 2003, Southern Europe was hit with a 10 day heat wave with temperatures well above 40ºC. Official figures released by the Office of National Statistics (2008) indicate that in Portugal there was 2,099 deaths (or 26% above the average death rate), in Italy 3,134 deaths (15% above the average death rate), with the largest casualties occurring in France, with a staggering 14,803 deaths (60% above the average death rate).

Media attention given to heat-related deaths may act as a deterrent to tourism, particularly if such heat waves are to become regularly repeated. In addition to present-day temperatures, tourists' expectations of future temperatures and extreme weather may also affect tourism demand, as stated by the European Union sponsored WISE project (*Weather Impacts on Natural, Social and Economic Systems*) (Bigano et al. 2005). Under A2 SRES regional climate model simulations for the Mediterranean region, the latter half of this century projects similar summer temperatures to those of 2003, indicating that this extreme may indeed become annually repeated (Alcamo et al. 2007).

During an extreme event such as 2003, water scarcity also posed as a severe hazard, particularly given the fact that the physical structure of tourism is highly dependent on its availability (i.e., oceans, lakes and rivers) and its necessary presence to maintain activities (swimming pools, gardens, laundry, washrooms, food production). Per capita water usage for tourism is well above the global average, with the highest demand arising during the driest weather conditions and along sunny coasts or small islands where there are often scarce water resources (UNWTO 2003, Gossling and Hall 2006). These hot and dry conditions were the primary factor behind massive forest fires which raged throughout southern France, Portugal and Spain, destroying campsites and forcing emergency evacuations (Pinol et al. 1998). Impacts such as these are anticipated to increase with the wet season projected to end earlier and the dry season to begin sooner (IPCC, 2007b).

Other risks posed by warming temperatures include increased photochemical smog in the summer, particularly reducing air quality in large cities such as Athens (Agnew and Viner 2001). The creation of a suitable habitat for malaria-bearing mosquitoes as the geographical range of vector-borne diseases shifts northwards into countries such as Spain (Martin and Lefebvre 1995, Alcamo et al. 2007). Higher temperatures also can affect water quality, as the presence of algae increases, which greens the water and thereby has the visual effect of perceived low quality, and in cases of sensitivity, the development of an allergic reaction (Ratz and Vizi 2004). Algal blooms may also form, leading to beach closures, disfiguration of the coastal environment and the death of various aquatic species (Perry 2005).

2.4.3 Climate Induced Environmental Change

Tourism relies heavily on environmental resources, as this is often a key determinant in the attractiveness of a destination. An altered climate could induce a variety of environmental changes including changes in snow cover, vegetation, loss of wildlife productivity and biodiversity and reduced landscape aesthetic, all of which can have direct implications for future tourism demand and use. The United Nations

Educational, Scientific and Cultural Organization (UNESCO) has listed several World Heritage Sites that are among the most popular tourist destinations that are vulnerable to climate-induced environmental change, the list of which features destinations that are sought after for their specific environmental feature. These include Australia's Great Barrier Reef (coral bleaching and biodiversity loss) and the Glacier-Waterton International Peace Park, USA and Canada (vegetation loss and glacier retreat) (UNESCO 2007).

The most popular tourist regions, coastal destinations, are not only considered particularly sensitive to changes, but are projected to experience largely negative impacts (IPCC 2007b). These include sea level rise, which will cause beach erosion, inundation or submersion of flood plains and islands, rising water tables, salinization of aquifers and destruction of coastal ecosystems including damage or loss of fish and coral biodiversity, sea defenses and mangrove swamps. It is also projected that sea temperatures will increase, resulting in more frequent and severe coral bleaching and dying events (IPCC 2007b). In 1998, a bleaching event in Palau led to a 99% reduction in some local species populations, killed one-third of the reefs and led to a reduction in annual tourism revenue by 9% (Hay et al. 2003).

2.5 Anticipated Climate Change Impacts on Mediterranean Tourism

As indicated, the Mediterranean attracts almost one-fifth of total international tourism arrivals (19.4%) (UNWTO 2009) and over 30% of the world's total international tourism receipts (US$ 205 billion) (UNWTO 2007a). The region's popularity among tourists is in large part due to the role of climate as an intrinsic motivator, which may be at risk due to altered weather conditions induced by climate change.

Perhaps the most obvious climatic threat to Mediterranean tourism is increased summer temperatures, which could lead to a host of climate-related hazards including more common and severe heat waves and subsequent heat related deaths (Alcamo et al. 2007). Warmer temperatures may require up to five more weeks of cooling (air conditioning) by 2050, increasing the cost and demand for energy (Alcamo et al. 2007). Water availability is anticipated to decrease as annual average runoff decreases up to 36% in 2070, with summer runoff flows to decrease even further, up to 80% by 2070

(Christensen et al. 2007). Mean precipitation is also projected to decrease, furthering drier conditions. This will lead to a more frequent and prolonged season of forest fire risk and drought, with the longest yearly dry spell increasing by as much as 50% by the end of the 21st century(Alcamo et al. 2007). Sea-level rise is projected to cause land loss, as the inland migration of beaches, estuaries and deltas increases by up to 20% (Christensen et al. 2007). Finally, climate change may increase summer episodes of photochemical smog due to increased temperatures, although model results are inconsistent (Alcamo et al. 2007).

Academic articles that discuss the link between tourism demand and climate change in the Mediterranean (Agnew and Viner 2001, Maddison 2001, Amelung and Viner 2006, Perry 2000a, 2000b, 2001, 2006, Amelung et al. 2007), have unanimously claimed that by mid-century or earlier, climate change will push Mediterranean temperatures above the threshold for human comfort resulting in the region's beach resorts becoming "too hot" during the summer peak season. Amelung and Viner (2006) base their argument on analyses that use the Mieczkowski (1985) TCI, while Agnew and Viner (2001) simply speculate that the comfort threshold will be exceeded without any empirical evidence. Maddison (2001) states that Greece and Spain will experience a reduced summer tourism demand, which is based on the results of a modified pooled travel cost model that incorporates international tourism arrivals data.

The media's statements have been even more bold, pronouncing that "the likelihood [is] that Mediterranean summers may be too hot for tourists after 2020" (Guardian 2006 – based on Amelung and Viner 2006), and "by 2030, the traditional British package holiday to a Mediterranean beach resort may be consigned to the 'scrap-heap of history'" (Easier Travel 2006, BBC News 2006, - based on the *Holiday 2030* report produced by Halifax Travel Insurance 2006). A sample of media headlines produced in chronological order is summarized in Table 2.2.

These "too hot" claims have also begun to filter into highly prominent reports that are relied upon to inform decision-makers worldwide. The IPCC's Fourth Assessment Report states that summer tourism in the Mediterranean is likely to decline as a result of rising, uncomfortable, summer temperatures (Alcamo et al. 2007, Wilbanks et al. 2007). Similarly, a report by UNWTO-UNEP-WMO (2008) states that the impact of projected climate change will decrease the attractiveness of tourism in the summer, with the direct effect potentially significant enough to alter the major intra-regional tourism flow between Northern Europe and the region. However, one important factor that distinguishes the claims made in these reports from those found in academia and the media is that there is no specific date within this century as to when these "too hot" conditions may occur.

Table 2.2 Media Headlines on Future Temperatures and Mediterranean Tourism

Source	Date	Media Headline
BBC News	July 15, 2003	Scorchio! Is Britain the new Mediterranean?
AKI	July 2, 2005	Global warming threatens Mediterranean tourism
Reuters	July 2, 2005	Global warming to wreck Med paradise
Freesun News	Nov 18, 2005	The Mediterranean: too hot to holiday?
The Guardian	July 28, 2006	Climate change could bring tourists to UK - report
The Guardian	Aug 9, 2006	Med to lose pull as Earth heats up
BBC News	Aug 26, 2006	Package holiday 'will be history'
Easier Travel	Aug 27, 2006	Climate change to drive radical changes in global tourism
Reuters	June 15, 2007	Mediterranean to get more deadly hot days: study
The Observer	July 22, 2007	Over-heated Med stokes tourism fears
Travel Trade Gazette	Dec 7, 2007	Packages face extinction

To date, no empirical research has been published on what tourists perceive to be "unacceptably hot" for any particular destination or tourism segment. Therefore media stories foretelling the major threat of a warming climate deterring mass summer tourism in the Mediterranean remain entirely speculative. UNWTO-UNEP-WMO (2008) refutes these "too hot" by 2020-30 claims, stating that it is only in the later decades of the century, with high temperature increases (+6°C), that there could be a notable departure between the perceived optimal temperatures for a beach holiday and the projected maximum summer temperatures. Even with this difference, it is still highly uncertain as to whether or not this temperature increase is sufficient to alter tourist perceptions of the Mediterranean as a destination. In order to assess whether tourism demand in the region may be affected as a result of climate change, a more comprehensive survey that investigates appropriate climatological preference criteria is required. What tourists perceive as ideal, acceptable and most importantly unacceptable climate conditions needs to be examined if we are to assess whether the Mediterranean could become “too hot” for tourists at anytime in the future.

2.6 Chapter Summary

While it is fair to state progress has been made in assessing the importance of climate and which climate-related criteria tourists use to make their decisions, its role in destination choice is more complex than assumed in most current destination choice models (Scott et al. 2008, Gossling and Hall 2006, Bigano et al. 2005). Other than in very general terms, the particular role climate plays in destination choice and its effects on tourism remains comparatively unknown. There are very few studies that identify optimal or preferred conditions for tourism, even fewer which examine the sensitivity of tourism to atmospheric conditions generally, and no studies that address tourists’ climatic thresholds. The limited studies that do assess human comfort thresholds are based largely on subjective expert opinion rather than empirical evidence. With so many uncertainties surrounding both what future climate conditions to expect and the climate-tourism relationship, it is difficult to assess what impact a warmer climate may have on the Mediterranean. More observational research is needed to determine the actual responses, perceptions, needs, reactions and expectations of tourists in order to understand their potential response to future climate.

The following chapter will describe the research approach adopted in this study to assess the potential impacts that climate change, and more specifically the impact of warmer temperatures, may have on Mediterranean tourism. Chapter 4 will then present the quantitative results generated from this approach and chapter 5 will discuss tourists’ responses to climate change and increased temperatures and the potential implications these responses may have for the region.

Chapter 3
Methods

3.1 Introduction

This chapter describes the methods used to determine the stated climate preferences of a sample of European tourists and assesses the potential impacts of increased temperatures on tourism in the Mediterranean region. The rationale for selecting the Mediterranean region as the focus of this study, as well as details on the development and distribution of the survey instrument utilized to collect the primary data, are provided. This chapter concludes by addressing some of the limitations of this research approach.

3.2 Study Area

The Mediterranean region was selected as the study area for this analysis for two central reasons: (1) it is the world's most popular tourism destination, and (2) academic studies and the media continue to make claims that by mid-century or earlier, climate change will cause Mediterranean temperatures to become "too hot" for summer tourism, when no empirical evidence exists to define a threshold of "too hot" for tourists.

The Mediterranean as a region consists of 25 countries that surround the almost enclosed Mediterranean Sea (Figure 1.1). The 46,000 kilometres of coastline is at the crossroads of Europe, Africa and the Middle East, supporting a diverse economy, a blend of eight main cultural and linguistic subsystems, and three monotheistic religions (UNWTO 2007b). More specifically, the Mediterranean includes the European countries of Portugal, Spain, France, Monaco, Italy, Malta, Slovenia, Croatia, Bosnia and Herzegovina, (former)Yugoslavia, Albania, Serbia and Montenegro, Greece and Cyprus; the African countries of Egypt, Libya, Tunisia, Algeria and Morocco; and the Middle Eastern countries of Turkey, Syria, Lebanon, Palestine and Israel (UNWTO 2007a).

Over 179 million international tourists arrived in the Mediterranean in 2008, distinguishing the region as the world's most popular tourism destination (UNWTO 2009). The region continues to experience substantial growth in arrivals over the past few decades, increasing by 3% in 2004, and 6% in 2005 (UNWTO 2007a). The mature destinations of France, Spain and Italy continue to lead the region in terms of tourism arrivals at 76 million, 56 million and 36 million international tourists respectively, which accounts for slightly less than two-thirds of the Mediterranean's total international arrivals (UNWTO 2007a). Emerging destinations in the East Mediterranean and North Africa are also beginning to gain a large share of the region's popularity, such as Turkey, which in 2005 ranked fourth in the region at 20 million arrivals with 15 billion Euros generated in international tourism receipts (UNWTO 2007a).

Climatic conditions, attractive landscapes, cultural heritage and striking coastal environment are among the factors that have turned the Mediterranean into a major tourist destination. The Mediterranean coast and its numerous islands constitute a prime destination for those seeking sun, sea and sand (3S) tourism. The European Union estimates that over 60% of trips within Europe take place by the sea (UNWTO 2009) with 'sunshine destination' and 'sun-lust' packages obtaining the highest tourism demand in the region, particularly during the peak summer season (UNWTO 2007a, Bigano et al. 2006, Perry 2006).

3.3 Research Approach

A quantitative approach, utilizing a structured, closed-ended survey instrument, was deemed the most suitable method to collect the necessary data to achieve the six objectives of this study. First, the reach of surveys often exceeds other forms of data collection (Babbie, 2001). A quick and efficient manner in which to capture a large number of respondents was crucial given the relatively large and geographically dispersed sample that was asked to participate. Surveys are also time-effective, with most respondents familiar with studies that utilize standardized surveys, allowing the questionnaire to be completed and collected quickly (approximately 10-15 minutes). Once the surveys are completed, data can be entered into a variety of computer software packages which further enables efficiency through data turnover and ease of statistical analysis (Babbie 2001).

There were also advantages to mailing the survey, particularly the cost-effectiveness. Given the sample size and locations, it would be difficult for the researcher to be present while administering the surveys without incurring significant financial costs. In addition, not having the researcher in attendance while the questionnaire was being completed eliminates any interaction with the respondent, reducing the introduction of potential biases (Babbie 2001; Creswell 2003).

The literature review also indicated that surveys are a relevant and effective means to analyze a research topic from a tourists' perspective. For example, surveys have been carried out in studies that assess tourists' motivations (Hamilton 2005, Kozak 2002, Lohmann and Kaim 1999, Mintel International Group 1991, Perry 2006), destination choice (Hamilton 2005, Hamilton and Lau 2005) and climate preferences (Morgan et al. 2000, Gomez-Martin 2004, Mansfeld et al. 2004, Scott et al. 2008, Moreno et al. 2009). These studies signify that surveys are a widely-used method employed by researchers to investigate similar objectives to those of this study.

3.4 Survey Design

The survey instrument designed for this study has been modeled after Scott et al.'s (2008) survey method, which was the first known ex-situ study of tourist climate preference. Consistent with Scott et al. (2008), this survey investigates the perceived optimum climate conditions for tourism and the relative importance of four climate parameters in major tourism environments in the study area. As a second generation survey, this instrument more precisely determines the range of optimal climate preferences for beach and urban tourism. This survey also explores additional questions, including the thresholds within the continuum from 'ideal' to 'unacceptable', activity preferences, perceived climate ideals and thresholds, and the influence of the media on holiday planning.

The survey begins with a cover letter that clarifies the purpose of the research study, identifies who is conducting the survey research, and how the survey is being carried out (Appendix A). The survey consists of three main sections: (1) travel experience in the Mediterranean region, (2) the influence of weather on Mediterranean holidays, and (3) the influence of media on Mediterranean holiday planning. The survey elements of each section are further explained below, with the final version available in Appendix A.

3.4.1 Travel Experience in the Mediterranean Region

The opening section of the survey instrument was intended to understand respondents travel experience and visitation patterns in the Mediterranean. First, a series of activities were listed and respondents were asked to rate what activities they would plan to do while on a multi-day Mediterranean holiday. It is important to understand the whether the respondent is an active or passive tourist, since climate often determines the suitability of a tourist activity, and the climatic comfort of tourists while engaged in these activities.

Second, the survey aimed to establish the number of times the respondent traveled to the Mediterranean for a beach and urban sightseeing holiday, and the month(s) in which they experienced the region. Respondent were also asked to select the month(s) that they believed had ideal and unacceptable temperatures for a beach and urban holiday. The results were used to determine which respondents had first-hand experience of the region's climate, from those with perceived knowledge on the region's climate.

3.4.2 The Influence of Weather on Mediterranean Holidays

The second section is divided into two subsections, (1) beach holidays and (2) urban sightseeing holidays, and asked respondents to assume they were booking a multi-day trip to the Mediterranean. The purpose of this section was to examine what the respondents defined as their climatic ideals and thresholds based on four climate parameters; temperature, rain, wind and sky conditions. For temperature and rain conditions, respondents were able to select any number from the range. For example, respondents could circle any number of temperature degrees from 15ºC to 45ºC or any length of rain time between 0 minutes and 5 hours. This represents the first known survey to not only assess unacceptable climate conditions for a specific type of tourism, but is also the first known survey that provides a range for respondents to select from. Previous surveys had respondents select from a predetermined range or category that the researcher established, or had respondents indicate a single ideal temperature degree. This method is novel as some tourists may feel that a range or several degrees are ideal (e.g., 28-30°C rather than just 28°C) and thereby forcing respondents to chose one temperature may be an inaccurate representation of preferences.

3.4.3 The Influence of Media on Mediterranean Holiday Planning

The purpose of the third section of the survey was to evaluate the influence of the media when planning a multi-day holiday to the Mediterranean. The survey instrument included an article from the popular UK newspaper, *The Observer*, which addressed the 2007 heat wave that set records over much of southern Europe for being the hottest summer in decades. Respondents were then asked to rate the influence this or similar articles would have on their travel plans both before and after booking Mediterranean holiday reservations.

3.4.4 Pre-Testing

A pre-test survey (n=129) was conducted on undergraduate students attending a first year class in the Faculty of Environment at the University of Waterloo, Canada. Pre-testing was undertaken to gain some initial feedback and gauge the construct validity (ensuring the survey achieves results that accurately reflect the concept being measured) and reliability (consistency in results being measured). Slight modifications were made to improve the clarity and wording of some questions. The survey instrument received ethics approval through the Office of Research Ethics at the University of Waterloo in February 2009.

3.5 Survey Implementation

Between March and May 2009, 1,000 surveys, in English, were mailed to nine universities in five source market countries in the mid to northern latitudes of Europe. Similar to Scott et al. (2008), the surveys were administered in a climate controlled classroom setting. Participants were provided with a covering letter on the front of the survey, introducing the purpose and content of the questionnaire (Appendix A). Respondents were informed that participation in the study was voluntary and that confidentiality was ensured, given that the questionnaire was anonymous. The survey took approximately 10 to 15 minutes to complete. Respondents were asked to hand the questionnaire back to their respective class instructor, who was then responsible for mailing the completed surveys back to the researcher. A total of 866 surveys were returned (Table 3.1).

Table 3.1 Survey Distribution and Return[2]

Country	City	University	Surveys Completed	
Austria	Innsbruck	Universität Innsbruck	204	230
	Salzburg	Universität Salzburg	26	
Germany	Munich	Ludwig-Maximilliäns-Universitat Műnchen		303
The Netherlands	Breda	NHTV Breda University	113	163
	Maastricht	Universiteit Maastricht	50	
Sweden	Kalmar	University of Kalmar	64	81
	Umeå	Umeå Universitet	17	
Switzerland	St. Gallen	Pädagogische Hochschule des Kantons St. Gallen	49	89
	Zurich	University of Zurich	40	
Total				n=866

3.6 Data Analysis

All the survey questions and responses were coded, inputted and examined using the Statistical Package for the Social Sciences (SPSS), a software program that utilizes descriptive and inferential statistical tools to analyze quantitative data. Various statistical techniques were employed to explore and analyze the quantitative data collected through the questionnaire. The most frequently used techniques were descriptive statistics to examine responses to each question, as well as independent T-tests, one-way ANOVAs, Chi-square and post hoc analysis to examine the differences in variables between nationalities and the activity preference groups. All statistical analyses employed a 95% confidence limit ($p<.05$). Microsoft *Excel* was also utilized to graph the responses to various climate preference and threshold questions.

To provide context to the results, five Mediterranean beach and urban destinations were selected for climate analysis: Milos and Athens, Greece; Nice and Marseille, France; Costa Brava and Barcelona, Spain; Antalya and Istanbul, Turkey; Cyprus; and Venice, Italy. These locations were chosen based on their popularity as a tourist destination and for their distribution across the region from east to west. These locations are illustrative only, with substitution for other destinations possible in future studies. To evaluate respondents perceived months with ideal temperatures, as well as current stated

[2]Electronic (PDF) and paper surveys were sent, making it difficult to determine the response rate. A total of 750 paper copies were mailed with 535 returned, and 331 printed copies of the PDF were returned.

preferences, monthly normals (average daytime high temperatures) from the baseline period of 1961 to 1990 (WMO 1996) was gathered for all five beach and urban destinations.

To calculate the future climate suitability of the Mediterranean for tourism, projected temperature increases based an A1B emission scenario was applied to the baseline temperatures for all five beach and urban locations. This scenario was chosen because the A1scenario family is the warmest (representative of a 'worst case' climate change scenario), while A1B represents the balance between A1F1, which is fossil fuel intensive, and A1T, which is based on non-fossil energy resources (IPCC 2007a). The A1B projections are based on regional averages from a set of 21 Global Climate Models available from the IPCC (Christensen et al. 2007). "The mean temperature responses are first averaged for each model over all available realizations of the 1980 to 1999 period from the 20th Century Climate in Coupled Models (20C3M) simulations and the 2080 to 2099 period of A1B," with minimum and maximum values from the computed difference between these two periods included in this study (Christensen et al. 2007, p. 854). Under the minimum A1B emissions scenario, seasonal temperatures in the Mediterranean are projected to increase between 1.7°C (DJF) and 2.7°C (JJA), and under the maximum A1B scenario, seasonal temperatures are projected to increase between 4.5°C (MAM) and 6.5°C (JJA) (Christensen et al. 2007). The results of the data analysis are presented in chapter 4.

3.7 Limitations of Research Approach

Similar to Scott et al. (2008), there are two known limitations to this analysis due to the sample that participated. First, distributing the surveys solely to students attending university controls for a few demographic variables, primarily level of education and age (almost exclusively under the age of 30 years). Consequently, the results from this study should only be considered to represent the young adult market segment, and not the broader population of leisure tourists.

Second, the spatial coverage of the survey was geographically restricted to five Mediterranean source markets. However, it is important to note that the student groups are not homogeneous. Europeans have diverse geographical and cultural roots, with a small sample of the respondents (<5%) that self-identified as having originated in a region with a climate dissimilar to the region where the survey was completed. This could introduce some error in terms of the conclusions made about tourists' climate preferences at a national level.

The researcher opted to administer the survey via mail since distributing the questionnaire in a face-to-face fashion would be both cost and time consuming. Mail-out surveys also have the advantage of reducing the introduction of biases since the presence of the researcher and the interaction with the respondent is not there. However, a limitation is the inability for the researcher to provide on-the-spot clarification to the respondents should they misunderstand the meaning of the questions. Having the researcher administer the survey may have increased respondent confusion, minimizing the number of unanswered questions and increasing the response rate.

Limitations also arise as a result of using all closed ended questions in the survey instrument. Closed-ended questions are less flexible, as pre-selected answers can limit the prospect of other plausible responses and do not enable the participants an opportunity to provide answers on their travel experiences or preferences in more detail. Open-ended questions provide the advantage of having answers that are not restricted by the researcher's knowledge and perspective, so the probability of missing important factors is lowered. To try and curb this limitation, a box for comments was provided at the end of the survey to allow respondents to identify problems and make suggestions. In the future, adding open-ended alternatives to some questions may be a beneficial option in order to balance out the strengths and weaknesses of the two methods (open and closed) and achieve more representative results.

3.8 Chapter Summary

In summary, a self-administered questionnaire was mailed to participants in source markets for the Mediterranean as the primary means of data collection in this study. The survey was used to collect research amenable to quantitative analysis on tourists' climatic preferences and thresholds, as well as the influence of weather and the media when planning a multi-day Mediterranean holiday. The results of the survey are summarized in the next chapter.

Chapter 4
Results

4.1 Introduction

The results of the questionnaire are outlined in seven sections. The first section presents the respondent characteristics, focusing on tourism activity preferences and experience in the Mediterranean. The second section discusses what months the respondents perceive to have ideal and unacceptable temperatures for a multi-day holiday in the region. The third and fourth sections address the relative importance of climate for beach and urban holidays, as well as respondents' climate preferences and thresholds. Section five compares the results across two activity groups and the five source market samples. The final two sections report the influence of weather information and the media has on the respondents' holiday planning.

4.2 Respondent Characteristics

The respondent's travel profiles are presented below. The geographic location comprises the country and university that the survey was completed in, as well as the country in which the respondent grew up or spent most of their life. The travel activities profile describes the rate of occurrence that respondents would undertake various travel activities while on a Mediterranean holiday. Travel patterns include the number of times and the months that respondents' traveled to the Mediterranean. In terms of respondent demographics, as discussed in the methods chapter, the surveys were distributed to university students attending undergraduate classes. The survey results can therefore be said to be represent a young-adult tourism market segment, with respondents almost exclusively under the age of 30 years old.

4.2.1 Geographic Location

A total of 866 university participants completed the climate preference survey, with respondents classified into five geographical segments according to the source market in which the respondent completed the survey. (1) *Austria*, which consists of participants from Universität Innsbruck and Universität Salzburg (n=230). (2) *Germany*, which includes respondents from Ludwig-Maximilliäns-Universitat Műnchen (n=303). (3) *The Netherlands*, including NHTV Breda University and Universiteit Maastricht (n=163). (4) *Sweden*, University of Kalmar and Umeå Universitet (n=81). (5) *Switzerland*, Pädagogische Hochschule des Kantons St. Gallen and the University of Zurich (n=89).

A small sample of the respondents (4.7%) self-identified as having grown up in or spent most of their life in a region outside of the source markets[3], and in a climate dissimilar to the region where the survey was completed. This could introduce some error in terms of the conclusions made about tourists' climate preferences at a national level.

4.2.2 Travel Activities

As outlined in Table 4.1, from the list of 15 activities provided in the survey, swimming and sunbathing/sitting on a beach were by far the most frequently selected activities that respondents identified as 'always' undertaking while planning a Mediterranean holiday (54.1% and 48.2%, respectively). This is almost double the third most selected activity, shopping (24.5%). When combining the responses from "always" and "most times," 86.8% of respondents selected swimming, followed by sunbathing/sitting on a beach (79.9%), shopping (56.2%) and visiting cultural/historical sites (46.1%). One-third of the sample also selected water sports and hiking (34.4 and 33.9%, respectively).

Based on these selections, the majority of respondents plan highly weather sensitive activities for their multi-day holiday. With the exception of shopping and indoor cultural or historical sites, these recreational activities all take place outdoors. Therefore, this sample is both exposed to, and heavily reliant on, the weather conditions to carry out their planned tourism activities. This may have implications should the weather conditions alter as a result of projected climate change. However, it is difficult to draw strong conclusions on the activity preferences of this tourist sample. In most cases, more than half of the respondents selected "rarely" or "never," and more than two-thirds selected between "as often as not" and "never," for the list of activities provided.

[3] Australia, Bangladesh, Brazil, Cameroon, India, Italy, Kenya, Malta, Spain, Turkey, USA and Zimbabwe.

Respondents' activity preferences will be further discussed in section 4.6.1, in which activity choice is compared to the relative importance of weather variables and stated climate preferences and thresholds.

Table 4.1 Holiday Motives for a Mediterranean Holiday (% of respondents)

	Always (%)	Most Times (%)	As Often As Not (%)	Rarely (%)	Never (%)	Mean Score (1-5)
Visit cultural/historical sites	18.1	28.0	29.4	23.1	1.3	2.6
Visit theme parks	3.5	13.2	29.3	44.2	9.8	3.4
Water sports	11.0	23.4	21.8	30.4	13.4	3.1
Kayaking, Canoeing, Paddling	3.7	14.2	19.7	35.3	27.1	3.7
Hiking/Cycling	8.9	25.0	23.6	26.2	16.3	3.2
Golfing	0.8	2.7	3.4	12.0	81.2	4.7
Scuba Diving/Snorkeling	9.3	21.2	21.8	25.3	22.4	3.3
Horseback riding	2.7	5.7	11.0	19.9	60.7	4.3
Attend art performances	3.5	10.0	22.5	32.6	31.4	3.8
Attend a sporting event	4.5	18.2	22.6	30.7	23.9	3.5
Shopping	24.5	31.7	23.3	16.4	4.1	2.4
Wildlife viewing	10.4	28.6	28.2	23.4	9.4	2.9
Sunbathing/Sitting on a beach	48.2	31.7	13.2	5.8	1.0	1.8
Swimming	54.1	32.7	8.2	3.9	1.0	1.7
Spas	4.1	14.0	21.9	28.7	31.3	3.7

4.2.3 Travel Patterns to the Mediterranean

To assess the frequency of travel to the Mediterranean, respondents were classified into one of six tourist segments. (1) *Never been on a Mediterranean holiday*; (2) f*irst-time*, which consists of respondents that have holidayed in the Mediterranean once; (3) *a few times,* which consists of respondents who have holidayed in the region two or three times; (4) s*everal times*, representing four to six visits; (5) *frequently*, representing seven to 10 times; and (6) *very frequently*, representing 11 or more holidays in the Mediterranean (Table 4.2).

It is not surprising, given the popularity of the Mediterranean region for these source markets, that the majority of the survey respondents have been on a multi-day beach holiday (86.2%) and/or an urban sightseeing holiday (57.3%). Over half of the survey respondents have been on a Mediterranean beach holiday more than once, and despite the young age of the survey sample, many are experienced travelers with the largest percentage of respondents having gone on a beach vacation in the region four or more times (61%). While over one-third of the respondents have been on an urban sightseeing holiday more than two times, this tourism segment is clearly less popular than a beach holiday. Almost 30% more of the survey respondents have gone on a beach holiday then an urban sightseeing holiday, which supports the results found in the activities preference section.

Table 4.2 Travel Frequency to the Mediterranean (% of respondents)

Holiday frequency in the Mediterranean	Beach (%)	Urban (%)
Never been on a Mediterranean holiday	13.8	42.7
First Time	6.6	16.6
A Few Times (2-3)	18.6	22.3
Several Times (4-6)	23.4	12.0
Frequently (7-10)	21.5	5.0
Very Frequently (11+)	16.1	1.4

The peak tourism season for the Mediterranean is during the summer months, and it is therefore not surprising that the clear majority of respondents have traveled to the region for a beach holiday during July and August (Table 4.3). As discussed in chapter 2, the popularity of these months is likely due to a combination of climatic and institutional seasonality factors. The shoulder months of June and September are also popular travel months among survey sample, with over 40% experiencing a multi-day holiday during these months. Less than 5% stated they have traveled during the late fall, winter and early spring months.

The urban sightseeing segment is more evenly distributed throughout the year, with over 25% of respondents traveling between the months of April to September. The most popular month appears to be May[4] (38.4%), with the winter months recording the lowest travel numbers at less than 6%.

Table 4.3 Mediterranean Beach Holiday Experience by Month (% of respondents)

Month											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Beach											
1.1	1.9	4.2	10.7	26.5	45.8	70.7	73.8	42.8	11.8	1.4	1.6
Urban											
4.6	6.0	16.5	30.3	38.4	27.9	28.3	32.3	32.3	22.5	6.4	4.0

4.3 Perceptions of Seasonal Temperature Conditions for Holiday Travel to the Mediterranean

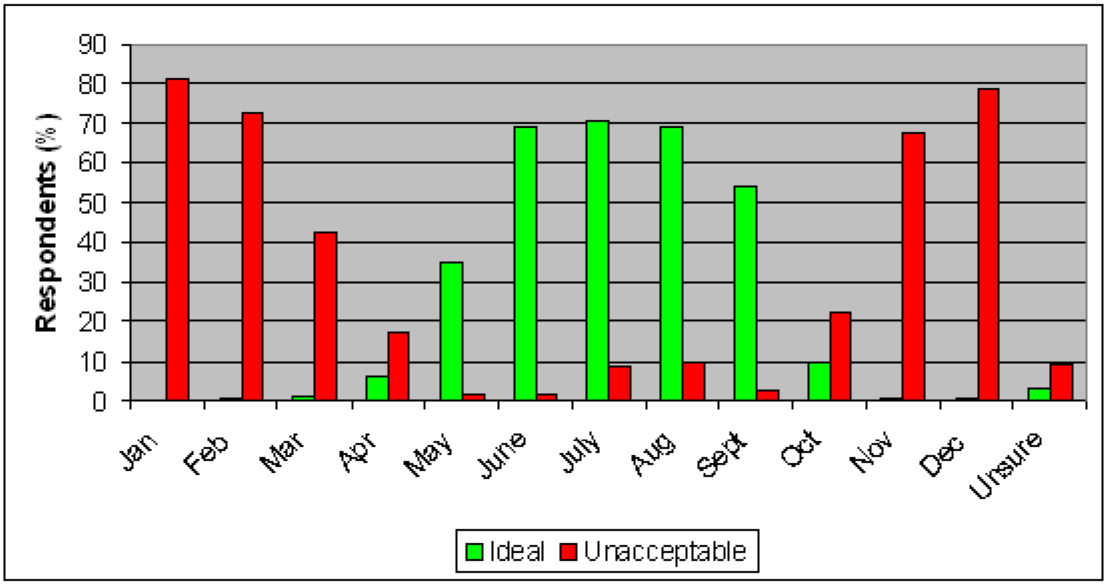
Respondents were asked to identify the month(s) that have ideal and unacceptable temperatures for a multi-day holiday, based on their current knowledge of the Mediterranean climate. The temperature perceptions are first presented for the beach holiday tourism segment, followed by the urban sightseeing segment.

4.3.1 Temperature Perceptions for Beach Holidays

As shown in Figure 4.1, the majority of respondents identified June (69.3%), July (70.8%), August (69.2%) and September (54%) as months with ideal temperatures for a Mediterranean beach holiday. Months with unacceptable temperatures were perceived to be November (67.8%), December (79.1%), January (81.6%) and February (73%).

[4] Various public and religious holidays occur in Europe during May (e.g., Labour Day, Memorial Day, Pentecost), which could explain the popularity for tourism during this month.

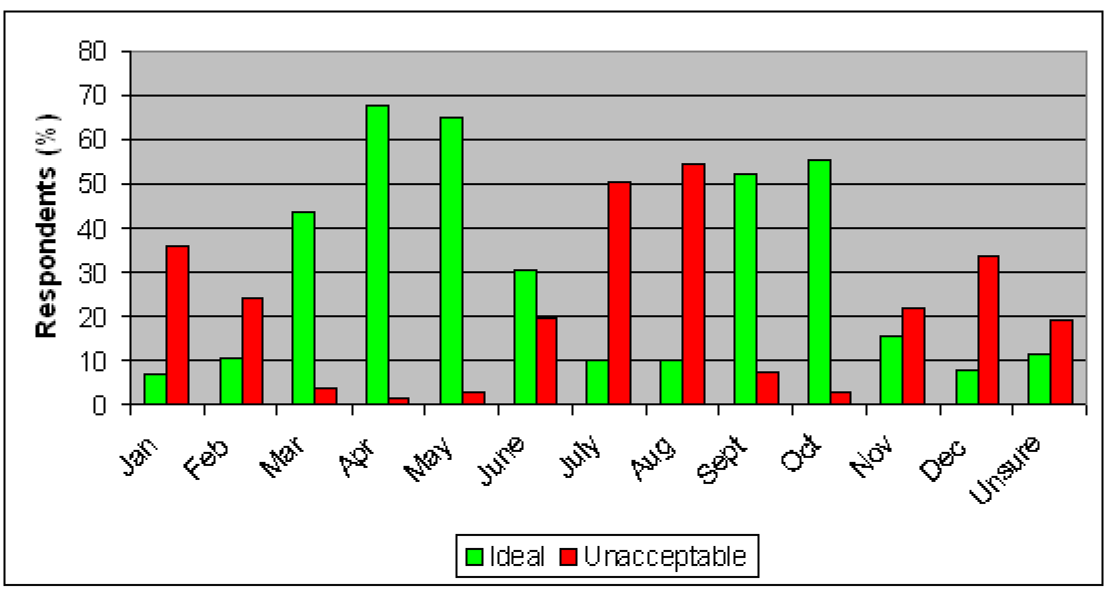
Figure 4.1 Perceived Ideal and Unacceptable Months for a Beach Holiday



4.3.2 Temperature Perceptions for Urban Holidays

As shown in Figure 4.2, the majority of respondents identified April (67.7%), May (64.9%), September (52.6%) and October (55.5%) as months with ideal temperatures for a Mediterranean urban holiday. Months with unacceptable temperatures were perceived to July (50.7%) and August (54.3%), suggesting the respondents may already perceive these destinations to be too hot.

Figure 4.2 Perceived Ideal and Unacceptable Months for an Urban Holiday



4.4 Climate Preferences for Beach Holidays

The following section describes the results from the questionnaire that examined the respondents' climatic preferences for a multi-day Mediterranean beach holiday. The rating of climate parameters is presented first, followed by an in-depth look at the ideal and thresholds values for the four climatic variables of temperature, rain, wind and sky conditions.

4.4.1 Importance of Climate Parameters

The first objective of this study was to examine the relative importance of five different climate parameters; absence of strong winds, absence of rain, sunshine, air temperature and water temperature. The importance rating for a beach holiday is outlined in Table 4.4. Sunshine was rated as the most important variable for a beach holiday, with a mean score of 4.6. Absence of rain (4.4) and comfortable air temperature (4.3) followed closely behind, with comfortable water temperature and the absence of strong winds rating the lowest in importance (3.9 and 3.3, respectively).

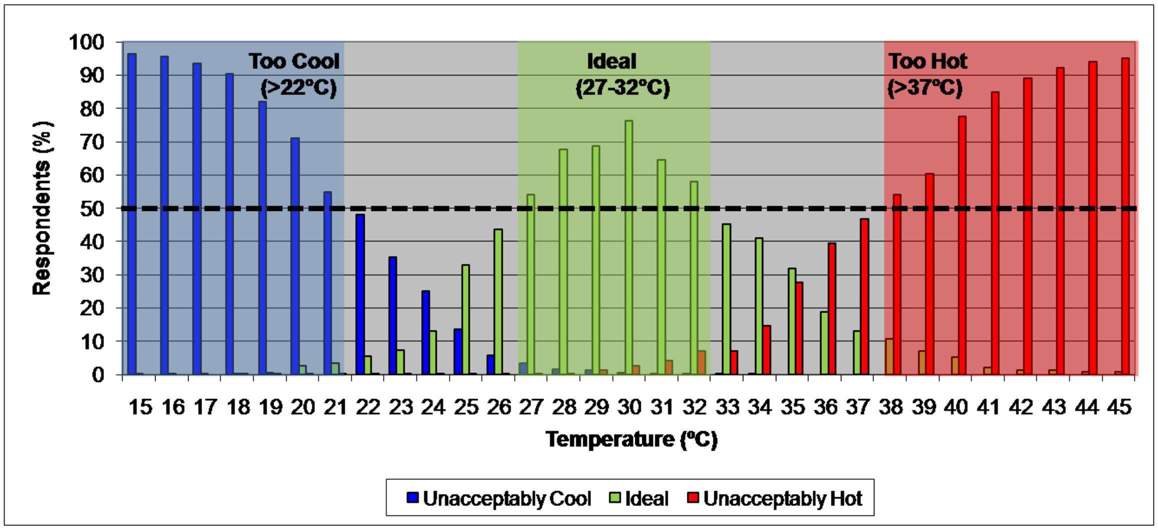
Table 4.4 Importance of Climate Variables for Beach Holidays

	Not Important (%)	(%)	Neutral (%)	(%)	Extremely Important (%)	Mean Score (1-5)
Sunshine	1.4	1.5	3.9	26.3	66.9	4.6
Absence of rain	1.7	2.9	7.1	31.0	57.2	4.4
Comfortable air temperature	1.5	2.2	9.8	42.4	44.1	4.3
Comfortable water temperature	1.8	4.6	25.0	41.6	27.1	3.9
Absence of strong winds	7.0	12.1	34.9	37.5	8.5	3.3

4.4.2 Temperature

Three temperature classifications for beach holidays have been identified in this study; ideal, unacceptably cool and unacceptably hot, with each classification defined by the majority of responses (>50%). Figure 4.3 illustrates the distribution of ideal and cool/hot thresholds for a beach holiday. The majority (>50%) of respondents preferred temperatures that range between 27°C and 32°C, with an additional 10% captured if the range of temperatures was increased between 26°C and 34°C. The majority (>50%) identified less than 22°C as unacceptably cool and greater than 37°C as unacceptably hot, with an additional 7% stating less than 23°C and greater than 36°C as unacceptable. Between the temperature classifications, transition zones were observed between the ideal and unacceptably cool/hot temperatures.

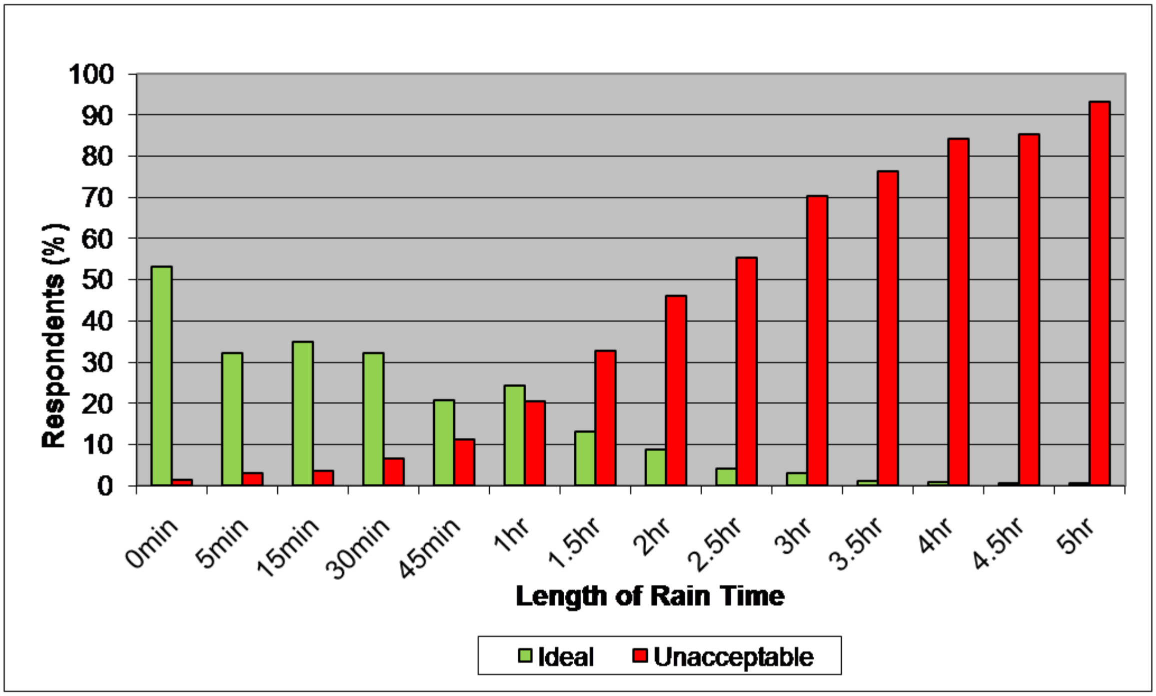
Figure 4.3 Rating of Temperatures for Beach Holidays



4.4.3 Rain

Two rain classifications have been identified in this study; ideal and unacceptable length of time that it would rain during a Mediterranean beach holiday, with each classification defined by the majority of responses (>50%). The majority of respondents preferred no rain, with an additional 20% captured if the range of rain times was increased to less than 30 minutes (Figure 4.4). The majority identified more than 2 hours of rain as unacceptable, with an additional 10% stating that more than one and a half hours of rain is unacceptable. Between the rain classifications, a transition zone is observed.

Figure 4.4 Rating of Rain Conditions for Beach Holidays



4.4.4 Wind

As identified in Table 4.5, the clear majority of respondents (86.2%) stated the ideal wind condition for a beach holiday is a light breeze. The remaining respondents prefer moderate wind (7.5%) or no wind (4.6%), with less than 2% stating ideal wind conditions are strong to very strong winds. As expected, the majority of respondents stated that strong to very strong winds are unacceptable for a beach holiday (74.6% and 91.6%, respectively). A notable percentage of respondents also stated that no wind is unacceptable (13%), likely a result of the preferred cooling effect that a breeze or moderate wind would provide on a beach. An additional 5.7% stated that all wind conditions are acceptable for a beach holiday.

Table 4.5 Ideal and Unacceptable Wind Conditions for Beach Holidays

Assume you are booking a multi-day beach holiday in the Mediterranean. What are the ideal and unacceptable wind condition(s) for your holiday?		
Variable	Ideal (%)	Unacceptable (%)
No wind	4.6	13.0
Light breeze (1-9km/h)	86.2	1.0
Moderate wind (10-40 km/h)	7.5	26.2
Strong wind (41-60 km/h)	1.3	74.6
Very strong wind (61-90 km/h)	0.4	91.6
All wind conditions are acceptable	-	5.7

4.4.5 Sky Conditions

Table 4.6 shows that the majority of respondents prefer 25% cloud cover as their ideal sky condition for a beach holiday (55.6%), followed by 0% cloud cover (40.1%). A small percentage of respondents identified 50% cloud cover as ideal, with less than 1% of identifying 75% or 100% cloud cover as ideal. As expected, the majority of respondents stated that 75% and 100% cloud cover is unacceptable (70.4% and 91.2%, respectively), followed by 34.3% of respondents stating 50% cloud cover as unacceptable. A small percentage of respondents stated all cloud conditions as acceptable for a beach holiday (7.5%), and even less identified 0% or 25% cloud cover as an unacceptable sky condition for a beach holiday (6%).

Table 4.6 Ideal and Unacceptable Sky Conditions for Beach Holidays

Assume you are booking a multi-day beach holiday in the Mediterranean. What are the ideal and unacceptable wind condition(s) for your holiday?		
Variable	Ideal (%)	Unacceptable (%)
0% cloud	40.1	4.1
25% cloud	55.6	1.9
50% cloud	3.7	34.3
75% cloud	0.5	70.4
100% cloud	0.1	91.2
All cloud conditions are acceptable	-	7.5

4.5 Climate Preferences for Urban Holidays

The following section describes the results for the respondents' climatic preferences for a multi-day Mediterranean urban sightseeing holiday. The rating of climate parameters is presented first, followed by an in-depth look at the ideal and thresholds values for the four climatic variables of temperature, rain, wind and sky conditions.

4.5.1 Importance of Climate Parameters

The first objective of this study was to examine the relative importance of five different climate parameters; absence of strong winds, absence of rain, sunshine, air temperature and water temperature. The importance rating for an urban sightseeing holiday is outlined in Table 4.7. Comfortable air temperature was rated as the most important variable for a beach holiday, with a mean score of 4.1. Absence of rain (3.9) rated second and sunshine rated third (3.5), followed by the absence of strong winds, which rated the lowest in importance (3.0).

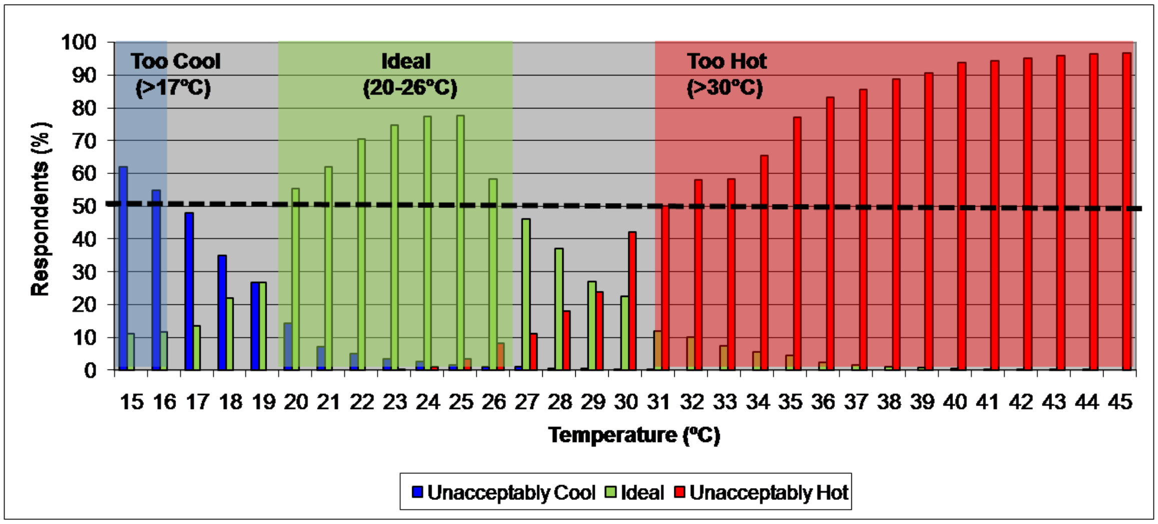
Table 4.7 Importance of Weather Variables for Urban Holidays

	Not Important (%)	(%)	Neutral (%)	(%)	Extremely Important (%)	Mean Score (1-5)
Comfortable air temperature	1.9	3.0	16.8	42.4	35.9	4.1
Absence of rain	2.4	7.1	20.3	37.0	33.2	3.9
Sunshine	4.1	6.1	37.4	37.6	14.8	3.5
Absence of strong winds	12.5	16.5	38.3	24.9	7.8	3.0

4.5.2 Temperature

Three temperature classifications for an urban sightseeing holiday have been identified in this study; ideal, unacceptably cool and unacceptably hot, with each classification defined by the majority of responses (>50%). Figure 4.5 illustrates the distribution of ideal and cool/hot thresholds for a beach holiday. The majority of respondents (>50%) preferred temperatures that range between 20°C and 26°C, with an additional 12% also identifying temperatures up to 27°C as ideal. The majority identified less than 17°C as unacceptably cool, with an additional 7% stating less than 18°C as unacceptable. Temperatures greater than 30°C was classified as unacceptably hot, with an additional 8% of respondents identifying anything warmer than 29°C as unacceptable. Between the temperature classifications, transition zones were observed between the ideal and unacceptably cool/hot temperatures.

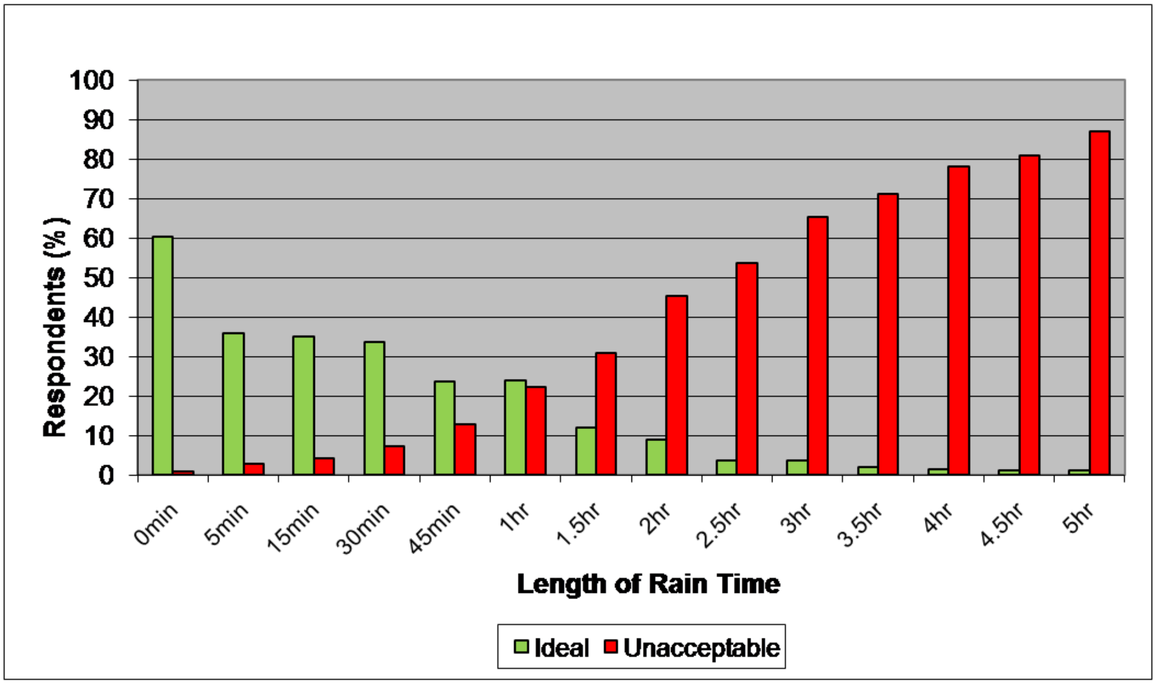
Figure 4.5 Rating of Temperatures for Urban Holidays



4.5.3 Rain

Two rain classifications have been identified in this study; ideal and unacceptable length of time that it would rain during a Mediterranean urban sightseeing holiday, with each classification defined by the majority of responses (>50%). The majority of respondents preferred no rain, with an additional 27% stating that less than 30 minutes of rain is ideal for urban tourism (Figure 4.6). The majority identified more than 2 hours of rain as unacceptable, with an additional 8% stating that more than one and a half hours of rain is unacceptable. Between the rain classifications, a transition zone is observed.

Figure 4.6 Rating of Rain Conditions for Urban Holidays



4.5.4 Wind Conditions

As identified in Table 4.8, the clear majority of respondents (72%) stated the ideal wind condition for an urban sightseeing holiday is a light breeze. The remaining respondents prefer moderate wind (19.5%) or no wind (8.2%). As expected, the majority of respondents stated that strong to very strong winds are unacceptable for a beach holiday (62.1% and 87.7% respectively), with 9.6% stating the presence of no wind is unacceptable. In addition, 9.6% stated that all wind conditions are acceptable for an urban holiday.

Table 4.8 Ideal and Unacceptable Wind Conditions for Urban Holidays

Assume you are booking a multi-day urban holiday in the Mediterranean. What are the ideal and unacceptable wind condition(s) for your holiday?		
Variable	Ideal (%)	Unacceptable (%)
No wind	8.2	9.6
Light breeze (1-9km/h)	72.0	1.6
Moderate wind (10-40 km/h)	19.5	13.2
Strong wind (41-60 km/h)	0.3	62.1
Very strong wind (61-90 km/h)	0.0	87.7
All wind conditions are acceptable	-	9.6

4.5.5 Sky Conditions

Table 4.9 shows that the majority of respondents prefer 25% cloud cover as their ideal sky condition for an urban holiday (51%), followed by 50% cloud cover (30%) and 0% cloud cover (16.2%). Less than 3% of respondents identified 75% and 100% cloud cover as ideal. The majority of respondents stated that 100% cloud cover is unacceptable for an urban holiday (64.3%) and 35.7% stated 75% cloud cover is unacceptable. Nearly one-third (31.3%) identified all cloud conditions as acceptable for an urban holiday.

Table 4.9 Ideal and Unacceptable Sky Conditions for Urban Holidays

Assume you are booking a multi-day beach holiday in the Mediterranean. What are the ideal and unacceptable wind condition(s) for your holiday?		
Variable	Ideal (%)	Unacceptable (%)
0% cloud	16.2	9.4
25% cloud	51.0	2.9
50% cloud	30.0	12.5
75% cloud	2.0	35.7
100% cloud	0.8	64.3
All cloud conditions are acceptable	-	31.3

4.6 Comparing Climate Preferences Across Groups

4.6.1 Comparison by Tourism Activity

To explore whether activity choice influences the importance of climate, as well as climatic preferences and thresholds, two new variables were created. First, a 3S activity group, which combined the score of respondents rating of swimming and sunbathing/sitting, for a minimum score of two (always plan 3S activities) and a maximum of 10 (never plan 3S activities). Second, an indoor urban activity group, which combined the score of cultural/historical sites, art performances and shopping, for a minimum score of three (always plan indoor urban activities) and maximum score of 15 (never plan indoor urban activities). Responses from each of the two activity groups were then sorted in descending order and split into quartiles. From this, the bottom ¼ of each activity group can be compared with the top ¼ of each activity group. The bottom quartile represents those with a high to maximum score (rarely-never plan the activities) and the top quartile represents minimum to low scores (always-most times plan the activities).

The relative rating of climate parameters based on the top and bottom quartiles of the 3S activity group for the beach holiday segment is explored in Table 4.10, and the indoor activity group for the urban holiday segment is explored in Table 4.11. The rating is based on a mean score (1-5) with one representing not important and five representing extremely important. For a beach holiday, those highly active in 3S activities rate the relative importance of weather variables the same as those least active in 3S activities, although independent sample T-tests reveal that there is a significant difference for all five variables ($p<.05$). For an urban holiday, those highly active in indoor activities rate the relative importance of weather variables the same as those least active in indoor activities, with a significant difference for wind and sunshine variables ($p<.05$).

Table 4.10 Importance of Weather Variable by 3S Activity Group

3S Activity Group	Mean Score (1-5)	
	Least Active (Bottom ¼)	Highly Active (Top ¼)
Beach Tourism Segment		
Absence of Strong Wind t(423)=3.535, p=.000	3.1	3.4
Absence of Rain t(423)=3.280, p=.001	4.2	4.5
Sunshine t(427)=6.243, p=.000	4.3	4.7
Air Temperature t(426)= 4.313, p=.000	4.1	4.4
Water Temperature t(423)= 2.542, p=.011	3.8	4.0

Table 4.11 Importance of Weather Variable by Indoor Activity Group

Indoor Activity Group	Mean Score (1-5)	
	Least Active Bottom ¼	Highly Active Top ¼
Urban Tourism Segment		
Absence of Strong Wind t(420)=3.275, p=.001	2.8	3.1
Absence of Rain t(420)=1.300, p=.194	3.9	4.0
Sunshine t(420)=2.275, p=.023	3.4	3.7
Air Temperature t(418)=1.044, p=.297	4.1	4.2

Table 4.12 shows the ideal and unacceptable temperature and rain preferences for the 3S and indoor activity groups. Ideal temperatures for a beach holiday are the same for the least and highly active 3S group at 27-32°C. Independent sample T-tests revealed that a significant difference occurred at 31°C and 32°C (p=.002 and p=.003, respectively). While the unacceptable temperature thresholds varied by the two groups, they were not significantly different (p>.05). For the indoor activity group, ideal temperatures for the varied by 1°C, with the highly active indoor group preferring cooler conditions, and significant differences were found at 20-21°C, and 25-26°C.

Ideal rain conditions for a beach holiday were the same for both 3S activity groups (0 minutes), with significant differences (p<.05) between 2.5and 4.5 hours of rain time. The threshold for unacceptable rain conditions was 30 minutes lower for the least active 3S group (2 hours), with significant differences (p<.05) found between 0-15 minutes and 1.5-5hours. Ideal rain conditions for an urban holiday were also the same for both indoor activity groups (0 minutes), with significant difference (p<.05) found at 0 minutes, 15 minutes, 1-1.5 hours and 3-5hours. Similar to the 3S activity groups, the threshold for unacceptable rain conditions was 30 minutes lower for the least active indoor group (2 hours), with significant differences (p<.05) between 1-2 and 3-5 hours.

Table 4.12 Temperature and Rain Preferences by Activity Group

	Climate Variable			
	Temperature (°C)		Length of Rain Time	
	Ideal	Unacceptable	Ideal	Unacceptable
3S Activity Group				
Least Active	27-32	<23, >38	0min	>2hr
Highly Active	27-32	<19, >37	0min	>2.5hr
Indoor Activity Group				
Least Active	20-27	<17, >33	0min	>2hr
Highly Active	20-26	<16, >31	0min	>2.5hr

As shown in Table 4.13, both the 3S and indoor activity group prefer a light breeze. There was no significant difference between the 3S group (p>.05), but a significant difference was found between the indoor activity group (p=.004), which is likely explained by the larger percentage of the highly active indoor group selecting moderate wind conditions over a light breeze as ideal for their urban holiday.

Table 4.13 Ideal Wind Conditions by Activity Group

	No Wind	Light Breeze (1-9km/h)	Moderate Wind (10-40km/h)	Strong Wind (41-60km/h)	Very Strong Wind (61-90km/h)
3S Activity Group					
Least Active	3.0	88.2	7.4	1.0	0.5
Highly Active	4.1	83.2	11.0	1.4	0.3
Indoor Activity Group					
Least Active	8.7	74.5	16.8	0	0
Highly Active	5.3	66.5	27.1	1.1	0

Table 4.14 shows that the majority of respondents in each activity group stated strong winds as unacceptable. There is also a notable percentage of respondents that identified no wind as unacceptable (15% for the 3S group and 10% for the indoor group), likely due to the strong preference for a light breeze which aids in cooling. For the 3S group, a significant difference was found for the moderate, strong and very strong wind categories (p=.001, p=.000, p=.004, respectively), with the active 3S group having a higher wind threshold. There was no significant difference in unacceptable wind conditions for the indoor activity group.

Table 4.14 Unacceptable Wind Conditions by Activity Group

	No Wind	Light Breeze (1-9km/h)	Moderate Wind (10-40km/h)	Strong Wind (41-60km/h)	Very Strong Wind (61-90km/h)
3S Activity Group					
Least Active	15.3	1.4	33.3	82.4	94.9
Highly Active	15.3	1.0	22.6	73.1	89.0
Indoor Activity Group					
Least Active	9.9	1.9	12.7	65.3	93.0
Highly Active	9.8	0.5	11.3	56.4	80.9

As shown in Table 4.15 the highly active 3S group prefers more cloud cover then the least active 3S group, which is more evenly distributed across 0% and 25% cloud cover, with a significant difference of p=.001. For the indoor activity group, there is a significant difference for ideal sky conditions, with the highly active indoor group preferring more clouds (p=.044).

Table 4.15 Ideal Sky Condition by Activity Group

	Cloud Cover (% of Sky)				
	0%	25%	50%	75%	100%
3S Activity Group					
Least Active	47.8	49.3	1.9	1.0	0
Highly Active	33.1	61.8	5.1	0	0
Indoor Activity Group					
Least Active	20.5	50.5	28.0	1.0	0
Highly Active	16.3	48.4	30.0	4.2	1.1

Unacceptable sky conditions for the 3S activity group were both 75% cloud cover, although the least active 3S group has a lower threshold (Table 4.16). Significant differences between the least and highly active groups were found at 50%, 75% and 100% cloud cover (p=.014, p=.043 and p=.020, respectively). Both indoor activity groups stated 100% cloud cover as unacceptable, with no significant difference (p>.05).

Table 4.16 Unacceptable Sky Condition by Activity Group

	Cloud Cover (% of Sky)				
	0%	25%	50%	75%	100%
3S Activity Group					
Least Active	6.0	1.9	40.7	76.4	93.5
Highly Active	4.2	2.3	29.4	62.1	87.9
Indoor Activity Group					
Least Active	10.4	3.3	12.7	35.8	68.4
Highly Active	10.2	4.4	13.7	37.6	61.5

4.6.2 Comparison by Mediterranean Source Markets

A comparison of the responses from the five countries was analyzed to determine if there were any significant differences in climate preferences among the nationalities. The overall rating is the same across the country samples for beach tourism, as well as the same across the urban tourism segment with the exception of The Netherlands, which placed absence of rain above comfortable air temperature. However, Chi-square tests reveal that there are significant differences ($p<.05$) between countries (Table 4.17).

Table 4.17 Importance of Weather Variables by Country Sample

	Mean Score (1-5)				
	Austria	Germany	The Netherlands	Sweden	Switzerland
Beach					
Absence of Strong Wind (χ^2=8.248, p=.083)	3.3	3.2	3.5	3.4	3.3
Absence of Rain (χ^2=14.831, p=.005)	4.2	4.4	4.6	4.5	4.5
Sunshine (χ^2=21.036, p=.000)	4.4	4.5	4.7	4.7	4.7
Air Temperature (χ^2=5.865, p=.209)	4.1	4.3	4.4	4.3	4.4
Water Temperature (χ^2=7.727, p=.102)	3.7	3.9	3.9	4.0	4.0
Urban					
Absence of Strong Wind (χ^2=20.283, p=.000)	3.0	2.8	3.3	3.1	3.0
Absence of Rain (χ^2=20.558, p=.000)	3.6	4.0	4.1	4.0	4.0
Sunshine (χ^2=30.062, p=.000)	3.3	3.5	3.8	3.5	3.7
Air Temperature (χ^2=2.345, p=.673)	4.0	4.1	4.1	4.2	4.1

For the beach tourism segment, significant differences were found for the climate variables absence of rain and sunshine. Since the mean scores are very similar, a post hoc test was conducted to explore the significant difference ($p<.05$) between each country sample within the climate variable, separately. The post hoc tests reveal Austria rated the absence of rain significantly different then all of the country samples, with a significant difference also found between The Netherlands and Germany. A significant difference was found between Austria and every country except Germany for the rating of sunshine, with Germany significantly different then Sweden and The Netherlands. Austria is also significantly different in the rating of sunshine between Germany, The Netherlands and Switzerland, as well as a significant difference between The Netherlands and Sweden, and The Netherlands and Germany.

For the urban tourism segment, significant differences were found for the climate variables absence of wind, rain and sunshine. A post hoc test reveals a significant difference for the rating of absence of strong wind between Austria, Germany and The Netherlands, as well as between Sweden and Germany. For absence of rain, Austria is significantly different then all four country samples.

Temperature preferences among the five country samples for a beach holiday were similar, with preferences within one degree of each sample, except Switzerland, which varied up to 2°C (Table 4.18). Significant differences ($p<.05$) between the country samples for ideal beach temperatures were found between 25-28°C, 33°C and 36-37°C. Ideal urban temperature preferences were identical for Austria, Germany and The Netherlands, with Sweden and Switzerland's temperature preferences slightly warmer by 1-2°C. Significant differences ($p<.05$) between the country samples were found between 18-25°C and 29-31°C.

Unacceptable temperatures for beach holidays were within two degrees of each country sample, ranging from 21-23°C for unacceptably cool, and 36-38°C for unacceptably hot. Significant differences ($p<.05$) between the country samples for unacceptable cool beach temperatures were found between 21-22°C and between 36-41°C for unacceptably hot beach temperatures. Unacceptably cool temperatures for urban holidays were within two degrees of each country sample (16-18°C), while unacceptably hot temperatures varied by three degrees (30-33°C). There were no significant differences found for unacceptably cool urban temperatures and significant differences found between 36-39°C and 45°C ($p<.05$) for unacceptably hot urban temperatures.

Rain preferences were identical for all five country samples, for both a beach and urban holiday, at zero minutes of rain per day (Table 4.18). There is a significant difference for ideal beach rain preferences been 45minutes and 2 hours ($p<.05$), but no significant difference for the urban tourism segment ($p>.05$). Unacceptable lengths of rain time for a beach holiday varied between one and a half hours (Sweden and Switzerland) to 2 and a half hours (Austria) for a beach holiday, with significant difference ($p<.05$) for every time period (0minutes to over 5 hours). Unacceptable lengths of rain time for an urban holiday also varied between one and a half hours (The Netherlands, Sweden and Switzerland) to 2 and a half hours (Austria), with significant differences found between 45minutes to more than 5 hours ($p<.05$).

Table 4.18 Temperature and Rain Preferences by Country Sample

	Climate Variable			
	Temperature (°C)		Length of Rain Time	
	Ideal	Unacceptable	Ideal	Unacceptable
Beach				
Austria	28-33	<23, >38	0min	>2.5hr
Germany	27-32	<22, >36	0min	>2hr
The Netherlands	27-32	<21, >37	0min	>2hr
Sweden	28-32	<22, >38	0min	>1.5hr
Switzerland	26-32	<23, >37	0min	>1.5hr
Urban				
Austria	20-26	<17, >31	0min	>2.5hr
Germany	20-26	<16, >30	0min	>2hr
The Netherlands	20-26	<18, >30	0min	>1.5hr
Sweden	21-28	<18, >33	0min	>1.5hr
Switzerland	20-27	<18, >31	0min	>1.5hr

As highlighted in Table 4.19, the clear majority in all five countries prefer a light breeze (1-9km/h) for both a beach and urban holiday, but only the latter is significantly different (χ^2=7.076, p=.132 and χ^2=16.027, p=.003, respectively). Upon closer examination with a post hoc test, Germany's ideal wind condition is significantly different (p<.05) then The Netherlands, Sweden and Switzerland.

Table 4.19 Ideal Wind Conditions by Country Samples (% of respondents)

	No Wind	Light Breeze (1-9km/h)	Moderate Wind (10-40km/h)	Strong Wind (41-60km/h)	Very Strong Wind (61-90km/h)
Beach					
Austria	6.7	83.0	6.7	2.7	0.9
Germany	4.1	83.2	11.0	1.4	0.3
The Netherlands	2.6	91.4	5.3	7.0	0
Sweden	1.3	94.9	3.8	0	0
Switzerland	7.1	88.1	4.8	0	0
Urban					
Austria	9.5	70.0	20.0	0.5	0
Germany	5.3	69.1	25.2	0.4	0
The Netherlands	8.5	76.1	15.5	0	0
Sweden	8.1	82.4	9.5	0	0
Switzerland	15.0	70.0	15.0	0	0

As outlined in Table 4.20, the majority in all five countries found winds equal or greater to 41km/h as unacceptable for a beach holiday, with a significant difference found in the moderate wind category (χ^2=18.290, p=.001). A post hoc test shows that Germany is significantly different (p<.05) then Sweden, while Austria is significantly different then The Netherlands, Sweden and Switzerland. For an urban holiday, the majority of respondents in all five countries identified winds equal or greater to 41km/h as unacceptable, with a significant difference found in the strong and very strong wind categories (χ^2=19.676, p=.001 and χ^2=12.330, p=.015, respectively). A post hoc test reveals Germany is significantly different (p<.05) then the other four country samples for the strong wind category, while Austria is significantly different then Sweden, Sweden is significantly different then Germany, and Germany is significantly different then The Netherlands in the very strong wind category.

Table 4.20 Unacceptable Wind Condition by Country Samples (% of respondents)

	No Wind	Light Breeze (1-9km/h)	Moderate Wind (10-40km/h)	Strong Wind (41-60km/h)	Very Strong Wind (61-90km/h)
Beach					
Austria	13.9	0.9	20.4	70.9	91.3
Germany	15.3	1.0	22.6	73.1	89.0
The Netherlands	10.6	2.5	30.6	74.4	91.9
Sweden	11.1	0	40.7	84.0	96.3
Switzerland	9.0	0	32.6	80.9	96.6
Urban					
Austria	8.9	2.7	12.0	63.1	86.7
Germany	13.2	0.7	9.9	53.0	83.8
The Netherlands	8.2	3.2	16.5	70.3	91.8
Sweden	6.3	1.3	20.3	72.2	96.2
Switzerland	4.5	0	15.7	67.4	88.8

As highlighted in Table 4.21, every country sample, except Sweden, selected 25% cloud cover as the ideal sky condition for a beach holiday, with a significant difference found (χ^2=14.831, p=.001). A post hoc test reveals that Sweden is significantly different (p<.05) then Austria, Germany and Switzerland, while Germany is also significantly different from The Netherlands. With the exception of Austria, the majority of country samples also selected 25% cloud cover as ideal for an urban holiday, with a significant difference found (χ^2=19.305, p=.001). Post hoc analysis found significant differences (p<.05) between Austria, The Netherlands and Switzerland, as well as between Germany, The Netherlands and Switzerland.

Table 4.21 Ideal Sky Condition by Country Samples (% of respondents)

	Cloud Cover (% of Sky)				
	0%	25%	50%	75%	100%
Beach					
Austria	39.9	54.1	5.0	0.9	0
Germany	33.1	61.8	5.1	0	0
The Netherlands	46.4	51.0	2.0	0.7	0
Sweden	55.7	43.0	1.3	0	0
Switzerland	38.8	57.6	1.2	1.2	1.2
Urban					
Austria	12.4	46.2	36.2	3.8	1.4
Germany	15.4	50.2	31.6	2.1	0.7
The Netherlands	18.6	60.7	20.0	0.7	0
Sweden	17.6	50.0	29.7	1.4	1.4
Switzerland	23.2	50.0	26.8	0	0

Table 4.22 outlines the unacceptable sky conditions for a beach holiday, which varies significantly between 50% cloud cover and 75% cloud cover (χ^2=27.068, p=.000 and χ^2=14.674, p=.005, respectively). Post hoc tests highlight that The Netherlands is significant different (p<.05) then Austria, Germany and Switzerland, Germany is also significantly different then Sweden, and Sweden is significantly different then Switzerland. For an urban holiday, unacceptable sky conditions varies significantly between 50% to 100% cloud cover for the five country samples (χ^2=16.391, p=.003; χ^2=25.229, p=.000; and χ^2=20.111, p=.000). Post hoc tests reveal The Netherlands is significantly different (p<.05) then Austria, Germany and Switzerland for 50% cloud cover. Austria and Germany are significantly different (p<.05) then The Netherlands and Sweden, with Sweden also significantly different then Switzerland for the 75% cloud cover condition. Germany is significantly different (p<.05) then The Netherlands, Sweden, Switzerland, with The Netherlands also significantly different then Austria for the 100% cloud cover condition.

Table 4.22 Unacceptable Sky Condition by Country samples (% of respondents)

	Cloud Cover (% of Sky)				
	0%	25%	50%	75%	100%
Beach					
Austria	4.4	0.9	29.3	64.2	90.0
Germany	5.6	2.3	29.2	67.8	91.7
The Netherlands	4.3	3.7	44.4	74.1	92.0
Sweden	1.2	1.2	53.1	76.5	88.9
Switzerland	0	0	29.2	83.1	93.3
Urban					
Austria	8.9	4.4	12.4	34.7	60.0
Germany	12.3	3.0	9.7	27.0	57.7
The Netherlands	8.9	3.2	20.9	46.2	75.9
Sweden	5.1	1.3	13.9	50.6	72.2

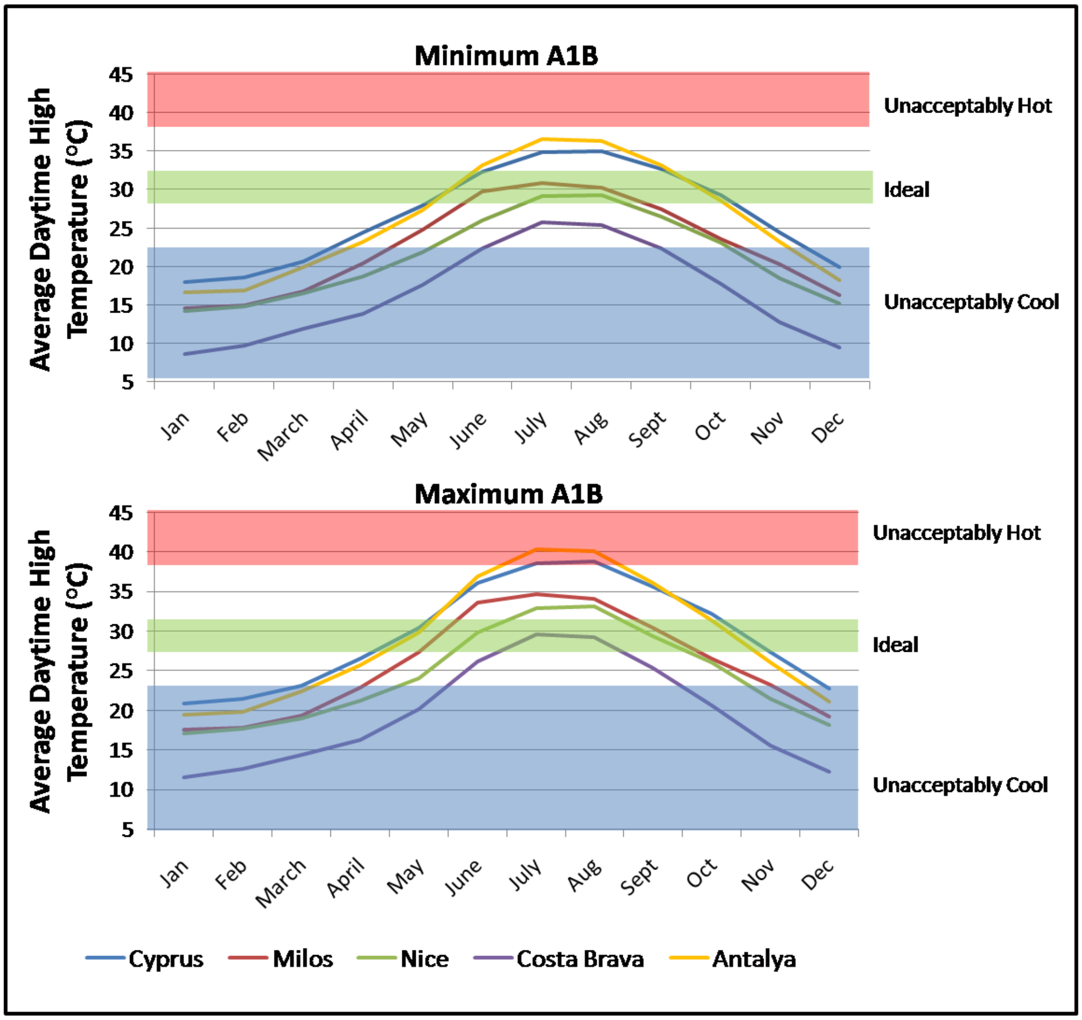
4.7 Climate Change Analysis

As indicated in chapter 3, to evaluate the suitability of temperature conditions for tourism in the Mediterranean, the three temperature classifications (ideal, unacceptably cool and unacceptably hot) will be compared with projected temperatures for five popular beach and urban destinations in the region. Under the minimum A1B climate change projection for the Mediterranean region, ideal temperatures for Mediterranean beach tourism continue throughout the summer months, with some destinations also gaining ideal temperatures during the shoulder months of spring and autumn (Figure 4.7). A warmer climate leaves the monthly ratings for beach holidays at Milos unchanged (when compared to current baseline temperatures), while Nice becomes ideal during July and August. Cyprus and Antalya are similar, becoming ideal in May and October, but are no longer considered ideal in June through September. Costa Brava continues to not have any months with ideal temperatures. In terms of unacceptable temperature conditions, Cyprus and Costa Brava remain unchanged, Milos and Nice are no longer considered unacceptably cool in October, and Antalya is no longer too cool in April and November. None of the five beach destinations are considered unacceptably hot in 2080-2099 under a minimum A1B scenario.

Under a maximum A1B scenario there is a notable change in the beach holiday ratings compared to the 1961-1990 baseline period (Figure 4.7). As the climate becomes warmer, Milos, Antalya and Cyprus have fewer months with ideal temperatures, and the current peak summer tourism season may no longer be climatically ideal for beach holiday. However, the shoulder tourism months are projected to become ideal, with all three destinations reaching ideal temperatures in May. In addition, Milos and Nice become ideal in September and Antalya in October. Nice is also considered ideal during June, while Costa Brava's projected summer daytime highs to be ideal in July and August.

As expected, the number of unacceptably cool months has decreased in all five destinations. Cyprus is unacceptably cool in January and February, followed by Antalya in all three winter months. Milos is considered unacceptably cool for much of winter and spring, Nice in winter and the month of March, and Costa Brava remains the coolest with winter, spring and the majority of autumn remaining unacceptably cool for beach holidays. Under the maximum A1B climate change scenario, Cyprus and Antalya become unacceptably hot during July and August.

Figure 4.7 Monthly Rating of Average Daytime High Temperatures (2080-2099) for Beach Holidays

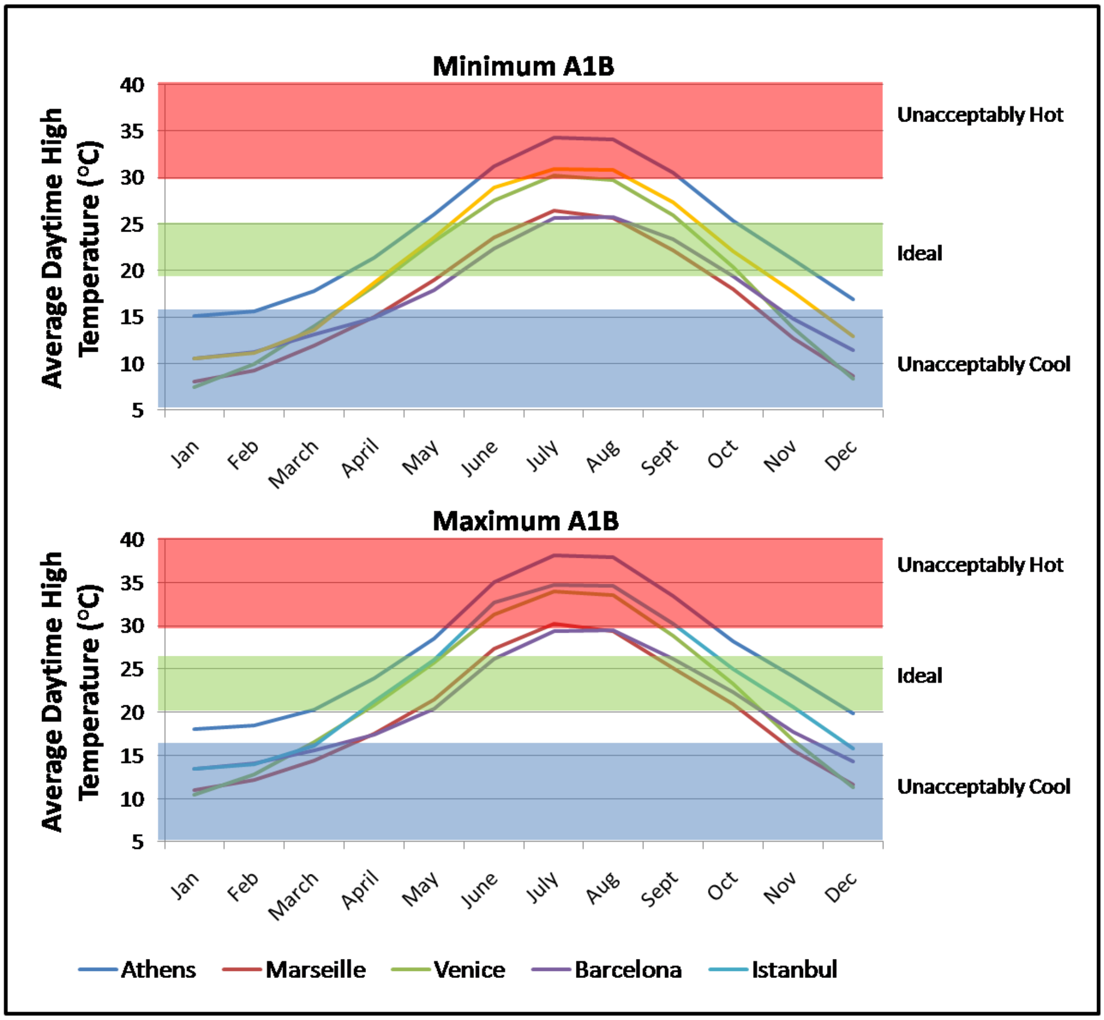


For an urban sightseeing holiday under the minimum A1B climate change projection, Barcelona will become ideal in June, while Marseille will no longer be considered ideal in June and September (Figure 4.8). Athens is projected to become ideal in April and November, while Venice and Istanbul become ideal in October. As expected, a projected increase in temperatures reduces the number of unacceptably cool months. Venice is no longer unacceptable in April, Athens in May, Barcelona in May and June and Istanbul in April and November. Marseille is the only destination where the number of unacceptably cool months for urban holidays stayed unchanged when compared to current baseline conditions. In terms of unacceptably hot temperatures for an urban holiday, Athens becomes the most unacceptable, with “too hot” temperatures from June through to September, followed by Istanbul in July and August, and Venice in July.

When examining future conditions for urban tourism under a maximum A1B scenario, temperatures during the summer months are projected to no longer be ideal for any of the five urban destinations (Figure 4.8) Istanbul is projected to have the most months with ideal temperatures (April to May and October to November), followed by three months of ideal temperatures in Venice (April, May and October) and Athens (March, April and November). Marseille has three months of ideal temperatures for urban holidays (May and October to November) and lastly Barcelona (May and October).

When compared to the baseline temperatures, the number of months considered unacceptably cool under a high A1B scenario is greatly reduced. Athens will no longer be rated as unacceptably cool for any month of the year. Marseille and Venice are considered too cool November through to March, and Barcelona and Istanbul are unacceptable December to March. There is also an increase in the number of months and destinations that are projected to be unacceptably hot for urban tourism. Athens and Istanbul are projected to become unacceptably hot June through to September, followed by Venice June to August, and Marseille in July. Barcelona is the only urban destination projected to not have any months with unacceptably hot temperatures.

Figure 4.8 Monthly Ratings of Average Daytime High Temperatures (2080-2099) for Urban Sightseeing Holidays



With two Mediterranean beach destinations (Antalya and Cyprus) and three urban destinations (Marseille, Venice and Istanbul) becoming unacceptably hot (>37°C and >30°C, respectively) during the summer months of the last two decades of the century (with Athens already considered unacceptably hot under baseline conditions), projected A1B temperatures for the period 2046 to 2065 was applied to these destinations. Seasonal temperature projections for this period are not available through the IPCC, but annual mean surface air temperature is projected to increase 2.5°C in the region (Meehl, et al. 2007). Based on this projection, none of the Mediterranean beach destinations examined in this study will become "too hot," and neither will Marseille and Venice by mid-century. However, Istanbul may become unacceptable by mid-century during July and August. Projected annual mean A1B temperatures for the period 2011-2030 was then applied to Istanbul, with a projected increase of 1°C, revealing that this destination will not be "too hot" in the next two decades.

4.8 Weather Information and Holiday Planning

When respondents were asked if they would look up their destinations typical weather condition for the time of year they were planning a multi-day holiday, 85.6% stated that they would. From this, 80.7% look up the weather conditions before booking their holiday plans, 17.4% look up the conditions after booking their holiday plans, and 1.9% stated both before and after booking. Due to a typographical error in the distributed survey instrument (the question read 'check that apply' instead of 'check *all* that apply') the results may be therefore somewhat inaccurate or misleading. There is the potential that a greater percentage of respondents may have selected both before and after booking their holiday reservations as the period when they gather weather information for their trip.

4.9 Influence of Media on Holiday Planning

Participants were asked to evaluate how a media article, such as the one included in the survey (Appendix A), would influence their travel plans to the Mediterranean. Table 4.23 reveals that only a small percentage of the respondents are uninfluenced (11.7%). The largest proportion of respondents (39.2%) were unsure how the media story would influence their Mediterranean travel plans, while 31.7% stated that such stories would have a strong (28.3%) or very strong (3.4%) influence on their travel plans.

Table 4.23 Influence of Media Stories on Mediterranean Holiday Plans

How much influence would media stories have on your travel plans to the Mediterranean?					
No Influence (%)	(%)	Neutral/Unsure (%)	(%)	Very Strong Influence (%)	Mean Score (1-5)
11.7	17.4	39.2	28.3	3.4	2.9

To better understand the influence and potential impact of media stories, respondents were asked to assume they were planning a Mediterranean holiday, but had not yet booked their travel reservations (Table 4.24). More than half of the respondents

(52.2%) stated that they would change their travel plans in some manner as a result of reading such a story. Most (28.3% of total sample) stated they would still book a Mediterranean holiday, but would book a location that was not enduring a heat wave, 18.9% (of total sample) would book a later departure date, and 5% (of total sample) would forego the Mediterranean altogether and go on a holiday outside the region. The remaining respondents stated they would still book their holiday at the original location and time (32.3%), while 15.5% would seek additional information before deciding what to would do.

Table 4.24 Media's Effect on Mediterranean Holiday Plans Before Booking Reservations

If you had not yet booked your multi-day Mediterranean holiday reservation, how would such a media story affect your Mediterranean holiday plans?	
Variable	(%)
Would still book a holiday	32.3
Would still book a holiday but would book a Mediterranean destination that was not having a heat wave	28.3
Would still book a holiday, but would book for a later departure date	18.9
Would not go to the Mediterranean and would chose a non-Mediterranean destination	5.0
Would seek additional information about impacts in my planned destination before I would decide what to do	15.5

Respondents were also asked about the influence of media stories if their holiday reservations had already been booked (Table 4.25). As expected, fewer respondents would change their plans, with the majority stating they would still go forward with their Mediterranean holiday reservations as originally booked (58.4%). Nevertheless, a substantial number (28.4%) stated they would alter their reservations. This includes 17.6% who responded that they would switch their Mediterranean destination to one not undergoing a heat wave, 9% would alter their departure date, and 1.8% would forgo the Mediterranean and travel to a different region. The remaining 13.3% stated that they would seek additional information before deciding if or how they would alter their booked reservations.

Table 4.25 Media's Effect on Mediterranean Holiday Plans After Booking Reservations

If you had already booked your multi-day Mediterranean holiday reservation, how would such a media story affect your Mediterranean holiday plans?	
Variable	(%)
Would still book a holiday	58.4
Would still book a holiday but would book a Mediterranean destination that was not having a heat wave	17.6
Would still book a holiday, but would book for a later departure date	9.0
Would cancel my holiday and would chose a non-Mediterranean destination	1.8
Would seek additional information about impacts in my planned destination before I would decide what to do	13.3

4.10 Chapter Summary

This chapter presented the quantitative results derived from the survey that was administered to nine universities in five source market countries for the Mediterranean. Analysis included respondents travel experience in the Mediterranean and their activity preferences, the importance respondents placed on climate variables, as well as perceived and stated climatic ideals and thresholds when planning a multi-day beach and urban holiday to the region. The influence of weather information and the role of the media while planning a holiday were also explored. From these results, a better understanding of tourists' weather sensitivity and preferences can be gained in order to begin understanding how sensitive Mediterranean tourism may become to projected climate change.

Chapter 5
Discussion and Conclusion

5.1 Introduction

The overall goal of this thesis was to explore the climatic preferences and thresholds (multiple variables) for two popular Mediterranean tourism segments, beach and urban sightseeing tourism. To achieve this goal, questionnaires were administered to university students located in the Mediterranean's major source markets. The survey gathered information on the respondent's travel characteristics, including planned activities and travel patterns, the importance and rating of four climate conditions (temperature, rain, wind and sky conditions), as well as the role of gathering weather information, the influence of the media on holiday planning, and perceived seasonal climate conditions.

This chapter discusses the main findings and implications that stem from the research results by addressing the six research objectives set out for this study. Additional research questions raised by this analysis, as well as recommendations for future research, are also provided.

5.2 Main Findings

5.2.1 Objective One

Explore the relative importance of climate parameters to tourists and evaluate whether these preferences vary between beach/3S (sun, sea, sand) and urban sightseeing tourism segments.

Much of the existing literature considers air temperature to be the primary climate variable of importance to tourism (Mieckowski 1985, Becker 2000, Maddison 2001, Lise and Tol 2002, Hamilton et al. 2005, Bigano et al. 2006). A key finding from this study is that the order of importance for climate variables, as identified by the university student sample, differed for beach and urban sightseeing holidays, including the rating of air temperature. While this study and Scott et al. (2008) have found that temperature is the climate parameter of greatest importance for the urban tourism segment, this is not the case for the beach tourism segment (Table 5.1). The importance of air temperature for beach tourism has either been rated second (Scott et al. 2008, Moreno 2009) or third (this study) in importance behind sunshine, absence of rain and absence of strong winds. This has implications for earlier works on tourism and climate that only assess thermal factors of climate (e.g., Harlfinger 1991, Becker 1998 and 2000, Matzarakis 2001, Blazejczyk 2001, Cegnar and Matzarakis 2004, Marabito et al. 2004, Zaninovic and Matzarakis 2004). Studies cannot adequately evaluate the suitability and quality of climate parameters for tourism if they do not account for the physical (i.e., wind and rain) and aesthetic (i.e., sunshine hours, sky conditions) variables (de Freitas 2008, Scott et al. 2008).

Table 5.1 A Comparison of Climate Variables Rating of Importance for Tourism

Source	Importance Rate			
	Air Temp	Sunshine	Absence of Rain	Absence of Strong Wind
Beach				
Scott et al. (2008)	2	1	3	4
Moreno 2009	2	3	1	4
Rutty (This Study)	3	1	2	4
Urban				
Scott et al. (2008)	1	3	2	4
Rutty (This Study)	1	3	2	4

These findings also have similar implications for studies that subscribe to Meiczkowski's (1985) TCI to explore the potential implications of climate change for tourism (Scott et al. 2004, Amelung and Viner 2006, Perry 2006, Amelung et al. 2007, Nicholls and Amelung 2008). While the TCI does incorporate multiple climate parameters, the weighting of these variables may be unsuitable for certain tourism segments. For example, daytime temperature and daily temperature is given a combined weight of 50%, which is unsuitable to explore the implications of climate change for beach tourism given air temperature's lower rating (de Freitas 2008, Scott et al. 2008). While comfortable air temperature did rate the highest in importance for urban tourism (in both this study and Scott et al. 2008), the mean score for air temperature was rated lower in the urban holiday segment than the beach holiday segment (4.3 vs. 4.1 and 6.1

vs. 5.8, respectively), further questioning the conceptual accuracy of the weighting of the TCI's climate variables. The validity and widespread usage of the TCI across tourism will be further discussed throughout this chapter.

5.2.2 Objective Two

Assess tourists' stated ideal and unacceptable climate for multiple climate variables (temperature, rain, wind and sky conditions) and evaluate whether these preferences vary between beach/3S and urban sightseeing tourism segments.

Table 5.2 presents the results found in this study for tourists' stated ideal temperature, rain, wind and sky conditions for a beach and urban holiday, in combination with the results found in the literature. Since this study asked respondents to identify a range of temperatures, rather than identifying a single ideal temperature, it is difficult to directly compare the results from this study to others. While it is possible to calculate the mode, thereby identifying the temperature degree that was most frequently selected by respondents, the mode is ultimately different than the mean, which would misrepresent the results and be misleading. Nevertheless, Moreno (2009) and Scott et al. (2008) survey results (28°C and 27°C, respectively) fits in the range identified in this study (27-32°C). For ideal urban temperatures, Scott et al. (2008) result of 23°C is also comparable to this study at 20-26°C.

Based on the results from these studies, tourists' ideal temperature preferences do vary between beach and urban sightseeing tourism segments. This supports Scott et al.'s (2008) argument that there is no single optimum temperature for tourism, raising questions about the validity of studies that employ a single optimum temperature for tourism (e.g., Besancenot et al. 1978, Mieczkowski 1985, Maddison 2001, Lise and Tol 2002, Scott et al. 2004, Hamilton 2005, Hamilton et al. 2005, Bigano et al. 2006, Amelung and Viner 2006, Perry 2006, Amelung et al. 2007).

Zero minutes of rain and winds equal to or less than 9km per hour were both selected as the ideal condition for a beach and urban holiday. While this is the only study to identify optimal rain conditions, the results for wind preferences supports those of Scott et al. (2008) and Moreno (2009). Sky preference of 25% cloud cover was the same for both tourism segments, which supports the results of Scott et al. (2008), but not those of Moreno (2009) beach/3S study, which found 0% cloud cover as ideal. This difference may be attributed to the relatively small sample size used in Moreno's study (n=115), particularly given the small percentage difference found between 0% and 25% cloud cover in this study and Scott et al. (2008) at less than 15%, or attributed to a public sample, as opposed to university participants as utilized in this and Scott et al. (2008) study.

Table 5.2 A Comparison of Ideal Climate Conditions for Beach and Urban Tourism

Source	Climate Variable			
	Temperature (°C)	Rain	Wind	Cloud Cover
Beach				
Scott et al. (2008)	26.8	-	≤9km/h	25%
Moreno (2009)	28.3	-	≤9km/h	0%
Rutty (This Study)	27-32	0min	≤9km/h	25%
Urban				
Scott et al. (2008)	22.5	-	≤9km/h	25%
Rutty (This Study)	20-26	0min	≤9km/h	25%

Unacceptable climate conditions varied over the two tourism segments for both temperature and sky conditions, while unacceptable rain and wind conditions were the same (Table 5.3). Temperature has the most notable difference between the two segments, with unacceptable conditions being 7°C warmer for a beach environment than temperatures for an urban environment. It is also interesting to note that the transition zones between the temperature classifications is smaller for the urban holiday segment than the beach holiday, with a 5°C difference between unacceptably cool to ideal, and ideal to unacceptably hot for a beach holiday, compared to 3°C and 4°C for an urban holiday, respectively. Since this is the first known study to empirically examine tourists stated threshold climate conditions, there is no literature to compare these results with.

Table 5.3 A Comparison of Unacceptable Climate Conditions for Beach and Urban Tourism

	Climate Variable			
	Temperature (°C)	Rain	Wind	Cloud Cover
Beach	>37	≥2hrs	≥41km/h	≥75%
Urban	>30	≥2hrs	≥41km/h	100%

The different climate preferences and thresholds for temperature and sky conditions across the two tourism segments, reinforces the indication that a universal climate index for all tourism, as originally conceived for the TCI by Meiczkowski (1985), is likely conceptually unsound. The broad application of the TCI across different tourism activities in order to yield estimations of climate change implications, as is currently the practice (Morgan et al. 2000, Scott et al. 2004, Amelung and Viner 2006, Amelung et al. 2007, Nicholls and Amelung 2008), should be reconsidered. With common agreement that the relationship between weather and recreation is highly dependent on the kind of activity that is being assessed (de Freitas et al. 2008, Moreno et al. 2009, Moreno and Amelung 2009, Scott et al. 2008), these results stress the need to develop climate indices that are based on specific tourism segments.

5.2.3 Objective Three

Investigate whether preferred climates for tourism vary between different activity groups and nationalities.

When examining climatic preferences between activity groups, ideal temperatures, as well as ideal and unacceptable sky and wind conditions were the same for both least and highly active 3S groups, although significant differences ($p<.05$) were found for all but ideal wind conditions. An interesting finding was that the highly active 3S group had a slightly lower threshold for unacceptably hot and cool temperatures (37°C and <19°C versus 38°C and <23°C for the least active 3S group) and a slightly higher threshold for unacceptable rain conditions (>2.5 hours versus >2 hours). In terms of the relative rating of importance for the five climate variables, as expected given the climate sensitivity of 3S activities, the variables were rated higher for the highly active 3S group. Therefore ideal wind conditions was the only variable with no significant difference ($p>.05$) between whether a tourist is least active or highly active in 3S activities, and hence independent from activity preference.

Between the least and highly active indoor activity groups, ideal temperatures varied by 1°C, with the highly active group preferring cooler temperatures. Ideal and unacceptable sky and wind conditions were the same for both least and highly active indoor groups, although significant differences ($p<.05$) were found for ideal sky and wind conditions. Similar to the 3S activity group, the highly active indoor group had a lower threshold for unacceptably hot and cool temperatures (<16°C and >31°C versus <17°C and >33°C) and a higher threshold for unacceptable rain condition (>2.5 hours versus >2 hours). Also interesting was the active indoor activity group, which is climatically insensitive, rated the relative importance of wind and sunshine variables for an urban holiday significantly higher than the less active indoor group, with preference for less wind and cloud cover. The rating of absence of rain and comfortable air temperature was not significantly different between groups, nor was unacceptable wind and sky conditions, distinguishing these variables as independent from activity choice.

Overall, climate preferences do vary between the two activity groups. However, climate arguably matters more for 3S activities as the number of statistically different variables was greater for the beach tourism segment, although climate preferences are not completely irrelevant for urban activities as significant differences were found. Regardless of whether the activity is outdoors or indoors, climatically sensitive or insensitive, while tourists are engaged in their preferred recreation, climate remains important.

In terms of differences between nationalities, there is contention in the literature as to whether or not preferred climates for tourism do vary. Revealed preference studies have stated that differences do not exist. For example, Lise and Tol (2002) found that the estimated optimal temperatures and rainfall for the individual countries do not have a statistically significant difference. Hamilton et al. (2005) created a simulation model to project changes in tourism demand (as a result of multiple factors including climate change) and input the climate preference results from Lise and Tol (2002), thereby assuming preferences do not vary by nationality. Finally, Bigano et al. (2006) found that preferred holiday climates are the same for all tourists, independent of the home climate, suggesting that it is the basic biological process of humans that drive people's preferences.

However, this study has discovered that differences among nationalities do exist, despite relatively close proximity and temperature climate in all locations. Significant difference ($p<.05$) were found for ideal and unacceptable wind and sky conditions in a beach and urban environment. Significant differences ($p<.05$) were also found for ideal and unacceptable wind conditions, as well as ideal sky conditions in an urban environment. Given that respondents were to circle a range of preferred and threshold temperature and lengths of rain time, it is difficult to compare statistical differences among the nationalities. Nevertheless, ideal temperatures vary up to 3°C and unacceptable temperatures by 2°C, with unacceptable rain times differing by up to one hour.

Other stated preference studies have also found that there are differences among nationalities' climatic preferences. Morgan et al. (2000) distributed in situ surveys to tourists in beach environments in Wales, Malta and Turkey. The study found that the relative importance of four climate parameters (absence of rain, presence of sunshine, temperature sensation and wind speed) were rated differently among respondents from Northern Europe and Mediterranean Europe, but these differences were not elaborated on. Similarly, Moreno (2009) found differences in the factors that constitute an ideal climate for beach tourism between Dutch and Belgian respondents, but detailed preference analysis was only provided for the respondents from Belgium. Scott et al. (2008) study of students attending university in Canada, New Zealand and Sweden, found climatic preferences differed across the three nations, of which the differences are compared to the results from this study in Table 5.4. Based on these stated preference studies, as well as the results from this study, differences among nationalities are becoming evident. A more difficult task may be empirically sorting out why these differences do exist and evaluating whether or not most tourists are actually able to, while on holiday, detect such small climatic variations (e.g., 1 or 2°C difference in temperature preference) as identified by each nationality. Nevertheless, inter-cultural and geographical differences are present, once again calling into question the validity of the TCI since the index does not allow for such differences to be incorporated (de Freitas et al. 2008, Scott et al. 2008, Moreno 2009).

Table 5.4 Climate Preferences by Country Samples (% of respondents)

	Climate Variable							
	Temperature (°C)		Length of Rain Time		Wind Speed		Sky Condition (%)	
	Ideal	Unacceptable	Ideal	Unacceptable	Ideal	Unacceptable	Ideal	Unacceptable
Beach								
Austria	28-33	<23, >38	0min	>2.5hr	≤9km/h	≥41km/h	25	75
Germany	27-32	<22, >36	0min	>2hr	≤9km/h	≥41km/h	25	75
The Netherlands	27-32	<21, >37	0min	>2hr	≤9km/h	≥41km/h	25	75
Sweden	28-32	<22, >38	0min	>1.5hr	≤9km/h	≥41km/h	0	50
Switzerland	26-32	<23, >37	0min	>1.5hr	≤9km/h	≥41km/h	25	75
Scott et al. (2008)								
Canada	26.8	-	-	-	≤9km/h	-	25	-
New Zealand	24.9	-	-	-	≤9km/h	-	-	-
Sweden	28.5	-	-	-	≤9km/h	-	0	-
Urban								
Austria	20-26	<17, >31	0min	>2.5hr	≤9km/h	≥41km/h	25	100
Germany	20-26	<16, >30	0min	>2hr	≤9km/h	≥41km/h	25	100
The Netherlands	20-26	<18, >30	0min	>1.5hr	≤9km/h	≥41km/h	25	100
Sweden	21-28	<18, >33	0min	>1.5hr	≤9km/h	≥41km/h	25	75
Switzerland	20-27	<18, >31	0min	>1.5hr	≤9km/h	≥41km/h	25	100
Scott et al. (2008)								
Canada	22.7	-	-	-	≤9km/h	-	25	-
New Zealand	22.1	-	-	-	≤9km/h	-	-	-
Sweden	22.6	-	-	-	≤9km/h	-	25	-

5.2.4 Objective Four

Compare respondents' perceptions of when (months) ideal and unacceptable temperatures exist for tourism in the Mediterranean with actual conditions, according to their stated climate preferences.

The majority of respondents (>50%) perceived the months of June, July, August and September to have ideal temperatures for a beach holiday in the Mediterranean region. As shown in Table 5.5, based on the stated preference ratings of temperatures (27-32°C), Cyprus has ideal temperatures during all four months (30-32°C), Milos June through to August (27-28°C), and Nice in August (27°C). However, Costa Brava does not have any of these months with ideal conditions, including temperatures rated in the unacceptably cool category (<22°C) for June and September (20°C). In addition, Cyprus obtains ideal temperatures in October (27°C), a month in which only 9% of the respondents perceived to have ideal temperatures for a beach holiday.

Perceived unacceptable months for a beach holiday are January, February, November and December. Based on the stated preference ratings, all five locations are unacceptable during these months (<22°C), with the exception of Cyprus at 22°C in November. The month of March reveals that unacceptable conditions occur in all five destinations, of which 42.8% of respondents perceived to be unacceptable, followed by four locations in April (16.9%) and three locations in October (22.3%).

The majority of respondents perceived the ideal temperatures for urban tourism (20-26°C) to be May, June, and September in the Mediterranean region. As shown in Table 5.6, the month of April is rated as unacceptably cool (<17°C) in every location except Athens and Istanbul (19 and 17°C, respectively), and October is unacceptable in Marseille (16°C). It is interesting to note that the summer months were not perceived to be ideal, yet Marseille and Barcelona's temperatures between June and August are ideal (21-24°C and 20-23°C, respectively), followed by June in Venice and Istanbul (25°C and 26°C, respectively).

Unacceptable urban tourism months were perceived to be July and August (>30°C). Based on stated preferences, the only location with temperatures that are unacceptably hot during these two months is Athens (32°C and 31°C, respectively).There are however a number of actual months with unacceptably cool temperatures (<17°C), including December, January, February and March in all five destinations, as well as everywhere destination but Istanbul in April (17°C) and Athens in April and November (19°C).

When comparing perceptions versus actual ratings, it becomes evident that for the beach tourism segment, respondents overestimated the number of months with ideal temperatures and underestimated the number of months with unacceptable ratings. For the urban tourism segment, ideal temperatures were underestimated, while unacceptable temperatures are over estimated, particularly during the summer months. Of particular interest to this research is the perception that the summer months are unacceptable for urban tourism, raising questions as to whether or not the media may have influenced these views. The next objective examines this in more detail.

Table 5.5 Stated Climate Preferences for Beach Holidays and Average Daytime High Temperatures (1961 to 1990)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Cyprus	16	17	19	22	26	30	32	32	30	27	22	18
Milos	13	13	15	18	23	27	28	28	25	21	18	15
Nice	13	13	15	17	20	23	26	27	24	21	16	14
Costa Brava	7	8	10	12	16	20	23	23	20	15	10	8
Antalya	15	15	18	21	25	30	34	34	31	26	20	17

Blue = Unacceptably Cool (<22°C), Green = ideal (27-32°C), Red = Unacceptable Hot (>37°C)

Table 5.6 Stated Climate Preferences for Urban Holidays and Average Daytime High Temperatures (1961 to 1990)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Athens	13	14	16	19	24	29	32	31	28	23	19	15
Marseille	6	8	10	13	17	21	24	23	20	16	10	7
Venice	6	8	12	16	21	25	28	27	24	18	12	7
Barcelona	9	10	11	13	16	20	23	23	21	17	13	10
Istanbul	9	9	12	17	22	26	28	28	25	20	15	11

Blue = Unacceptably Cool (<17°C), Green = ideal (20-26°C), Red = Unacceptable Hot (>30°C)

5.2.5 Objective Five

Reassess the claims in the media and literature that the Mediterranean will become "too hot" for summer tourism by 2020-2030 or by 2050.

Based on the evaluation of the suitability of temperature conditions for beach and urban sightseeing tourism in the Mediterranean, the results show no scientific evidence to support the media's claims that the region will become "too hot" for summer tourism by 2020 - 2030. According to the A1B scenario projections for the popular beach destinations of Milos, Nice and Costa Brava, they will not become "too hot" within the next two decades nor within this century. The two Mediterranean beach destinations that may become unacceptably hot in July and August are Antalya and Cyprus, but only under the maximum A1B scenario for the last two decades of the century. When these two destinations were evaluated based on the mean annual temperature projection for the period 2046-2065, neither destination would be considered "too hot."

The media's claims also appear to be amiss for the urban tourism segment. In terms of climate change projections, Barcelona will remain acceptable for urban tourism throughout the century. Marseille and Venice will not be considered "too hot" by mid-century, but may become unacceptable by 2080-2099. Istanbul is not projected to become unacceptably hot until after 2030. Therefore the temporal rate of temperature change is much slower than the rates stated in the media, with the exception of Athens, which at baseline temperatures is already considered unacceptable during the months of July and August.

Even if the media claims were hypothetically true, the rise in temperatures need not be so grave for Mediterranean tourism. For example, there are two other recent studies that suggest that there is no indication of a threshold or maximum temperature that may lead to decreased tourism demand. For example, Moreno et al. (2009) employed webcams to identify tourist density on a beach in The Netherlands, and found that the day in which the beach had the highest density occurred when the temperature was the highest. Martinez Ibarra (2006) found similar results during the European heat wave of 2003, in which the number of tourists involved in beach recreation increased as the temperatures increased. Unfortunately the temperature in both these studies for the warmest day was not provided.

Furthermore, numerous studies and reports have supported the notion that with projected climate change the months with ideal temperature conditions may shift to the Mediterranean's current shoulder season of spring and autumn (Maddison 2001, Lise and Tol 2002, Bigano et al. 2006, Hamilton et al. 2005, Amelung and Viner 2006, Amelung et al. 2007, Alcamo et al. 2007, Wilbanks et al. 2007, UNWTO-UNEP-WMO 2008). There is the potential for a longer more evenly distributed tourism season, with an increase in the number of days per year with suitable weather for tourism. As a result, demand may not necessarily decline, but rather lead to a change in the timing and pattern of tourists that vacation in the region. Ultimately such changes will depend on the strength of several factors, including institutional seasonality and the ability of the destination to adapt to or take advantage of the improved shoulder season climate (Amelung et al. 2007).

5.2.6 Objective Six

Examine whether the media's coverage of the Mediterranean climate influences tourists' holiday planning

Perhaps a more central question is the strength of the media, and how it may influence tourists' holiday plans. While the temperatures may not become unacceptably hot in the Mediterranean, based on stated temperature preferences, there is the possibility that the stories published in the media could influence tourists' decision to travel to the region. The media story provided in the survey focused on heat waves, and resulted in a large percentage of the survey respondents stating they would change their holiday plans in some way (52.2% before booking and 28.4% after booking holiday reservations). The results of a study by Moreno (2009) hint to the notion that the media's influence may be even greater, as his study found that of five climate change impacts, the influence of heat waves on holiday planning was rated the lowest behind risk of disease, forest fires, water restrictions in hotel and reduced beach extension. Therefore acknowledging and understanding the potential that the media has to influence tourists travel plans will be important, particularly as the implications of climate change become more pronounced, will be crucial.

With over 85% of respondents stating that they look up the weather conditions when planning a holiday, further emphasizes the importance of how destinations handle their travel media communications. With a trend towards shorter timeframes for travel planning, in addition to the rise in 'last-minute' holiday bookings, communicating accurate conditions and forecasts for very specific destinations (i.e., Athens versus all of Greece) in a timely manner will be vital. This will help ensure tourists make informed travel decisions and avoid unnecessary impacts to unaffected destinations.

5.3 Future Research

The degree of interest into research on the various aspects of the tourism-climate relationship is gradually increasing. However, there remain a limited number of studies that identify ideal or preferred conditions for tourism, fewer that examine the sensitivity of tourism to atmospheric conditions generally, and no known studies that identify unacceptable conditions. The results from this study have empirically strengthened the findings of some past studies, called into question the conceptual accuracy of others, and provided the first known insights into what tourists deem to be unacceptable climatic conditions (multiple parameters) for two major tourism environments. In order to continue to increase our understanding and reduce the present knowledge gaps, further development into research that aims to examine tourists' climate preferences and thresholds is warranted.

Building upon this study, which focused on the stated preferences of students in the Mediterranean's source markets, a more public and globally distributed survey may prove beneficial in validating and fleshing out climate preference differences among a cross-section of tourist segments. Previous studies (i.e., Lise and Tol 2002) found that younger and older tourists, as well as wealthy and less wealthy tourists, do different things during their vacations. Different dominant holiday activities imply different preference for holiday climates, thereby suggesting that preferences for climates differ among age and income groups. An analysis of a public survey sample from Moreno's (2009) study between Belgian and Dutch tourists, as well as an analysis in Germany based on the survey instrument used in this study, is currently underway, but was not completed at the time of writing this paper.

Such results would aid in understanding whether these assumed differing preferences for ideal and threshold climates between groups are true.

Additionally, differences have only been identified among nations with similar cultures and climates (mid-northern Europe, Canada and New Zealand), and it can therefore be argued that there is the potential for differences to be even greater among nations that are more culturally and climatically dissimilar. Survey distribution across populations located in tropical, temperate, monsoon and semi-arid regions remains a potentially productive direction (Scott et al. 2008).

The influence of current climate conditions on tourists stated ideals and thresholds may also be a productive research topic to investigate. While this survey was administered in a climate controlled classroom setting, it does not guarantee that respondents are freed from the potential bias of existing weather conditions. For instance, will tourists state warmer temperatures as ideal or unacceptable for a holiday while they are experiencing cold winter temperatures at home? Or will tourists state lower temperature preferences and thresholds for a holiday when they are experiencing hot summer temperatures at home? Fortunately this survey, Scott et al. (2008) and Moreno’s (2009) survey were all distributed during the months of spring, enabling stronger comparability across the three studies. In the future, surveys could be distributed during all four seasons (winter, spring, autumn and summer) to analyze whether results for stated ideal and unacceptable climate conditions for a multi-day holiday changes.

The importance of the respondents’ home climate as a pull factor also needs to be investigated in the future. Since climate change will modify conditions in both origin and destination location, it will change the present position between climate-related push factors in the generating regions and pull factors at the destination (Scott et al. 2004, Wall and Badke 1994). For the Mediterranean, the seasonal contrast between the source markets and the region drives demand. With climate change projections signifying improved conditions in Central and Northern Europe, a reduction in demand for the current summer peak season may become more common (Agnew and Viner 2001, Lise and Tol 2002, Hamilton et al.

2005, Amelung and Viner 2006, Bigano et al. 2006). Moreno (2009) surveyed 57 Belgian and Dutch tourists travelling to the Mediterranean and found that 32% of respondents would stay in their home country if it was experiencing ideal weather conditions. Moreno's is the first known study to objectively examine this aspect of climate change and tourism, however the sample size examined is too small (n=57) and does not allow for generalizations to be made. This is nevertheless a starting point, with further exploration needed.

This study focused on a minimum and maximum climate model for one emissions scenario (A1B) to assess the difference between projected climate change temperatures and ideal and unacceptable temperatures for tourism. While this was reasoned to be sufficient for this study, in the future, a range of SRES could be investigated to increase the robustness of these results. Moreover, the temperature projections were based on calculations from the monthly climate normals, neglecting to account for the frequency and intensity of extreme temperature conditions. While it is hard to predict these extreme events, they may be more important to understand since tourists experience actual weather conditions and not necessarily the mean temperatures (Moreno and Amelung in press). Understanding the influence of extreme weather on tourists when they are planning a holiday, as well as the level of importance that tourists assign to being able to predict their intensity and occurrence, still needs to be investigated.

In terms of extreme weather events, future studies may do well to expand beyond just heat waves, as was explored in this study, to include a more detailed study of the climatic influence of other events such as increased occurrence of storms, floods, wildfires and drought. What influence might these events have on tourists? Does the influence vary across the events as suggested by Moreno (2009), or are all extreme weather events deemed equally influential? During what stage of the holiday planning might tourists react to such events? Will the influence differ between pre-booked holidays and last-minute trips? Will holiday plans be altered, and if so how? As the events become more frequent and intense, will reliance on travel insurance increase to try and compensate for the risk associated with unpredictability? These are just some of the questions a future survey might consider.

There is also increasing discussion in the literature that there are overriding climate thresholds, such that under certain conditions, the physical facet has an overriding influence on the thermal and aesthetic facets (Moreno et al. 2009, de Freitas et al. 2008). Therefore days with intense winds and heavy rains may lead tourists to leave their planned activities, even if ideal temperature and sky conditions exist. This research may prove particularly useful when developing a new index, such as the climate index for tourism (CIT) suggested by de Freitas et al (2008), which acknowledges that the joint effects of a given weather condition is not necessarily the sum total of its various facets. Understanding these thresholds will be increasingly important in the face of climate change, as the frequency and intensity of extreme weather events such as heavy precipitation are *very likely* to increase in the 21st century (IPCC 2007b). Future research needs to begin exploring when these overriding thresholds are reached to ensure that destinations where the physical climate conditions dominate, are not overrated and vice versa.

5.4 Final Thoughts

As anticipated, the findings from this thesis hold important implications for critically assessing the usefulness of the literature on climate change impact assessment in the Mediterranean region and more broadly. From a theoretical standpoint, the results support a strong need to re-evaluate previous studies that measure the climate suitability of tourism based on general indices such as the TCI, while simultaneously producing the first known insights into threshold climates. From a practical standpoint, these results can guide future research (notably a more public sample), which can then be incorporated into broader models intended to predict changes in tourism demand and international tourism flows as a result of climate change.

The empirical evidence presented here illustrates how complex the relationship between climate and tourism can be, even in a simple framework where climate preferences and thresholds are the only explanatory factors taken into account. Based on the stated preference surveys examined, there is reasonable evidence to state that by 2030 (or earlier), the Mediterranean will not become “too hot” for tourists in the summer. Even though temperature is important, there are multiple climate parameters, as well as the type of tourism segment, activity choice and an individual's nationality, that need to be considered when trying to understand the implications of climate change on tourists' climatic preferences. The future employment of tourism behavior theories may also help to better project tourists' responses to future climate change through the exploration of substitution, willingness to pay, specialization, place attachment and loyalty. The results offered from this study are exploratory and by no means predictive. Undoubtedly much more research is needed to understand the complexities of the current and future influence of climate on the geography of travel patterns and regional tourism economies.

Appendix A

Survey Instrument

Climate Change & Mediterranean Tourism Survey

Dear participant,

This letter is an invitation to participate in a study being conducted by researchers at the Interdisciplinary Centre on Climate Change (IC3) at the University of Waterloo, Canada. Over the past few years the potential for climate change, particularly increased summer temperatures, to negatively impact the tourism industry in the Mediterranean has been widely discussed. To gain a better understanding of how sensitive Mediterranean tourism is to climate change, it is necessary to better understand weather sensitivity of tourism in the region.

Your participation in this study is entirely voluntary and would involve completing a short survey. The survey would take approximately 10-15 minutes of your time. In the survey you will be asked questions about your preferred climate for common tourism activities and how you would adjust your holiday choices in the future due to changing weather conditions. You may decline to answer any of the questions. All the information you provide is completely confidential, as your responses will be summarized with those of hundreds of other tourists.

This study has received ethics clearance from the Office of Research Ethics at the University of Waterloo and there are no known risks to you as a participant in this study. If you have any questions or would like additional information about the study to assist you in reaching a decision about participation, you may contact my supervisor, Dr. Daniel Scott at (519) 888-4567 ext. 35497, dj2scott@uwaterloo.ca or Dr. Susan Sykes of the Office of Research Ethics at (519) 888-4567 ext. 36005, ssykes@uwaterloo.ca.

Your opinions are very much appreciated and necessary to the success of this project! Thank you in advance for your assistance with this survey.

University of Waterloo

Sincerely,

Michelle Rutty
University of Waterloo
mkrutty@uwaterloo.ca

Date: ___________________ Location: ______________________________ Code #: ____________

SECTION ONE:
Travel Experience in the Mediterranean Region

1. What city/town/region did you grow up in or spend most of your life in?
   City/town/region: ____________________ Country: ____________________

2. If you were planning a multi-day holiday to the Mediterranean region, what are the activities you would plan to do? (*Please* <u>*circle*</u> *your answer along this 5-point scale for* <u>*each*</u> *statement)*

	Always	Most Times	As Often As Not (50% of time)	Rarely	Never
Visit cultural/historical sites (museums, galleries, buildings, monuments, etc)	1	2	3	4	5
Visit theme parks (amusement/water parks, zoos, aquarium, etc)	1	2	3	4	5
Water sports (motorboat, surfing, water skiing, etc)	1	2	3	4	5
Kayaking/Canoeing/Paddling	1	2	3	4	5
Hiking/Cycling	1	2	3	4	5
Golfing	1	2	3	4	5
Scuba Diving/Snorkeling	1	2	3	4	5
Horseback riding	1	2	3	4	5
Attend art performances (concert, ballet, theatre)	1	2	3	4	5
Attend a sporting event	1	2	3	4	5
Shopping	1	2	3	4	5
Wildlife viewing	1	2	3	4	5
Sunbathing/Sitting on beach	1	2	3	4	5
Swimming	1	2	3	4	5
Spas	1	2	3	4	5

3. Have you ever travelled to the Mediterranean for a **beach** holiday? (*Check* <u>*one*</u> *box*)
   ☐ Yes ☐ No
   <u>If yes</u>, how many times have you visited the Mediterranean for a **beach** holiday? ________

   <u>If yes</u>, what time(s) of the year did you take your **beach** holiday to the Mediterranean?
   (*Check* <u>*all*</u> *that apply*)
   ☐ January ☐ March ☐ May ☐ July ☐ September ☐ November
   ☐ February ☐ April ☐ June ☐ August ☐ October ☐ December

4. Based on your current knowledge of Mediterranean region climate, what month(s) has **<u>ideal</u>** temperatures for a **beach** holiday? (*Check <u>all</u> that apply*)

☐ January	☐ March	☐ May	☐ July	☐ September	☐ November
☐ February	☐ April	☐ June	☐ August	☐ October	☐ December
☐ Unsure					

5. Based on your current knowledge of Mediterranean region climate, what month(s) has **<u>unacceptable</u>** temperatures for a **beach** holiday? (*Check <u>all</u> that apply*)

☐ January	☐ March	☐ May	☐ July	☐ September	☐ November
☐ February	☐ April	☐ June	☐ August	☐ October	☐ December
☐ Unsure					

6. Have you ever travelled to the Mediterranean for an **urban** sightseeing holiday? (*Check one box*)
   ☐ Yes ☐ No
   <u>If yes</u>, how many times have you visited the Mediterranean for an **urban** sightseeing holiday? ________

   <u>If yes</u>, what time(s) of the year did you take your **urban** sightseeing holiday to the Mediterranean? (*Check <u>all</u> that apply*)

☐ January	☐ March	☐ May	☐ July	☐ September	☐ November
☐ February	☐ April	☐ June	☐ August	☐ October	☐ December

7. Based on your current knowledge of Mediterranean region climate, what month(s) has **<u>ideal</u>** temperatures for an **urban** sightseeing holiday? (*Check <u>all</u> that apply*)

☐ January	☐ March	☐ May	☐ July	☐ September	☐ November
☐ February	☐ April	☐ June	☐ August	☐ October	☐ December
☐ Unsure					

8. Based on your current knowledge of Mediterranean region climate, what month(s) has **<u>unacceptable</u>** temperatures for an **urban** sightseeing holiday? (*Check <u>all</u> that apply*)

☐ January	☐ March	☐ May	☐ July	☐ September	☐ November
☐ February	☐ April	☐ June	☐ August	☐ October	☐ December
☐ Unsure					

SECTION TWO:
The Influence of Weather on Mediterranean Holidays

Note: for this section, assume you are planning a trip to the Mediterranean

1. Assume you are planning a multi-day holiday to the Mediterranean. Would you look up your destination's typical weather conditions for the time of year you plan to visit? (*Check <u>one</u> box*)
   ☐ Yes ☐ No

   <u>If yes,</u> at what stage of your holiday planning would you typically gather weather information? (*Check that apply*)
   - ☐ Before booking transport tickets and/or accommodations and/or tickets to an attraction
   - ☐ After booking transport tickets and/or accommodations and/or tickets to an attraction

PART A: Beach Holidays

2. Assume you are booking a multi-day **beach** holiday in the Mediterranean. How important are the following aspects of weather to your **beach** holiday? (*Please circle your answer along this 5-point scale for each statement)*

	Not Important		Neutral		Extremely Important
No strong winds	1	2	3	4	5
No rain	1	2	3	4	5
Sunshine	1	2	3	4	5
Comfortable air temperature	1	2	3	4	5
Comfortable water temperature	1	2	3	4	5

3. Assume you are booking a multi-day **beach** holiday in the Mediterranean. For each of the three questions below, circle the temperature or range of temperatures that best represent your opinion on weather conditions for **beach** holidays.

EXAMPLE: if you feel the ideal temperature for your **beach** holiday is between 41 and 44ºC, then you would circle these temperatures as illustrated below.

15ºC 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 34 35 36 37 38 39 40 41 42 43 44 45ºC

a. Please circle the temperature(s) that are **<u>ideal</u>** for your Mediterranean **beach** holiday.
15ºC 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45ºC

b. Please circle the temperature(s) that are **<u>unacceptably hot</u>** for your Mediterranean **beach** holiday
…OR if all temperatures are acceptable for a **beach** holiday then *check this box* ☐.
15ºC 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45ºC

c. Please circle the temperature(s) that are **<u>unacceptably cool</u>** for your Mediterranean **beach** holiday
…OR if all temperatures are acceptable for a **beach** holiday then *check this box* ☐.
15ºC 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45ºC

4. Assume you are booking a multi-day **beach** holiday in the Mediterranean. For each of the two questions below, circle the length of rain that best represent your opinion on weather conditions for **beach** holidays.

EXAMPLE: if you feel the ideal length of time that it would rain <u>each</u> day for your **beach** holiday is between 3 and 4 hours, then you would circle this range as illustrated below.

0min 5min 15min 30min 45min 1hr 1.5hrs 2hrs 2.5hrs 3hrs 3.5hrs 4hrs 4.5hrs 5hrs

a. Please circle the **<u>ideal</u>** length of time that it would rain <u>each</u> day during your Mediterranean **beach** holiday.
0min 5min 15min 30min 45min 1hr 1.5hrs 2hrs 2.5hrs 3hrs 3.5hrs 4hrs 4.5hrs 5hrs

b. Please circle the **<u>unacceptable</u>** length of time that it would rain <u>each</u> day during your Mediterranean **beach** holiday. *(Circle <u>all</u> that are unacceptable)*
…OR if all of the lengths of time that it would rain are acceptable then *check this box* ☐.
0min 5min 15min 30min 45min 1hr 1.5hrs 2hrs 2.5hrs 3hrs 3.5hrs 4hrs 4.5hrs 5hrs

5. Assume you are booking a multi-day **beach** holiday in the Mediterranean. What is the **ideal** wind condition for your holiday? (*Check one box*)
    - ☐ No wind
    - ☐ Light breeze (1-9 km/h)
    - ☐ Moderate wind, when sand begins to be blown around (10-40 km/h)
    - ☐ Strong wind (41-60 km/h)
    - ☐ Very strong wind (61-90 km/h)

6. Assume you are booking a multi-day **beach** holiday in the Mediterranean. What are **unacceptable** wind condition(s) for your holiday? (*Check all that are unacceptable*)
    - ☐ No wind
    - ☐ Light breeze (1-9 km/h)
    - ☐ Moderate wind, when sand begins to be blown around (10-40 km/h)
    - ☐ Strong wind (41-60 km/h)
    - ☐ Very strong wind (61-90 km/h)
    - ☐ All wind conditions are acceptable

7. Assume you are booking a multi-day **beach** holiday in the Mediterranean. What is the **ideal** sky condition for your holiday? (*Check one box*)
    - ☐ 0% cloud
    - ☐ 25% cloud
    - ☐ 50% cloud
    - ☐ 75% cloud
    - ☐ 100% cloud

8. Assume you are booking a multi-day **beach** holiday in the Mediterranean. What are **unacceptable** sky condition(s) for your holiday? (*Check all that are unacceptable*)
    - ☐ 0% cloud
    - ☐ 25% cloud
    - ☐ 50% cloud
    - ☐ 75% cloud
    - ☐ 100% cloud
    - ☐ All cloud conditions are acceptable

PART B: Urban Sightseeing Holidays

9. Assume you are booking a multi-day **urban** sightseeing holiday in the Mediterranean. How important are the following aspects of weather to your multi-day **urban** sightseeing holiday? (*Please circle your answer along this 5-point scale for each statement)*

	Not Important		Neutral		Extremely Important
No strong winds	1	2	3	4	5
No rain	1	2	3	4	5
Sunshine	1	2	3	4	5
Comfortable air temperature	1	2	3	4	5

10. Assume you are booking a multi-day **urban** sightseeing holiday in the Mediterranean. For each of the three questions below, circle the temperature or range of temperatures that best represent your opinion on weather conditions for **urban** sightseeing holiday.

> EXAMPLE: if you feel the ideal temperature for your **urban** sightseeing holiday is between 41 and 44ºC, then you would circle these temperatures as illustrated below.
>
> 15ºC 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 34 35 36 37 38 39 40 41 42 43 44 45ºC

a. Please circle the temperature(s) that are **<u>ideal</u>** for your Mediterranean **urban** sightseeing holiday.
15ºC 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45ºC

b. Please circle the temperature(s) that are **<u>unacceptably hot</u>** for your Mediterranean **urban** sightseeing holiday
…OR if you feel all temperatures are acceptable then *check this box* ☐.
15ºC 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45ºC

c. Please circle the temperature(s) that are **<u>unacceptably cool</u>** for your Mediterranean **urban** sightseeing holiday.
…OR if all temperatures are acceptable for an **urban** sightseeing holiday then *check this box* ☐.
15ºC 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45ºC

11. Assume you are booking a multi-day **urban** sightseeing holiday in the Mediterranean. For each of the two questions below, circle the length of rain that best represent your opinion on weather conditions for an **urban** sightseeing holiday.

> EXAMPLE: if you feel the ideal length of time that it would rain each day for your **urban** sightseeing holiday is between 3 and 4 hours, then you would circle this range as illustrated below.
>
> 0min 5min 15min 30min 45min 1hr 1.5hrs 2hrs 2.5hrs 3hrs 3.5hrs 4hrs 4.5hrs 5hrs

a. Please circle the **<u>ideal</u>** length of time that it would rain each day during your Mediterranean **urban** sightseeing holiday.
0min 5min 15min 30min 45min 1hr 1.5hrs 2hrs 2.5hrs 3hrs 3.5hrs 4hrs 4.5hrs 5hrs

b. Please circle the **<u>unacceptable</u>** length of time that it would rain each day during your Mediterranean **urban** sightseeing holiday.
…OR if all of the lengths of time that it would rain are acceptable then *check this box* ☐
0min 5min 15min 30min 45min 1hr 1.5hrs 2hrs 2.5hrs 3hrs 3.5hrs 4hrs 4.5hrs 5hrs

12. Assume you are booking a multi-day **urban** sightseeing holiday in the Mediterranean. What is the **<u>ideal</u>** wind condition for your holiday? (*Check <u>one</u> box*)
   - ☐ No wind
   - ☐ Light breeze (1-9 km/h)
   - ☐ Moderate wind (10-40 km/h)
   - ☐ Strong wind (41-60 km/h)
   - ☐ Very strong wind (61-90 km/h)

13. Assume you are booking a multi-day **urban** sightseeing holiday in the Mediterranean. What are the **unacceptable** wind condition(s) for your holiday? (*Check* <u>*all*</u> *that are unacceptable*)
    - ☐ No wind
    - ☐ Light breeze (1-9 km/h)
    - ☐ Moderate wind (10-40 km/h)
    - ☐ Strong wind (41-60 km/h)
    - ☐ Very strong wind (61-90 km/h)
    - ☐ All wind conditions are acceptable

14. Assume you are booking a multi-day **urban** sightseeing holiday in the Mediterranean. What is the **ideal** sky condition for your holiday? (*Check* <u>*one*</u> *box*)
    - ☐ 0% cloud
    - ☐ 25% cloud
    - ☐ 50% cloud
    - ☐ 75% cloud
    - ☐ 100% cloud

15. Assume you are booking a multi-day **urban** sightseeing holiday in the Mediterranean. What are the **unacceptable** sky condition(s) for your holiday? (*Check* <u>*all*</u> *that are unacceptable*)
    - ☐ 0% cloud
    - ☐ 25% cloud
    - ☐ 50% cloud
    - ☐ 75% cloud
    - ☐ 100% cloud
    - ☐ All cloud conditions are acceptable

SECTION THREE:
The influence of media on Mediterranean holiday planning

During the summers of 2003 and 2007, numerous media stories covered the heat waves occurring in the Mediterranean region. Please read the article below and then answer the two related questions that follow.

Over-heated Med stokes tourism fears

The Observer – 22 July 2007

As temperatures in southern Europe reach record heights, traditional holiday playgrounds may soon become unbearably hot and dangerously dry

Greece is now on a war footing against weather phenomena ‘the likes of which we have never seen’, the country’s Public Order Minister, Byron Polydoras, warned this weekend. Polydoras was speaking as countries around the Mediterranean roasted, with temperatures soaring to ‘furnace levels’, as one meteorologist described it.

Temperatures are likely to reach 43ºC in the shade this week, making this the hottest summer on record for Greece in the past century. Macedonia has declared a state of emergency. Spain, Italy and France are experiencing droughts that are measuring up to become the worst on record.

1. How much influence would media stories like this have on your travel plans to the Mediterranean? (*Please circle your answer along this 5-point scale)*

No Influence		Neutral		Very Strong Influence
1	2	3	4	5

2. If you had <u>not yet booked</u> your multi-day Mediterranean holiday reservations (accommodation, transport tickets, etc), how would such a story affect your Mediterranean holiday plans? (*Check <u>one</u> box*)
   - ◻ I would still book a multi-day Mediterranean holiday
   - ◻ I would still book a multi-day Mediterranean holiday, but would book a Mediterranean destination that was not having a heat wave
   - ◻ I would still book a multi-day Mediterranean holiday, but would book for a later departure date
   - ◻ I would not go to the Mediterranean and would chose a non-Mediterranean destination
   - ◻ I would seek additional information about impacts in my planned destination before I would decide what to do

3. If you had <u>already booked</u> your multi-day Mediterranean holiday reservations (accommodation, transport tickets, etc), how would such a story affect your decision to go on your Mediterranean holiday? (*Check <u>one</u> box*)
   - ◻ I would still go on my multi-day Mediterranean holiday at the planned location despite the heat wave
   - ◻ I would still go on multi-day Mediterranean holiday, but would change to a Mediterranean destination that was not having a heat wave
   - ◻ I would go on my multi-day Mediterranean beach holiday, but would change my departure to a later date
   - ◻ I would cancel my multi-day Mediterranean holiday and would chose a non-Mediterranean destination
   - ◻ I would seek additional information about impacts in my planned destination before I would decide what to do

Thank you very much for your time!

Please provide any additional comments in this box below

Bibliography

Agnew, M.D. and Viner, D. (2001). Potential impacts of climate change on international tourism. In J.H. Hohnholz (Eds) *Applied Geography and Development*, 81-93.

AKI. (2005). *Global warming threatens Mediterranean tourism.* Rome: AKI., 2 July, 2005.

Alcamo, J., Moreno, J.M., Novaky, B., Bindi, M., Corobov, R., Devoy, R.J.N, Giannakopoulos, C., Martin, E., Olesen, J.E., Shvidenko, A. (2007). Europe. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental panel on climate Change,* Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., and Hanson, C.E. (eds.). Cambridge University Press, Cambridge, UK, 541-580.

Amelung, B., Nicholls, S., and Viner, D. (2007). Implications of Global Climate Change for Tourism Flows and Seasonality. *Journal of Travel Research*, 45, 285-296.

Amelung, B. and Viner, D. (2006) Mediterranean tourism: Exploring the future with the tourism climate index. *Journal of Sustainable Tourism*, 14(4), 349-366.

BarOn, R. (1975). *Seasonality in Tourism: A Guide to the Analysis of Seasonality and Trends for Policy Making.* London: Economist Intelligence Unit.

Babbie, E. (2001). *Practice of Social Research* (8th ed.). New York: Wadsworth Publishing Company.

BBC News. (2006). *Package holidays 'will be history.'* BBC News, 26 August 26 2006.

Besancenot, J.P., Mouiner, J., De Lavenne, F. (1978). Les Conditions Climatiques du Tourisme, Littoral. *Norois*, 99, 357-382.

Becken, S., and Hay, J.E. (eds.). (2007). *Tourism and Climate Change. Risks and Opportunities.* Channel View Publications, Clevedon.

Becker, S. (1998). Beach comfort index: a new approach to evaluate the thermal conditions for beach holiday resort using a South Africa example. *Geojournal*, 44(4): 297-307.

Becker, S. (2000). Bioclimatological rating of cities and resorts in South Africa according to the climate index. *International Journal of Climatology*, 20, 1403-1414.

Berrittella, M., Bigano, A., Ronson, R., and Tol, R. (2006). A general equilibrium analysis of climate change impacts on tourism. *Tourism Management*, 27, 913-924.

Bigano, A., Goria, A., Hamilton, J.H., and Tol, R.S.J. (2005). The effect of climate change and extreme weather events on tourism. FEEM Working Paper No. 30.05, Climate Change Modeling and Policy Research Programme, Fondazione Eni Enrico Mattei, and the Research Unit on Sustainability and Global Change, Hamburg University and Centre for marine and Atmospheric Science, Hamburg. Retrieved February 3, 2009 from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=673453.

Bigano, A., Hamilton J.M., and Tol, R.S.J. (2006). The impact of climate on holiday destination choice. *Climatic Change*, 76, 389-406.

Blazejczyk, K. (2001). Assessment of recreational potential of bio-climate based on human heat balance. In: Matzarakis A., de Freitas C (eds.). Proc 1st Int Workshop on Climate, Recreation and Tourism, 5-10 October. International Society of Biometeorology, Commission on climate, Tourism and Recreation. Halkidi, 133-142.

Butler, R.W. (1994). Seasonality in Tourism: Issues and Problems. In A.V. Seaton (Eds) *Tourism: The State of the Art*, 332-339. Chichester, UK: Wiley.

Butler, R. W. (2001). Seasonality in tourism: Issues and implications. In: T. Baum and S. Lundtorp (eds.). *Seasonality in Tourism*. Pergamon, London.

Cegnar T. and Matzarakis, A. (2004). Trends of thermal bioclimate and their application for tourism in Slovenia. In: Matzarakis A., de Fretias C., Scott D (eds.). Advances in tourism climatology. Berichte des meteorologischen Institutes der Universtat Freiburg, 12, 66-73.

Christensen, J.H., Hewiston, B., Busuioc, A., Chen, A., Gao, X., Held, I., Jones, R., Kolli, R.K., Kwon, W-T., Laprise, R., Magana Rueda, V., Mearns, L., Menendez, C.G., Raisanen, J., Rinke, A., Sarr, A., and Whetton, P. 2007: Regional Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report on the Intergovernmental Panel on Climate Change* [Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 847-940.

Cohen, E. (1972). Toward a sociology of international tourism. *Social Research*, 39, 164-182.

Conservation International (2007). Biodiversity Hotspots: Mediterranean Basin. Retrieved October 20, 2008 from http://www.biodiversityhotspots.org/xp/hotspots/mediterranean/Pages/default.aspx

Creswell, J.W. (2003). *Research design: qualitative, quantitative and mixed methods approaches.* (2nd ed.). Thoursand Oaks: SAGE Publications.

Crompton, J.L. (1979). Motivations for pleasure vacation. *Annals of Tourism Research,* 6(4), 420-434.

Dann, G.M.S. (1977). Anomie, ego-enhancement and tourism. *Annals of Tourism Research*, 6(4), 184-194.

de Freitas, C.R. (2003). Tourism climatology: evaluating environmental information for decision making and business planning in the recreation and tourism sector. *International Journal of Biometeorology,* 4, 45-54.

de Freitas, C.R., Scott, D., and McBoyle, G. (2008). A second generation climate index for tourism (CIT): specifications and verification. *International Journal of Biometeorology*, 52, 399-407.

Easier Travel. (2006). *Climate change to drive radical changes in global tourism.* Retrieved October 20, 2008 from http://www.easier.com/view/News/Travel/artiklce-66761.html

Freesun News. (2005). *The Mediterranean: too hot to holiday?* Freesun News (Belgium), 18 November, 2005.

Giles, A. and Perry, A.H. (1998). The use of temporal analogue to investigate the possible impact of projected global warming on the UK tourist industry. *Tourism Management*, 19(1), 75-80.

Gomez-Martin, M.B. (2004). An evaluation of the tourist potential of the climate in Catalonia (Spain): A regional study. *Geografiska Annaler*, 86, 249-264.

Gomez-Martin, M.B. (2005). Weather, Climate and Tourism. A Geographical Perspective. *Annals of Tourism Research*, 32(3), 571-591.

Gomez-Martin, M.B. (2006). Climate potential and tourist demand in Catalonia (Spain) during the summer season. *Climate Research*, 32, 75-87.

Gossling, S. and Hall, M. (2006). An introduction to tourism and global environmental change. In: Gossling, S. and Hall, M. (eds.). *Tourism & Global Environmental Change. Ecological, Social, Economic and Political Interrelationship*, 1-34. London: Routledge.

Gossling, S., Bredberg, M., Randow, A., Svensson, P. and Swedlin, E. (2006). Tourist perceptions of climate change: a study of international tourists in Zanzibar. *Current Issues in Tourism*, 9 (4-5), 419-435.

Guardian. (2006). Climate change could bring tourists to UK – report. *The Guardian*, 28 July, 2006. Retrieved October 20, 2008 from http://www.guardian.co.uk/travel/2006/jul/28/travelnews.uknews.climatechange

Halifax Travel Insurance (2006). *Holiday 2030*. 1 September 2006. Retrieved October 20, 2008 from http://www.hbosplc.com/media/pressreleases/articles/halifax/2006-09-01-05.asp?section+Halifax

Hall, M.C., and Higham, J. (eds.). (2005). *Tourism, Recreation and Climate Change*. Channel View Publications, Clevedon.

Hamilton, J. (2005). *Climate and the Destination Choice of German Tourists: Working Paper FNU-15.* Centre for Marine and Climate Research, University of Hamburg, Hamburg, Germany.

Hamilton, J.M. and Lau, M.A. (2005). The role of climate information in tourist destination choice decision-making. In Gossling, S., and Hall, C.M (Eds) *Tourism and global environmental change, 2*29-250. London: Routledge.

Hamilton, J.M., Maddison, D., and Tol, R.S.J. (2005). Climate change and international tourism: a simulation study. *Global Environmental Change*, 15(3), 253-266.

Harlfinger, O. (1991). Holiday biometeorology: a study of Palma de Majorca, Spain. *GeoJournal*, 25, 377-381.

Hay, J., Mimura, N., Campbell, J., Fifita, S., Koshy, K., McLean, R., Nakalevu, T., Nunn, P. and de Wet, N. (2003). *Climate Variability and Change and Sea-level Rise in the Pacific Islands Region. A Resource Book for Policy and Decision Makers, Educators and other Stakeholders.* South Pacific Regional Environment Programme. Ministry of the Environment, Japan.

Higham, J., and Hinch, T. (2002). Tourism Sports and Seasons: The Challenges and Potential of Overcoming Seasonality in the Sport and Tourism Sectors. *Tourism Management*, 23(2), 175-185.

Intergovernmental Panel on Climate Change (IPCC). (2007a). *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Asessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1-18.

Intergovernmental Panel on Climate Change (IPCC). (2007b). *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovenrmental Panel on Climate Change* [Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., and Hanson, C.E. (eds.)]. Cambridge University Press, Cambridge, UK, 7-22.

Intergovernmental Panel on Climate Change (IPCC). (2008). *About IPCC.* Accessed October 21, 2008 from http://www.ipcc.ch/about/index.htm

Jang, S.C. (2004). Mitigating Tourism Seasonality: A Quantitative Approach. *Annals of Tourism Research*, 31(4), 819-836.

Jorgensen, F. and Solvoll, G. (1996). Demand models for inclusive tour charter: the Norwegian case. *Tourism Management*, 17, 17-24.

Kozak, M. (2002). Comparative analysis of tourist motivations by nationality and destinations. *Tourism Management*, 23, 221-232.

Kundzewicz, Z.W., Mata, L.J., Arnell, N.W., Doll, P. Kabat, P., Jimenez, B., Miller, K.B., Oki, T., Sen, Z. and Shiklomanov, I.A. 2007: Freshwater resources and their management. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report to the Intergovernmental Panel on Climate Change* [Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J. and Hanson, C.E. (eds.)]. Cambridge University Press, Cambridge, UK, 173-210.

Lise, W. and Tol, R.S.J. (2002). Impact of climate on tourist demand. *Climatic Change*, 55(4), 429-449.

Lohmann, M., and Kaim, E. (1999). Weather and holiday preference – image, attitude and experience. *Revue de Tourisme*, 2, 54-64.

Maslow, A. (1954). *Motivation and Personality*. New York: Harper and Row.

Maddison, D. (2001). In search of warmer climates? The impact of climate change on flows of British tourists. *Climatic Change,* 49(1/2), 193-208.

Mansfeld, Y., Freundlish, A. and Kutiel, H. (2004). The relationship between weather conditions and tourists' perception of comfort: the case of the winter sun resort of Eilat. In Amelung, B. and Viner, D. (eds.). *Proceedings of the NATO Advanced Research Workshop on Climate Change and Tourism*, Warsaw, Poland.

Martin, P. and Lefebvre, M. (1995). Malaria and climate: sensitivity of malaria potential transmission to climate. *Ambio,* 24(4), 200-220.

Martinez Ibarra, E. (2006). Consideraciones geográficas en torno al binomio clima-turismo: applicación al litoral alicantino. Alicante: University of Alicante.

Matzarakis, A. (2001). Assessing climate for tourism purposes: existing methods and tools for the thermal complex. In: Matzarakis, A., de Freitas, C. (eds.). Proc 1st International Workshop on Climate Tourism and Recreation, 5-10 October. International Society of Biometeorology, Commission on Climate Tourism and Recreation, Halkidi, 101-112.

Meehl, G.A., Stocker, T.F., Collins, W.D., Friedlingstein, P., Gaye, A.T., Gregory, J.M, Kitoh, A., Knutti, R., Murphy, J.M., Noda, A., Raper, S.C.B., Watterson, I.G., Weaver, A.J. and Zhao, Z-C. 2007: Global Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 747-846.

Meyer, D., and Dewar, K. (1999). A new tool for investigating the effect of weather on visitor numbers. *Tourism Analysis*, 4, 145-155.

Mieczkowski, Z. (1985). The tourism climatic index: A method of evaluating world climates for tourism. *Canadian Geographer*, 29(3), 220-233.

Mintel International Group. (1991). *Special Report – Holidays*. Leisure Intelligence. Mintel International Group, London, England.

Morabito, M., Crisci, A., Barcaioli, G. and Maracchi, G. (2004). *Climate Change: The impact on tourism comfort at three Italian tourist sites.* Nr. 12. Freiburg: Berichte des Meteorologischen Institutes der Universitat.

Moreno, A. (2009). *Mediterranean Tourism and Climate (Change): A Survey-Based Study*. Paper presented at the 7th International Symposium on Tourism and Sustainability, 8-10 July, University of Brighton, United Kingdom.

Moreno, A., Amelung, B. and Santamarta, L. (2009). Linking Beach Recreation to Weather Conditions: A Case Study in Zandvoort, Netherlands. *Tourism in Marine Environments*, 5(2-3), 111-119.

Moreno, A., and Amelung, B. (2009-in press). Climate change and tourist comfort on Europe's beaches in summer: a reassessment. *Coastal Management.*

Morgan, R., Gatell, E., Junyent, R., Micallef, A., Ozhan, E. and Williams, A. (2000). An improved user-based beach climate index. *Journal of Coastal Conservation*, 6, 41-50.

Nicholls, S. and Amelung, B. (2008). Climate change and tourism in northwestern Europe: impacts and adaptation. *Tourism Analysis*, 13, 21-31.

Office for National Statistics. (2008). *Summer mortality – deaths up in August heat wave*. Office for National Statistics. Retrieved October 3 2003 from http://www.statistics.gov.uk/cci/nugget.asp?id=480

Office of Travel and Tourism Industries (OTTI), U.S. Department of Commerce. (2008). *Overseas Visitation Estimates for U.S. States, Cities, and Census Regions: 2008.* Retrieved August 18 2009 from http://tinet.ita.doc.gov/outreachpages/download_data_table/2008_States_and_Cities.pdf

Pearce, P.L. (1993). Fundamentals of tourist motivation. In D.G. Pearce and R.W. Butler (eds.) *Tourism research: Critiques and challenges*, 113-134. London: Routledge.

Perry, A.H. (2000a). *Impacts of Climate Change on Tourism in the Mediterranean: Adaptive Responses.* 35.2000, Fondazione Eni Enrico Mattei.

Perry, A.H. (2000b). Tourism and recreation. Chapter 12 in M.L. Parry (eds.). *Assessment of Potential Effects and Adaptations for Climate Change in Europe: The Europe Acacia Project.* Norwhich: Jackson Environment Institute, University of East Anglia, EU ENV4-CT97-0531.

Perry, A.H. (2001). More heat and drought – can Mediterranean tourism survive and prosper? First International Workshop on Climate, Tourism and Recreation, Halkidiki, Greece.

Perry, A.H. (2005). The Mediterranean: How Can the World's Most Popular and Successful Tourist Destination Adapt to a Changing Climate? In C.M. Hall and J. Higham (eds.) *Tourism, Recreation and Climate Change: International Perspectives*, 86-96. Clevedon: Channel View Publications.

Perry, A.H. (2006). Will Predicted Climate Change Compromise the Sustainability of Mediterranean Tourism? *Journal of Sustainable Tourism,* 14(4), 367-375.

Pinol, J., Terradas, J., and Lloret, F. (1998). Climate warming, wildfire hazard and wildfire occurrence in coastal eastern Spain. *Climate Change,* 38, 345-357.

Plog, S.C. (1974). Why destination areas rise and fall in popularity. *Cornell Hotel and Restaurant Administration Quarterly*, February, 55-58.

The Guardian. (2006). *Med to lose pull as Earth heats up*. 9 August, 2006. Retrieved October 20, 2008 from http://www.guardian.co.uk/science/2006/aug/09/travelnews.environment

Ratz, T. and Vizi, I. (2004). *The impacts of global climate change on water resources and tourism: the responses of Lake Balaton and Lake Tisza.* Nr. 12. Freiburg: Berichte des Meteorologischen Institutes der Universitat.

Reuters. (2005). *Global warming to wreck Med paradise*. 2 July, 2005. London: Reuters.

Reuters. (2007). Mediterranean to get more deadly hot days: study. 15 June, 2007. London: Reuters.

Scott, D., Gossling, S., and de Freitas, C. (2008). Climate preferences for tourism: evidence from Canada, New Zealand and Sweden. *Climate Research,* 38, 61-73.

Scott, D. and Jones, B. (2006). Climate Change, Seasonality and Visitation to Canada's National Parks. *Journal of Parks and Recreation Administration,* 24(2), 42-62.

Scott, D., and Jones, B. (2007). A regional comparison of the implications of climate change of the golf industry in Canada, *The Canadian Geographer*, 51(2), 219-232.

Scott, D., Jones, B., and McBoyle, G. (2006). Climate, Tourism and Recreation: A bibliography-1936 to 2005. Retrieved August 17, 2009 from http://www.fes.uwaterloo.ca/geography/faculty/danielscott/PDFFiles/CTREC%20Biblio_June%202006.pdf

Scott, D., McBoyle, G., and Schwartzentruber, M. (2004). Climate change and distribution of climatic resources for tourism in North America. *Climate Research*, 27, 105-117.

Soesilo, J., and Mings, R. (1987). Assessing the Seasonality of Tourism. *Visions in Leisure and business,* 6(2), 25-38.

The Observer. (2007). *Over-heated Med stokes tourism fears*. 22 July, 2007. Accessed October 21, 2008 from http://www.guardian.uk/travel/2007/jul/22/climatechange.greece

Thuiller, W., Lavorel, S., Araujo, M.B., Sykes, M.T., and Prentice, I.C. (2005). Climate change threats plant diversity in Europe. *Proc. Natl. Acad. Sci. U.S.A.,* 102, 8245-8250.

Travel Trade Gazette. (2007). *Packages face extinction.* Travel Trade Gazette (London), *7 December, 2007.*

UNESCO World Heritage Centre (WHC). (2007). *Case studies on Climate Change and World Heritage*. Paris, France: UNESCO World Heritage Centre.

United Nations World Tourism Organization (UNWTO). (2001). *Tourism Highlights 2001.* Madrid, Spain: United Nations.

United Nations World Tourism Organization (UNWTO). (2003). *Climate Change and Tourism Proceedings of the 1st International Conference on Climate change and Tourism.* Djerba, Tunisia, 9-11 April 2003. Madrid, Spain: United Nations.

United Nations World Tourism Organization (UNWTO). (2007a). *Tourism Market Trends: Europe.* Madrid, Spain: United Nations.

United Nations World Tourism Organization (UNWTO). (2007b). *Climate Change and Tourism: Responding to Global Challenges*. Davos, Switzerland, 1-3 October 2007. Madrid, Spain: United Nations.

United Nations World Tourism Organization (UNWTO). (2008). World Tourism Barometer. Volume 6, Number 2. Madrid, Spain: United Nations.

United Nations World Tourism Organization, United Nations Environmental Programme and World Meterological Organization (UNWTO-UNEP-WMO). (2008). *Climate Change & Tourism: Responding to Global Challenges.* Madrid, Spain: United Nations.

United Nations World Tourism Organization (UNWTO), (2009). *World Tourism Barometer, 5(1).* Madrid, Spain: United Nations

Uysal, M. and Hagen, L. (1993). Motivations of pleasure travel and tourism. In M. Khan, M. Olsen and T. Var (eds.) *Encyclopedia of hospitality and tourism*, 98-810. New York: Van Nostrand Reinhold.

Wall, G. and Badke, C. (1994). Tourism and climate change: an international perspective. *Journal of Sustainable Tourism*, 2(4), 193-203.

Wilbanks, T.J., Romero Lankao, P., Bao, M., Berkhout, F., Cairncross, S., Ceron, J-P., Kapshe, M. Muir-Wood, R. and Zapata-Marti, R. 2007: Industry, settlement and society. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the fourth Assessment Report for the Intergovernmental Panel on Climate Change*, [Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., and Hanson, C.E. (eds.)]. Cambridge University Press, Cambridge, UK, 357-390.

Witt, C.A., and Wright, P. (1992). Tourist motivation: Life after Maslow. In P. Johnson and B. Thomas (eds.). *Choice and Demand in Tourism*, 33-56. London: Mansell.

Woodworth, P.L., Gregory, J.M., Nicholls, R.J. (2005). Long term sea level changes and their impacts. In A.R. Robinson and K.H. Brink (eds.). *The Global Coastal Ocean: Multiscale interdisciplinary processes*, 715-753. Cambridge: Massachusetts.

Zaninovic, K. and Matzarakis, A. (2004). Variation and trends of thermal comfort at the Adriatic Coast. In: Matzarakis, A., de Freitas C., Scott, D. (eds.). Advances in tourism climatology. Berichte des Meteorologischen Institutes der Universtat Freiburg, 12, 66-73.