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Will Predicted Climate Change Compromise the Sustainability of Mediterranean Tourism?

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Projected greenhouse gas induced climate change may alter the frequency and intensity of events like heat waves, drought and fires which affect tourists in the Mediterranean. The summer of 2003 is used as an example of the impact of climate on tourists to the area. Tourists' reactions and the possible adaptive responses that the tourist industry might adopt are considered. The sustainability of tourism in the future is also investigated.

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The Mediterranean is currently the world's most popular and successful tourist destination with over 120 million visitors every year.

The climate of the Mediterranean is perceived by many tourists as idyllic, benign and delightful. It is the usually fine summer weather and clarity of light that have made the area attractive to north Europeans for many centuries, rather than the heatwaves, droughts, storms and floods that can plague the region at times. Climate constitutes an important part of the environmental context in which all recreation and tourism takes place, and because tourism is a voluntary and discretionary activity, participation will depend on perceived favourable conditions. The main impacts of climate change on sustainability will include excessive summer heat, protracted drought and other hydrological stresses, including pollution problems. Increases of sea level will erode tourist beaches and diseases, including malaria may well become a significant problem. These threats will be considered in this paper.

Whereas in the 18th and 19th centuries it was the winter that was 'the season' in the Mediterranean, with the aristocracy of northern Europe fleeing cold and dark conditions, today it is mass 'sun-lust' package tourism which leads to a seasonal peak in high summer. A UK survey suggested that for over 80% of overseas holidaymakers better weather than can normally be found in the UK in summer was the primary reason for choosing an overseas holiday. Concern about skin cancer and worries about UV-B radiation has so far tended merely to modify behaviour (e.g. the use of more effective sunscreen treatments), rather than cause a change in destination preference. It is still the case that for many the acquisition of a sun tan and the purchase of a holiday is as important as buying consumer durables for the home. The beach has become a fun place.

Smith (1990) showed that the level of tourism from the UK to the Mediterranean was influenced by precipitation in the UK during the previous summer. A study from the Netherlands (Lise & Tol, 2002) has extended this analysis and shown how models can be built linking tourist demand to climate. If the current mass travel movement is viewed as a kind of import substitution, then such trends as growth of the domestic short-holiday market in northern European countries could have an impact on the balance of payments of several countries. An interesting study of the amenity value of climate has been carried out by Maddison (2001) who finds that British tourists are attracted by climates which deviate little from an average daytime maximum of 29°C.

The Future Climate

The Intergovernmental Panel on Climate Change 3rd Assessment (2001) has shown that a rise in maximum temperatures and an increase in the frequency of heat waves and hot days is likely during the 21st century. The Mediterranean will probably become less attractive for health reasons in the summer. Apart from the dangers increasingly associated with skin cancer, many Mediterranean beach resorts may simply be too hot to be comfortable in the peak season, with a much higher frequency of severe heatwaves (Perry, 1987). Carter (1991) has used an approximate index of climatic favourability to investigate changes of seasonal climate in Europe under possible future climate change. Results suggested that a climate warming of 4°C would lead to a shift in the optimum summertime climate from the traditional southern coastal resorts northwards to currently less fashionable regions. This result holds true regardless of whether the warming is associated with moderate decreases or increases of precipitation. Mieczkowski (1985) proposed a tourism climate index (TCI) as a means of evaluating world climates for tourism. Whilst he used five climate variables in the TCI formulae, thermal comfort was considered the most important and given a 50% weighting. Using the ACACIA A2 High scenario (Parry *et al.*, 2000) the index was calculated for the recent good summer of 1995 and an average summer in 1999, together with the expected index value in 2020, 2050 and 2080 for the UK resort of Bournemouth. By the middle of the 21st century most summers are likely to have a preponderance of very good, excellent or ideal days for the holidaymaker in the UK. However, the attractiveness of the Mediterranean coastal zone in spring and autumn would be enhanced relative to the present. It is in the months of October–November that the lingering warmth and sunshine of the Mediterranean provides the biggest contrast with the weather in northern Europe. At this season maximum temperatures at present are 8–10°C higher than in London whilst in April this difference is only 5–7°C. Rotmans *et al.* (1994) suggest that the area suitable for sun-related tourism will decline in much of Italy and Greece as higher summer temperatures make beach tourism too uncomfortable. It is single-product beach destinations that are likely to be most vulnerable.

Key sensitivities to weather and climate

Major holiday decisions within many of the 'tourist exporting' countries of northern Europe are subject to a push and pull effect. The higher temperatures and settled weather of the Mediterranean summer exert a big attraction, but

better summers at home will reduce overseas holiday bookings. Giles and Perry (1998) have shown that the exceptional summer of 1995 in the UK led to a drop in outbound tourism and a big reduction in demand in the peak summer season for Mediterranean package holidays. In hot years there is a suggestion that Dutch tourists too prefer domestic to foreign beach holidays (WISE, 1999). Large numbers of people indulge in short-term opportunistic decisionmaking and switch their normal holiday preferences to take account of the unusually favourable conditions at home. Such limited evidence does suggest that climate warming might alter the competitive balance of holiday destinations with adverse effects on high season tourism in the Mediterranean. A limited survey of UK travel agents revealed that their customers most of all wanted guaranteed fine warm weather. Press reports about adverse health conditions, terrorism threats and devastating forest fires were more likely to concern customers than reports of very high temperatures.

Drought

The Spanish drought of the early 1990s showed how island resorts like Majorca could become dependent on water being transported from the mainland with attendant political tensions (Wheeler, 1995). In the last three decades there is evidence of the wet season ending earlier and the dry season onset also occurring earlier. High natural variability of rainfall helps to mask overall trends but endemic water scarcity is a very likely future scenario, especially south of 40 degrees north.

Small islands, for example in the Aegean, could be particularly affected if tourism is allowed to continue to grow and it might be necessary to severely restrict tourist growth in such environments. Nicholls and Hoozemans (1996) have shown that in the Mediterranean there are 162 islands exceeding 10 square km in size; most have a low resource base but significant tourist development. Decline in rainfall and water supply availability, together with beach erosion could undermine their tourist industries and hence their local economies. It has been suggested (Karas, 1997) that Crete could experience serious water shortages in five years out of six by 2010. There is likely to be an increase in friction, with a conflict of interest between local people and tourist authorities on the use of scarce water. It has been calculated that a luxury hotel consumes around 600 litres of fresh water per guest per night. Water-hungry land uses like golf courses and water parks will be seen as water-stealers by local people. Projected decreases in runoff will exacerbate the problem of saline infiltration of water resources. Increased degradation of the environment and spreading desertification is likely to make some areas less scenically attractive to tourists. Comprehensive adaptation strategies, including re-use of waste water and high technology solutions such as desalination plants or water grids are likely to be needed and would lead to greater intervention by government in tourism planning.

Heatwaves

Two major factors have interacted to impede the development of a definition of what a heat wave is, namely, the absence of a simple meteorological measure representing the complex interaction between the human body and the thermal environment, and the lack of suitable homogeneous time series of the meteorological variables likely to be involved (Robinson, 2001). Should we use the

exceeding of fixed absolute values, or deviation from the normal local climate, as the basis for a definition? There are clearly several dimensions to very hot weather that need to be considered. Extended heatwaves, defined as 10 days or more, appear to be becoming more frequent in the Mediterranean. In the 15 years to 1994 Italy endured eight such heat waves. In addition short-duration heat waves of three to five days with temperatures 7°C or more above normal have occurred on 33 occasions in the central Mediterranean between 1950 and 1995. Individual heat wave days have increased from 52 days in the decade 1950–1959 to 230 in the decade 1980–1989 (Conte *et al.*, 1999). Heatwaves cause increases in the death rate, especially in urban areas; for example in one episode from 13 July to 2 August 1983 in Rome, 450 deaths above the normal average occurred. In 1987 more than 1100 residents died in Greece between 20 and 31 July (Katsouyanni *et al.*, 1988) with a combination of temperatures above 40°C and poor air quality. In 1998 in Cyprus 45 deaths attributable to heat were noted when the maximum temperature exceeded 40°C on eight successive days. In Athens the National Weather Service of Greece forecasts heatwave emergencies and warnings which are disseminated to the public. Extreme heatwaves and the deaths involved are frequently reported in the media of foreign countries and give a negative image to potential holiday-makers. Emotive phrases like ‘killer heat wave’ have been used. Even reports by reputable organisations can use hyperbole to get their message across. The World Wide Fund for Nature reported that some tourist destinations could be turned into ‘holiday horror stories’. It has to be remembered that holiday-makers from northern Europe will be unused to temperatures as high as 40°C and may be more at risk than local people, who are used to long hot summers.

Gawith *et al.* (1999) have shown that at Thessaloniki in northern Greece the temperature-humidity index (THI), which assesses the impact of high temperatures and humidity, will rise above a value of 84 (when nearly everyone feels uncomfortable) for more than twice as long as at present by 2050. In addition there will be significant increases in the shoulder warm periods, suggesting a lengthening of the summer season. Forest fires, widespread in August 1994 in Tuscany, Corsica, Sardinia and France, can lead to evacuation from tourist facilities such as camp sites. Pinol *et al.* (1998) found that in coastal eastern Spain there has been increased fire activity and the number of days of very high fire risk is likely to increase further as there is a correlation between summer heat and fire occurrence. In Italy a strong association has been found between the number of forest fires and both higher summer temperatures and lower summer precipitation. Measures such as the closure of forest and parkland in summer may become increasingly necessary.

The tourist industry is very vulnerable to natural disasters. The publicity given to heatwave deaths in Greece in summer 1998, if repeated regularly, could act as a deterrent to tourism. In that year there were stories in the UK press of holidaymakers staying in their hotel rooms to try to escape the intense heat on the beaches. Queues of Britons were reported at hospitals and pharmacies, suffering from heatstroke and burns while others cut short their holidays and returned home early. Rising mean summer temperatures will inevitably be accompanied by more occasions of extreme maximum temperatures. Extreme weather episodes are likely to have a stronger impact than average weather changes.

Heatwave conditions are also implicated in the development and proliferation of algal blooms which can lead to closure of beaches, disfiguration of the coastal environment, and the death of fish as has happened in the Adriatic.

Drought and heat combined: The example of summer 2003

The three summer months, June–August 2003, broke both heat and drought records over a large area of Western Europe from Germany in the north to Spain in the south, and from Portugal in the west to Switzerland in the east. Temperatures were above normal over almost the whole of Europe, with anomalies reaching more than 5°C in southern France. Drought conditions were widespread with the largest negative anomalies of precipitation further north in central and eastern Europe. National temperature records were broken in the UK, Switzerland, Germany and Belgium but not in France, Spain, Portugal or Italy. The first heatwave in Italy and Spain began in mid-June with Majorca recording 39.5°C, a new record for the month. There was a slight lull in the hot weather in early July but by the middle of the month temperatures of between 38 and 40°C were recorded in several Mediterranean countries. The most intense phase of the heatwave occurred from 4 to 13 August and during this period 70 out of 180 recording stations in France broke all-time records and in 15% of towns temperatures exceeded 40°C. The intense heat was protracted, unremitting and severe and in many places in central, southern and western Europe, unprecedented since at least 1500 (Beniston, 2004). This type of summer is entirely consistent with what computer models of the climate are saying will become more frequent over the next century.

The main impacts of the extreme weather on tourism appear to have been the following:

- (1) The most vulnerable tourists seem to have been campers and caravanners. Forest fires threatened camp sites and actually destroyed some and there were a number of injuries and fatalities. At several sites emergency evacuations were required. The worst fires were in southern France, Portugal, southwest Spain and southern Italy. These low-cost holidaymakers are also especially vulnerable to heat waves since there is no obvious access to air conditioning. There were many reports of holidaymakers abandoning their holidays and returning home early to escape the great heat.
- (2) Excess heat wave deaths reached 15,000 in France, 6000 in Spain and 4000 in Italy and the European total probably reached or exceeded 40,000. Although it is not known how many of these deaths involved tourists, the heatwave can be classed as a major public health incident.
- (3) Local people, especially those living in cities such as Rome and Milan, tended to abandon their cities whenever possible and retreat to the coasts, lakes and countryside, joining the normal tourist influx and increasing congestion on roads and beaches.
- (4) Infrastructure problems, including power cuts in Spain and Italy as a result of excessive demand for air conditioning, and train cancellations because of buckled rails, also affected tourists.
- (5) British tourists travelling to the Mediterranean received very little advice or warning before their departures. It was often left to tour reps, themselves

with very little medical knowledge, to warn of the dangers, especially from dehydration from excessive alcohol consumption.

The extreme conditions of the summer 2003 provided a further opportunity to monitor the demand for Mediterranean holidays in the light of the evolving conditions. In the UK there was a double heatwave with peaks of temperature in mid-July and again in early August. Between these peaks the weather in late July, at the beginning of the traditional holiday period coinciding with the school holidays, was more unsettled, although still warm. The return of settled and hot weather in the first few days of August was well forecast by the UK Meteorological Office but it was clear that holiday demand was more related to the actual than the forecast weather. The prices of late availability holidays were monitored on a day-by-day basis using the websites of both an upmarket tour operator specialising in Greece and Turkey and a holiday consolidator for the period from 16 July to 20 August. At the beginning of the survey period holiday demand was lower than normal with prices quite weak, but after a delay of just a few days as the more unsettled weather began, prices began to rise by between 25 and 40% on both websites. Peak prices were achieved in the first few days of August, following nearly two weeks of unsettled weather and continued until the hot, settled weather was re-established. After this they fell dramatically and by mid-August, normally an extremely busy time, demand had fallen and prices had eased considerably, in some cases to lower levels than had been prevailing at the start of the survey period. This limited survey suggests that for a wide range of differently priced Mediterranean holidays catering to different price-brackets, late-bookers tend to be highly influenced by the prevailing, as opposed to the forecast, conditions in the home country. Such tactical booking is probably a result of several factors acting in tandem, for example the desire to achieve a bargain holiday by very late booking, the inability to plan holidays ahead because of work commitments, or possibly a dislike of foreign travel unless there are perceived weather advantages to be derived from it. By mid-August there were numerous press reports that camp sites in many holiday areas of the UK were full, and camping and holiday centre operators reported exceptionally high booking rates.

Disease

Higher temperatures could lead to some Mediterranean holiday areas becoming a suitable habitat for malaria-bearing mosquitoes. Spain, for example, is currently seen as a safe, easily accessible, no-risk destination not requiring immunisation or courses of treatment against exotic diseases for intending visitors. It is anticipated that by the 2020s suitable habitats for malaria will have spread northward from North Africa into Spain. Increases in the incidence of food poisoning and food related diseases associated with enhanced microbiological activity, for example, salmonella and *E. coli*, are likely to increase as temperatures rise. There will be a higher risk of epidemics of cholera and typhoid as well as other infectious diseases. Adverse publicity would follow such public health scares and frighten tourists away, as happened at Salou, Spain a few years ago. Extra costs will be involved in maintaining and strengthening public health defences and in health and hygiene education programmes.

Tourists' Reactions to the Changing Climate and Adaptive Responses

Considerably more research has been done on the likely changes that Mediterranean climates may experience than on the possible impact of those changes on tourists in the future. It is not always easy to tease out the impact of climate from the many other factors influencing holiday choice (Perry, 2000).

Tourism is a continuously adapting industry, responding to changing demographic and economic conditions as well as to new demands and technologies. Climate change will present new challenges but also lead to opportunities for tourist investment to capitalise on the new environmental conditions. Work has only just begun on 'translating' the suggested future climate scenarios into their impacts on tourism but already some interesting adaptations are emerging. There follows a mixture of observed adaptations and speculative predictions:

- (1) Higher air and sea temperatures are likely to encourage a longer tourist season. If the summer becomes widely perceived as too hot the season could become 'doughnut shaped', with peaks in spring and autumn months and a hole in high summer. Such a pattern might resemble the current profile of visitor demand for a resort like Dubai. Maddison (2001) has indicated that a lengthening and flattening of the tourist season is likely in Greece although with overall tourist numbers almost unchanged. With this in mind, resorts need to discourage a 'closing down' attitude at the end of summer. Higher temperatures will allow a prolongation of the season and if possible added cultural and sporting attractions such as arts festivals, regattas, food or drink events and local fiestas can help this process. Breaking the traditional seasonal pattern has as much to do with changing consumer attitudes as with developing new attractions, and more targeted advertising could help in this respect. A longer tourist season would allow quicker returns on investment with more intensive utilisation of facilities over a longer period. What in the UK is called the short-haul beach package has almost certainly peaked, but beach holidays will still be popular. They will be price-sensitive and probably booked later and we are likely to see greater segregation between resorts which continue to cater for this market and those which choose to chase other markets and become more diversified. Some parts, particularly of the Spanish coasts, have an inheritance of many 30-year-old hotels, devoid of modern amenities and catering for a declining number of holidaymakers, many of whom will be low-spending, low-yielding eastern European tourists. The demand will be for more individual 'bespoke packages' offering a little more excitement than the 'identikit' traditional packages (Middleton, 1991).
- (2) Many of the increasing proportion of older people in the population will still wish to escape the dark, dreary winters of northern Europe. More are likely to consider moving permanently to, or buying second homes in Mediterranean areas. King *et al.* (1998) have shown that in several retirement destinations including the Costa del Sol and Malta the most important reason given for moving to the chosen destination was climate. Thus the climate of the receiving region for these migrants has been considered to be the most important pull factor. There are considerable planning impli-

cations if the growth of new apartments, villas and bungalows is not to cause environmental blight in some of these coastal areas. Along with this development will come increased demand for leisure pursuits such as golf courses and marinas, all with potential environmental impacts.

- (3) Tourists will increasingly expect holiday accommodation to be air conditioned. Such accommodation will attract a premium price, whilst poorer quality self-catering apartments and rooms without air conditioning will be much less attractive in the summer. At present only a fifth of rooms in hotels in Mediterranean countries are in the 4 and 5 star categories. Increased demands will be made on electricity supplies from the demand for additional cooling systems, with further environmental impacts as a consequence.

Conclusions

Tourism in the Mediterranean may become less sustainable, both economically and environmentally, as a result of climate change. Issues that are coming to the foreground include what are the safe and tolerable limits of the Mediterranean climate to sustain tourism? What is the likelihood that these limits will be breached and at what time? Predicting climate change is complex but even more complex is predicting how people will respond to that change. Socio-economic scenario analysis is now being used to study possible future pathways of tourism and their regional implications (Amelung, 2005).

Significant climate change could occur within the lifetime of many current tourist investment projects, such as golf courses and large-scale marinas. Advice on how to construct tourist facilities in harmony with the local climate and to provide the least stress to users is needed. At present we can see the following hierarchy of flexibility to climate change; namely tourists are most flexible, tour operators have a degree of short-term flexibility e.g. altering flight destinations, and local tourist managers are the least flexible with committed capital installed and not always transportable. It may be that changes in the frequency and intensity of events like heatwaves, droughts and fires will be more important in changing the perception of the climate than the general increases in projected temperatures.

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