

Potential Impact of Climate Change on Beach Tourism in MENA Countries: A Survey Based Study

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Abstract

Climate is a principal resource for tourism, as it codetermines the suitability of locations for a wide range of tourist activities, is a principal driver of global seasonality in tourism demand in MENA Countries, and has an important influence on operating costs, such as heating-cooling, snowmaking, irrigation, food and water supply, and insurance costs. Thus, changes in the length and quality of climate-dependent tourism seasons (e.g., sun-and-sea or winter sports holidays) could have considerable implications for competitive relationships between destinations and therefore the profitability of tourism enterprises. A Quantitative Approach-Questionnaire was designed with the aim of travellers to the MENA Countries. It was structured to focus on the role of climate in general as a destination attribute specifically issues of the relationship between weather beach tourism and climate change impacts. Results showed that Adapting to climate change requires anticipating change. Some sectors will be better able to plan than others depending on their capacity to adapt. Enhancing this capacity can reduce risks of adverse future impacts. That is why it would be strategic to increase adaptive capacity in tourism sector. To prevent the impact of climate change on coastal tourism and vice versa, a joint organization for MENA tourism should exist and should meet the need of the States, the tourist destinations, the private sector and NGOs to group together and form joint ventures.

Keywords: Potential Impact, Climate Change, Costal Tourism, MENA Countries.

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Introduction

The marine economy includes the activities related to the sea, such as tourism, seafood, shipbuilding, transportation extraction of marine materials and so on. Nevertheless, tourism remains the most important economic activity, especially in the MENA region. The importance of increasing seaside tourism will play a crucial role in the authorities' awareness of the necessity to implement an active policy to mitigate the negative consequences of climate change. Climate change will have a significant impact on global tourism. Climate defines the length and quality of the tourism season, and plays a major role in the choice of destination and tourist spending. In many destinations, tourism is closely linked with the natural environment. Climate affects a wide range of the environmental resources that are critical attractions for tourism, such as wildlife productivity and biodiversity, water levels and quality. Climate also has an important influence on environmental conditions, including infectious disease, bushfires, insect and water-borne pests and extreme weather events such as tropical cyclones. However tourism will continue to grow, but the patterns of travel will change – some destinations will benefit and others will lose. Tourism is also a significant contributor to climate change through the greenhouse gas emissions produced by transporting, accommodating tourists, the services and products provided to support tourism in a destination. It is critical for tourism businesses to assess how they contribute to the problem, and to understand the impact climate change will have on tourism in order to understand what risks will be and why every business must be a part of the solution. (Stanley, 2013)

Importance of the Research

The natural environment is a key element, and part of what differentiates a region from another. On a global scale, the Mediterranean countries are considered most vulnerable to the adverse impacts of climate change. There are two kinds of impacts: direct and indirect. The direct impacts on tourism include:

warmer summers, warmer winters, increase in extreme weather events, droughts, marine biodiversity loss, sea level rise, increase in disease outbreaks and increasing costs of travel from governments around the world implementing policies to reduce emissions, such as carbon taxes and emissions trading schemes.

Objectives of the Research

A sustainable development strategy should provide some solutions to enable simultaneous economic development of the area and the preservation of the coastal and marine ecosystems of the Mediterranean Sea. Therefore, it seems expedient:

- To explore the impact of climate change on the coastal tourism of MENA Destinations.
- To explain the characteristics of tourism in this region to highlight the importance of its coastal part.
- Then to analyze the potential effects of climate change on MENA countries' tourism based on the latest scientific studies.

Methodology and Data Collection

Questionnaire was designed with the aim of tourists traveling to the MENA Countries. Tourists were interviewed in the departure hall of Cairo Airport. The requisites for the airport to be considered were: (i) frequent daily flights to the Mediterranean and; (ii) proximity to researchers working place. The self-completed questionnaire was elaborated in Arabic language, the survey was adjusted accordingly and it was eventually carried out during three days in May and June 2016 in the check-in area of Cairo airport. Limited resources and time only allowed for the given sampling days and locations, determining the number of completed questionnaires. The questionnaire was handed in to travelling departing to a MENA destination, regardless of what that destination would be. It was structured to focus on the role of climate in general as a destination attribute specifically issues of the relationship between weather beach tourism and climate change impacts. To avoid any potential influence on the respondents about the matter of the survey, the objective of the questionnaire was not mentioned in the introductory notes given to the respondents.

I- The Characteristics of Tourism in MENA Countries

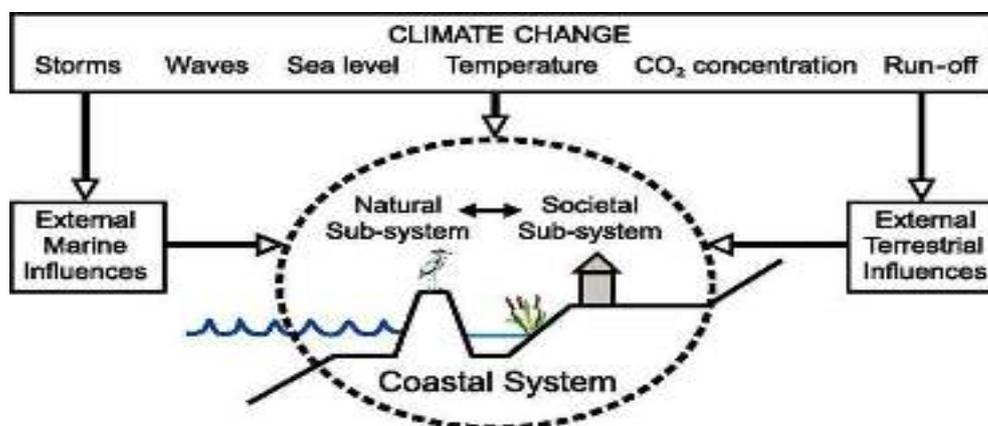
The substantial growth of the tourism activity clearly marks position as one of the most remarkable economic and social phenomena of the past century. The numbers of international arrivals show an evolution from 25 million international arrivals in 1950 to 806 million in 2015, corresponding to an average annual growth rate of 6.5%. (Williams, 2009) Concerning MENA countries in 2011, arrivals in the Middle East (-9%) and North Africa (- 15%) have been very seriously affected by the "Arab Spring". It affected the directly involved countries, such as Egypt, Tunisia, Syria and Yemen, which have shown arrivals decline. European holidaymakers tended to stay away from the whole region, even Arabs in general have avoided traveling within the region. Arrivals in Lebanon, for instance, went down by 25%. However, a number of destinations both inside and outside the region have benefited from diversions. The GCC countries (without Bahrain) and Turkey are major beneficiaries, as well as destinations in southern and Mediterranean Europe in general. (Berritella, 2012) During this period, development of tourism was particularly strong in Asia and the Pacific (13% on the average a year) and in the Middle East (10%), but less strong in the Americas (5%) and Europe (6%). Europe's world share declined by more than 10 percentage points since 1950 whereas the Americas lost 13 percentage points. Europe and the Americas were the main tourist-receiving regions between 1950 and 2000. Both regions represented a joint market share of more than 95 per cent in 1950, 82% forty years later and 76% in 2000. Recently, International tourist arrivals are expected to grow by 3.5% in 2017. Recorded an estimated total of 570 million international tourist arrivals in 2015, growing

by 26 million more than in the same period of 2014. Europe showed the strongest growth (+6%) amid continuing economic uncertainty.

The growth in arrivals during the first eight months of 2015 was higher in advanced economies (+4,8%) than in emerging ones (+4,2%), due to the strong results recorded by Europe which benefited from the shift in travels away from the Middle East (-9%) and North Africa (-15%). (Adger et al., 2013)

II - The potential effects of climate change on MENA countries

This is the global perspective on the impacts of climate change and sea-level rise on coastal and adjoining low-lying areas, with an emphasis on post-2000 insights. Here, coastal systems are considered as the interacting low-lying areas and shallow coastal waters, including their human components. In addition to local drivers and interactions, coasts are subject to external events that challenge human activities and may compromise the natural functioning of coastal systems. (Ehmer



and Heymann, 2008)

Source: The IPCC Report, 2007.

Figure 1: Climate Change and coastal system.

Since the IPCC "Intergovernmental Panel on Climate Change" Third Assessment Report (TAR), our understanding of the implications of climate change for coastal systems and low-lying areas has increased substantially and six important policy-relevant messages have emerged: (Simpson, 2008)

- Coasts are experiencing the adverse consequences of hazards related to climate and sea level. Coasts are highly vulnerable to extreme events, such as storms, which impose substantial costs on coastal societies. Annually, about 120 million people are exposed to tropical cyclone hazards, which killed 250,000 people from 1980 to 2000. Through the 20th century, global rise of sea level contributed to increased coastal inundation, erosion and ecosystem losses, but with considerable local and regional variation due to other factors. Late 20th century effects of rising temperature include loss of sea ice, thawing of permafrost and associated coastal retreat, and more frequent coral bleaching and mortality.
- Coasts will be exposed to increasing risks, including coastal erosion, over coming decades due to climate change and sea-level rise (very high confidence).

Anticipated climate-related changes include: an accelerated rise in sea level of up to 0.6 m or more by 2100; a further rise in sea surface temperatures by up to 3°C; an intensification of tropical and extra-tropical cyclones; larger extreme waves and storm surges; altered precipitation/run-off; and ocean acidification. These phenomena will vary considerably at regional and local scales, but the impacts are virtually certain to be overwhelmingly negative: (Orams, 2011)

- Corals are vulnerable to thermal stress and have low adaptive capacity. Increases in sea surface temperature of about 1 to 3°C are projected to result in more frequent coral bleaching events and widespread mortality, unless there is thermal adaptation or acclimatization.
- Coastal wetland ecosystems, such as saltmarshes and mangroves, are especially threatened. Degradation of coastal ecosystems, especially wetlands and coral reefs, has serious implications for the well-being of societies dependent on the coastal ecosystems for goods and services. Increased flooding and the degradation of freshwater, fisheries and other resources could impact hundreds of millions of people, and socio-economic costs on coasts will escalate as a result of climate change. (EEAA Report., 2010)

Table 1: Summary of Climate-related Impacts on Socio-Economic Sectors in Coastal Zones.

Coastal socio-economic and sector	Temperature Rise (air and seawater)	Extreme events (storms, waves)	Floods (sea level, runoff)	Rising water tables (sea level)	Erosion (sea level, storms, waves)	Salt water intrusion (sea level, runoff)	Biological effects(all climate drivers)
Freshwater	X	X	X	X	–	X	x
Agriculture and forestry	X	X	X	X	–	X	x
	X	X	x	–	x	X	X
Fisheries and aquaculture	X	X	X	x	–	X	X
Health							
Recreation and tourism	X	X	x	–	X	–	X
Biodiversity	X	X	X	X	X	X	X
Settlements	X	X	X	X	X	X	–

X = strong; x= weak; – = negligible or not established.

Source: **The IPCC report, 2007.**

- The impact of climate change on coasts is exacerbated by increasing human- induced pressures. Utilization of the coast increased dramatically during the 20th century and this trend is virtually certain to continue through the 21st century. Under the SRES scenarios, the coastal population could grow from 1.2 billion people (in 1990) to 1.8 to billion people by the 2080s, depending on assumptions about migration. (Sestini, 2000)
- Adaptation for the coasts of developing countries will be more challenging than for coasts of developed countries, due to constraints on adaptive capacity. While physical exposure can significantly influence vulnerability for both human populations and natural systems, a lack of adaptive capacity is often the most important factor that creates a hotspot of human vulnerability.

Adaptive capacity is largely dependent upon development status. (Table 2) (DRET, 2015)

- Adaptation costs for vulnerable coasts are much less than the costs of inaction. Adaptation costs for climate change are much lower than damage costs without adaptation for most developed coasts, even considering only property losses and human deaths. (Lloret, 2014)

Table 2: Selected Information on Costs and Benefits of Adaptation.

Optimal (benefit-cost) coastal protection costs and remaining number of people displaced given a 1 m rise in sea level			
Region	Protection Costs (10 ⁹ US\$)	Number of People Displaced (10 ⁶)	
OECD Europe	136	0.22	
World	955	8.61	
Construction costs for coastal defense in England and Wales (average total cost in US\$/km)			
Earth embankment	970,000	Culverts	3.5 million
Protected embankment	4.7 million	Sea wall	4.7 million
Dunes (excl. replenishment)	93,000	Groynes, breakwater (shingle beach)	9 million
Costs (US\$/km) to protect against 1 m in rise in sea level for the USA			
Dike or levee	450,000 – 2.4 million	Sea wall; bulkhead construction	450,000 – 12 million
Capital costs (US\$/km) for selected coastal management options in New Zealand			
Sand dune replanting, with community input (maintenance costs minimal)			6,000 – 24,000
Dune restoration, including education programmes (maintenance costs minimal)			15,000 – 35,000
Dune reshaping and replanting (maintenance costs minimal)			50,000 –
Sea walls and revetments (maintenance costs high – full rebuild every 20 – 40years)			900,000 – 1.3
Direct losses, costs and benefits of adaptation to 65 cm sea-level rise in Pearl Delta, China			
Tidal level	Loss (US\$ billion)	Cost (US\$ billion)	Bene fit (US\$ billion)
100 year high water	4.8	0.4	4.4

Source: The IPCC report, 2007.

- The unavoidability of sea-level rise, even in the longer-term, frequently conflicts with present-day human development patterns and trends. Sea-level rise has substantial inertia and will continue beyond 2100 for many centuries. Irreversible breakdown of the West Antarctica and/or Greenland ice sheets, if triggered by rising temperatures, would make this long-term rise significantly larger, ultimately questioning the viability of many coastal settlements across the globe. The issue is reinforced by the increasing human use of the coastal zone. Stabilization of climate could reduce the risks of ice sheet breakdown, and reduce but not stop sea-level rise due to thermal expansion.

Hence, it is now more apparent than it was in the TAR that the most appropriate response to the sea-level rise for coastal areas is a combination of adaptation to deal with the inevitable rise, and mitigation to limit the long-term rise to a manageable level. (Jesper, 2010)

Table 3: Indicative Estimates of Regional Exposure as a function of Elevation and Baseline Socio-Economic MER (Market Exchange Rates)

Region	Exposure by factor and elevation above mean high water								
	Land area (km ²)			Population (millions)			GDP MER (US\$ billions)		
	1m	5m	10m	1m	5m	10	1m	5m	10m
Africa	118	183	271	8	14	22	6	11	19
Asia	875	1548	2342	108	200	294	453	843	1185
Australia	135	198	267	2	3	4	38	51	67
Europe	139	230	331	14	21	30	305	470	635
Latin America	317	509	676	10	17	25	39	71	103
North America	640	1000	1335	4	14	22	103	358	561
Global (Total)	2223	3667	5223	145	268	397	944	1802	2570

Source: Ceval, 2012

III- The forecast of the impact of climate change on the tourism sector in MENA countries

The response of the tourism community to the challenge of climate change has visibly increased over the last ten years. The World Tourism Organization (UNWTO), together with the World Meteorological Organization (WMO), the United Nations Environment Program (UNEP), the United Nations Convention to Combat Desertification (UNCCD), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Government of Tunisia hosted the First International Conference on Climate Change and Tourism in Djerba, Tunisia in 2003. The conference aimed at developing awareness among government administrations, the tourism industry and other tourism stakeholders, highlighting both current and anticipated climate change impacts on tourism destinations and the need to carefully consider the consequences of climate change mitigation policies on tourism as well as the responsibility of the tourism sector to be part of the solution by reducing its greenhouse gas emissions. (Farsari, 2007)

Subsequent workshops supported by the European Science Foundation (ESF), the North Atlantic Treaty Organization (NATO), the European Forum on Integrated Environmental Assessment (EFIEA), and the Experts on Climate Change and Tourism group (eCLAT), as well as the Helsingborg Meeting on Sustainable Tourism and the Marrakech Task Force on Sustainable Tourism Development further contributed to the development of collaborative research and practical case studies by the network of international tourism stakeholders and scientists. In March 2007, UNWTO, UNEP and WMO commissioned a review report on tourism and climate change, including impacts and adaptation, changes in tourism demand patterns, emissions from tourism, and mitigation policies and measures. The Executive Summary of this report was presented during the Second International Conference on Climate Change and Tourism, which took place in Davos, Switzerland, 1-3 October 2007: (Stanley, 2013)

“Climate Change Adaptation and Mitigation in the Tourism Sector Frameworks, Tools and Practices within the evolving UN framework and progressively reduce its Greenhouse Gas (GHG) emissions”. To this end, the Davos Declaration demands the simultaneous implementation of actions to mitigate the impact of tourism on climate change, to adapt to current and future climate changes, to develop new or apply

existing technology to enhance energy efficiency and to secure financial resources to ensure poorer regions or countries.

Climate Change

Inter-governmental Panel on Climate Change (IPCC) declared that „warming of the climate system is unequivocal“. The global mean temperature has increased by 0.76°C between 1850–1899 and 2001–2005 and the IPCC concluded that most of the observed increase in global average temperatures since the mid-20th century is „very likely“ (> 90% probability) to be a result of human activities that increase greenhouse gas (GHG) concentrations in the atmosphere. The IPCC predicts that the pace of climate change is „very likely“ (> 90% probability) to accelerate with continued GHG emissions at or above current rates, with globally averaged surface temperatures estimated to rise by 1.8°C to 4.0°C by the end of the 21st century. (Bigano et al., 2008)

Changes in temperatures and other climatic features will vary globally. It is very likely that hot extremes, heat waves and heavy precipitation events will continue to become more frequent. Tropical cyclones will likely become more intense, with larger peak wind speeds and more heavy precipitation associated with ongoing increases of tropical sea surface temperatures. Decreases in snow cover, already observed in some regions, are projected to continue. The regions affected by these extreme events, including many major tourism destinations, will expand. These predicted changes highlight the need for awareness and preparedness for natural hazards at the local level through systematic capacity building and strategies for disaster risk management. (UNWTO,2016)

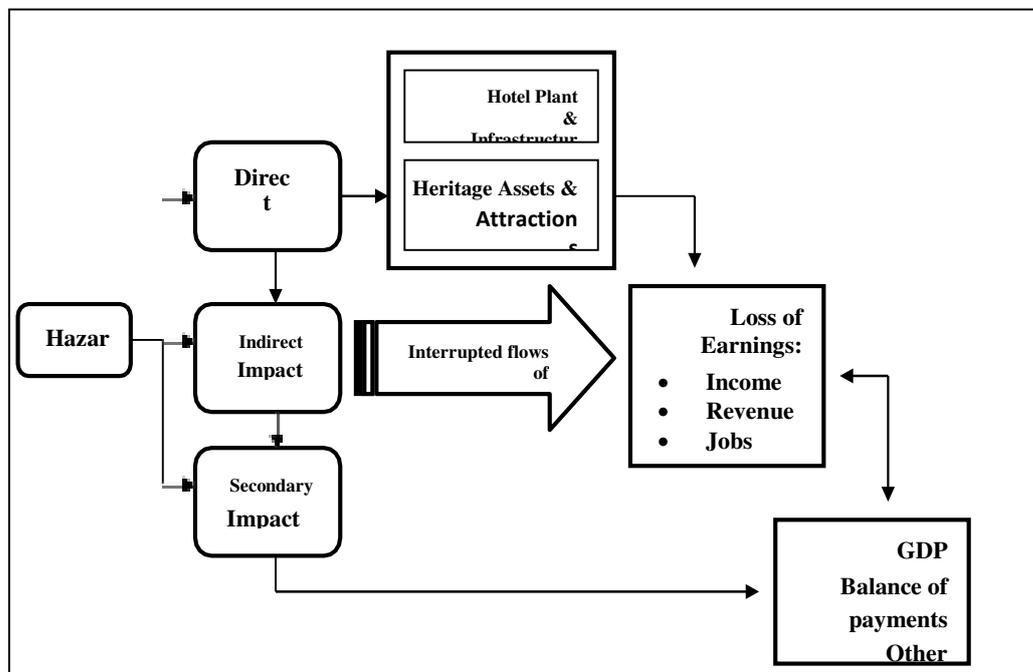
Climate Change and Tourism

With its close connections to the environment and climate itself, tourism is considered to be a highly climate-sensitive economic sector similar to agriculture, insurance, energy, and transportation. Indeed, climate change is not a remote future event for tourism, as the varied impacts of a changing climate are even now becoming evident at destinations around the world and climate change is already influencing decision-making in the tourism sector. There are four broad categories of climate change that will affect tourism destinations, their competitiveness and sustainability: (Nicholls, 2003)

- **Direct Climate Impacts:** Climate is a principal resource for tourism, as it codetermines the suitability of locations for a wide range of tourist activities, is a principal driver of global seasonality in tourism demand, and has an important influence on operation costs, such as heating-cooling, snowmaking, irrigation, food and water supply, and insurance costs. Thus, changes in the length and quality of climate- dependent tourism seasons (e.g., sun-and-sea or winter sports holidays) could have considerable implications for competitive relationships among destinations and therefore the profitability of tourism enterprises. Studies indicate that a shift of attractive climatic conditions for tourism towards higher latitudes and altitudes is very likely. The IPCC has concluded that increases in the frequency or magnitude of certain weather and climate extremes (e.g. heat waves, droughts, floods, tropical cyclones) are likely to be a result of projected climate change (IPCC 2007a). Such changes will affect the tourism industry through increased infrastructure damage, additional emergency preparedness requirements, higher operation expenses (e.g., insurance, backup water and power systems, and evacuations), and business interruptions.
- **Indirect Environmental Change Impacts:** Because environmental conditions are such a critical resource for tourism, a wide-range of climate-induced environmental changes will have profound effects on tourism at the local and regional destination level. Changes in water availability, biodiversity loss, reduced landscape aesthetic, altered agricultural production (e.g., food and wine tourism), increased natural hazards, coastal erosion and inundation, damage to infrastructure and the increasing incidence of vector- borne diseases will all impact tourism to varying degrees. In contrast to

the varied impacts of a changed climate on tourism, the indirect effects of climate induced environmental change are likely to be largely negative.

- **Impacts of Mitigation Policies on Tourist Mobility:** National or international mitigation policies that are policies that seek to reduce GHG emissions – may have an impact on tourist flows.). They are likely to lead to an increase in transport costs and may foster environmental attitudes that lead tourists to change their Travel patterns, specifically as it relates to air travel. Long-haul destinations can be particularly affected and could adversely impact their national tourism economy. (Ceval, 2012)
- **Indirect Societal Change Impacts:** Climate change is thought to pose a risk to future economic growth. Any such reduction of global GDP due to climate change would reduce the discretionary wealth available to consumers for tourism and have negative implications for anticipated future growth in tourism. Climate change is considered a national and international security risk that will steadily intensify, particularly under greater warming scenarios. Climate change associated security risks have been identified in a number of regions where tourism is highly important to local-national



economies. Many of which are believed to be in developing nations. (Hamilton, 2005)

Source: Hamilton, J., 2005.

Figure 2: Hazardous Impact on Tourism

Indirect damage includes interruptions to flows of:

- Services from capital or physicals stocks such as loss of guest revenue and loss of jobs.
- Services such as visitor receipts from natural attractions, tour guides, etc.
- Impacts on macroeconomic variables such as GDP and Balance of Payments

Contribution of Tourism to Climate Change

Anthropogenic climate change is caused by greenhouse gasses emitted into the atmosphere, primarily through the burning of fossil fuels. According to UNWTO-UNEP- WMO (2008), emissions from tourism, including transports, accommodation and activities (excluding the energy used for constructions and facilities for example) account for about 5% of global CO2 emissions. This is

particularly relevant to emissions from aviation. In 2005, tourism's contribution to global warming was estimated between 5% and 14% of the overall warming caused by human emissions of greenhouse. As we said before, long haul travel accounts for only 2.7% of all tourist trips, but contributes to 17% of global tourist emissions. (*Farsari et al., 2013*)

By 2035, tourism's contribution to climate change would have grown considerably. A recent scenario developed by the expert team of the technical report in the UNWTO/UNEP- WMO (2008) publication considers different emission pathways, including a „business as usual“ projection based on anticipated growth rates in tourist arrivals, as well as distances travelled by various means of transport. These projections indicate that in terms of the number of trips made, global tourism will grow by 179%, while guest nights will grow by 156%, while CO₂ emissions will increase at somewhat lower levels (152%) due to efficiency improvements. The share of aviation-related emissions will grow from 40% in 2005 to 52% by 2035. The development of emissions from tourism and their contribution to global warming is thus in stark contrast to the international community's climate change mitigation goals for the coming decades. (*Nicholls, 2003*)

The link between climate change and Tourism in MENA countries especially in Mediterranean ones

The Mediterranean region has long been familiar to tourists because of its perceived good climate. This region can justifiably claim to have been the focus of the modern tourism industry and yet in recent years it has begun to lose some of its gloss. The tourist industry is by its very nature fragile and susceptible to political, economic and social changes and the probability of climate change studies the economic implications of climate-change-induced variations in tourism demand, using a world CGE model. The model is first re-calibrated at some future years, obtaining hypothetical benchmark equilibrium, which are subsequently perturbed by shocks, simulating the effects of climate change. The first shocks translate predicted variations in tourist flows into changes of consumption preferences for domestically produced goods. The second shocks reallocate income across world regions, simulating the effect of higher or lower tourists“ expenditure. The authors of this General Equilibrium model conclude that the global economic impact of a climate-change-induced change on tourism is quite small, and approximately zero in 2010. In 2050, climate change will ultimately lead to a non-negligible global loss. Net losers are Western Europe, energy exporting countries, and the rest of the world. The Mediterranean, currently the world's prime tourism destination, would become substantially less attractive to tourists. The climate is changing and will continue to do so for the foreseeable future. (*Farsari et al., 2013*)

This will result in social, economic and environmental impacts. The degree of these impacts will depend on to what extent nations, industry and individuals mitigate emissions and adapt to changes. At a time of global economic downturn, a climate deal could fundamentally transform the global economy through the need for innovative technologies and sustainable development. Many of the potential solutions to reduce greenhouse gas emissions and tackle climate change are complex. However, the role tourism plays in less developed countries needs to be taken into consideration in any discussions on emission reductions. Tourism contributes to sustainable development, poverty reduction and the Millennium Development Goals. Any framework agreement should not disproportionately disadvantage those most dependent on tourism like the majority of MENA countries. According to Plan Blue's scenario (RED), the number of international tourists in the coastal regions will be 206 million by 2025 (average annual rise 1990-2025 of 2.8%) and the number of domestic tourists will be 107 million (annual rise 1990-2025 of 2%). In all, the Mediterranean coastal regions will welcome more than 312 million tourists, i.e. multiplied by 2.4 in 35 years.

The question is to know how and if the coastal areas can welcome these arrivals, without being confronted with an intolerable saturation situation for the environment (destruction of the coast's natural

environment) and for the quality of living (price inflation, congestion). The risks of saturation and degradation of the coastline should be pointed out. The Mediterranean is no doubt the region in the world most affected by tourism. The Mediterranean countries were historically characterized by the enhancement of resources adapted to the fragility of the natural environment: water saving, landscape-gardening, etc. This fragile balance has been in some cases disturbed by tourism. Public opinion is more and more concerned by the impact of tourism on the environment. In 1995, 46% of the Greek population said they were extremely worried about the damage caused by tourism. They were followed by 26% of the Spanish, 24% of the Portuguese and 18% of the Italian populations. With regard to environmental problems, southern Europeans complain more than northern Europeans about the destruction of the landscapes, of noise, of the quality of bathing water and of the lack of green spaces. They are also concerned by traffic congestion. For a long time this impact was underestimated because of assessment difficulties. If tourists stayed at home this pressure on the environment would not exist. It involves the travel from home to the holiday destination and the use of tourism and leisure facilities such as yacht harbors, mechanical lifts, golf courses, etc. The seasonal transfer of environmental pressure from the tourists' main residence to their holiday spot causes a lot of problems such as production of waste, of used water, consumption of energy, and so on, that has to be managed by the destinations in question at specific moments of time. Yet, if tourism transfers the problems to the tourist destinations it can be both positive and negative. The two aspects that make up tourism, travelling away from home and the stay elsewhere, are responsible for the impact on the environment. Tourism has repercussions on greenhouse gas emission and on the creation of facilities. (Bigano, A., 2008)

Results

A total of 116 questionnaires were distributed and returned. Three of them were only partially answered and therefore not included in the analysis. To facilitate the analysis, the results are presented for each of the four main sections covered on the questionnaire. Table 5.2 summarizes the results for the socio-demographic questions.

Table 4: Socio-demographic characteristics of the sample

	Frequency	Percent
Country of origin		
Egypt	113	100
Gender		
Male	50	44.2
Female	63	55.8
Travelling With		
Friends	45	21.1
Family	55	20.2
Alone	24	10.5
Holiday Organization		

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Travel Agent	66	38.4
Independent	57	36.6
Other	10	2.7
Age		
20-44	47	61.6
45-64	43	44.2
+65	23	5.2
Destination		
Algeria	2	1.8
Bahrain	3	2.7
Egypt	14	12.3
Iran	2	1.8
Iraq	0	0
Israel	0	0
Jordan	7	6.1
Kuwait	5	4.4
Lebanon	11	9.8
Libya	0	0
Morocco	13	11.5
Oman	5	4.4
Palestine	1	0.8
Qatar	3	2.7
Saudi Arabia	17	15.1
Sudan	1	0.8
Syria	0	0
Tunisia	13	11.5
United Arab of Emirates	16	14.1
Yemen	0	0

The role of climate as a key pull attribute to the MENA Countries

From all the activities tourists planned to carry out at their destination (multiple choices possible), beach tourism was selected by 76 of the respondents (66.7%), more than double the second activity, cultural tourism, which was selected 37 times (32.5%). The attractiveness of the destination was measured based on 14 attributes, using a Likert scale from unimportant (1) to very important (5). Table 5 shows that ‘climate’ is the attribute that contributed the most to the attractiveness of the destinations (mean 4.56) for

the overall sample (N=113), but even if the analysis is limited to the respondents that will not be involved in beach tourism (38 did not choose this activity), ‘climate’ still obtains the highest score (mean 4.50). Cultural influences might affect the preferences of different nationalities for weather and climate (Scott et al., 2008). To test if this is the case with the available sample, a T-Test was performed. From the list of attributes in Table 5.3, the ones that were found to be significantly different between the two nationalities are indicated by an asterisk.

Table 5: Descriptive statistics of destination attributes (asterisk indicates significant difference between nationalities)

Attributes	Mean	Std, Deviation	N
Climate	4.56	.580	113
Security	4.15	.858	112
Price of Accommodation*	3.94	.820	110
Nature/Landscape	3.85	.774	111
Price of transport to destination	3.79	.881	112
Travel distance/time*	3.34	1.063	110
Shopping opportunities*	3.27	1.041	112
Cultural and historical attractions	3.25	1.054	111
Uniqueness of local people’s way of life	3.13	.941	110
Sports and recreational opportunities	3.03	1.085	111
Festivals, special events*	2.38	.999	111

a 1 = unimportant; 5 = very important

The role of (high) temperature and other weather parameters and definition of ‘unfavorable’ weather for beach tourism

The next set of questions aimed at investigating in depth the relevance of weather specifically for beach tourism. First, respondents were asked to grade how important a set of weather variables were, again using a Likert scale from not important to extremely important. ‘Absence of rain’ was the aspect seen as most important (mean 4.28), followed by ‘comfortable temperature’ (mean 4.22), with no significant difference between respondents that chose beach as their main activity and respondents that did not choose this option (Table 5.5; asterisk indicates significance difference between nationalities).

Table 6: Importance of weather parameters for beach tourism

Attributes	Mean	Std, Deviation	N
Absence of rain	4.28	1.105	113
Comfortable temperature	4.22	.761	112

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Hours of sunlight	4.12	.857	111
Water temperature*	3.73	.976	113
Absence of clouds	3.51	1.079	13
Absence of strong wind	3.26	1.236	113

a 1 = unimportant; 5 = very important

Perceptions about climate change impacts in the MENA destination

Finally, the last question explored the effect on tourists' satisfaction of five different potential impacts of climate change in the Mediterranean identified in the literature. The five impacts had to be rated from no influence (1) to very negative influence (4). The impact considered more negatively was the 'risk of diseases', while 'heat waves' was ranked as the least negative of all of them (Table 7). Table 5.8 shows the responses both nationalities gave for the specific case of heat waves.

Table 7: Perceived importance of different climate change impacts on destinations

(Asterisk indicates significant difference between nationalities)

Attributes	Mean	Mode	Std, Deviation	N
Risk of diseases	4.28	4 (very negatively)	1.105	113
Forest fires	4.22	3 (negatively)	.761	112
Water restrictions in hotel*	4.12	3 (negatively)	.857	111
Reduced beach extension*	3.73	3 (negatively)	.976	113
Heat wave*	3.51	2 (not too negatively)	1.079	13

a 1 = unimportant; 5 = very important

Adaptation Recommendations to Combat Vulnerability of Coastal Infrastructure & Land Uses to Climate Variability & Change

	Regulator	Land-Use Planning	Economic &	Public	Research, Monitoring
Growth of		-Develop a comprehensive	-Market-based incentives to	-Public awareness &	
Intensive & Uncontrolled Coastal Development		-Develop a comprehensive land use plan -Integrate regional disaster	-Eliminate subsidies that promote development in high hazard areas		-Establish a computer network linking major sea level rise and climate change monitoring institutions

Location of Coastal Infrastructure in Hazardous	-Introduce regulations to phase out development in high	-Utilize a retreat approach to development in high hazard areas Utilize land	-Eliminate subsidies that promote development in high hazard areas	-Public awareness & education	-Expand hazard mapping of coastal zones, based on climate change Continue to build
Inadequate Waste Disposal Systems	- Strengthened regulations to protect		-Market-based incentives to promote sustainable tourism		
Quality of Building Construction & Insurance	- Strengthened building codes		-Link property insurance with construction quality	-Public awareness & education	
Destruction of Ecological Buffers	- Strengthened regulations to protect	-Utilize land protection tools to preserve/restore ecological buffers		-Public awareness & education	-Use of GIS mapping
Continued Reliance on Top-Down Approaches		- Develop & implement integrated coastal management plans			
Destructive Ag. & Forestry		-Develop a comp. land use plan		-Public awareness & education	

CONCLUSION AND RECOMMADATIONS

- Even if there are very many « sustainable » initiatives at all levels of MENA tourism, they have proved to be insufficient to face the future problems and the stakes that will have to be taken up.
- In the developing destinations, it is difficult to keep under control the seaside model growth. At local level tourism benefits are generally insufficient to finance fight against pollution and environmental nuisance. In emerging or potential destinations, the most beautiful coastal spots are coveted and are praise for investors who exert strong pressure to get and manage them. “Foreign enclaves” are developed and their benefits often completely elude the local populations.
- To prevent the impact of climate change on coastal tourism and vice versa, a joint organization for MENA tourism should exist and should meet the need of the States, the tourist destinations, the private sector and NGOs to group together and form joint ventures.
- Adapting to climate change requires anticipating change. Some sectors will be better able to plan than others depending on their capacity to adapt. Enhancing this capacity can reduce risks of adverse future impacts. That is why it would be strategic to increase adaptive capacity in tourism sector.
- Dependency on natural resources is another influence on adaptive capacity. In fact, flexibility to respond to altered conditions, such as a shift in climate change, is very important too. For instance, when diving is no more attractive in a natural spot, developing technical diving can

continue to attract tourists. So, reorganizing tourism can militate against dependent resource sectors.

- Adapting to climate change does not necessarily mean preparing for the worst. It can mean preparing to take advantage of new conditions. So exploring future positive as well as negative outcomes from climate change is important in developing climate adaptation strategies in tourism activities.

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التأثير المحتمل لتغير المناخ على السياحة الشاطئية في بلدان منطقة الشرق الأوسط وشمال أفريقيا: دراسة استقصائية

الملخص العربي

يعد المناخ أحد العناصر الأساسية التي يعتمد عليها النشاط السياحي ، حيث أنه يحدد مدى ملائمة المواقع لمجموعة واسعة من الأنشطة السياحية، وهو المحرك الرئيسي للطلب السياحي في بلاد الشرق الأوسط وشمال أفريقيا، وله تأثير هام على تكاليف التشغيل، التبريد، الري، الغذاء وامتدادات المياه، وتكاليف التأمين. ومن ثم فإن التغيرات في طول ونوعية مواسم السياحة المعتمدة على المناخ (مثل الرحلات الترفيهية والرياضات الشاطئية) يمكن أن تترتب عليها آثار كبيرة على الميزات التنافسية بين المقاصد السياحية وبالتالي ربحية المشاريع السياحية. وقد أعتمدت الدراسة الميدانية على المنهج الكمي عن طريق إعداد إستمارات إستقصاء وتوزيعها على عينة من المسافرين الى دول الشرق الأوسط وشمال أفريقيا.

وقد أظهرت النتائج أن التكيف مع تغير المناخ في المناطق الساحلية يتطلب توقع التغيير. وأن بعض القطاعات أكثر قدرة على التخطيط من غيرها اعتمادا على قدرتها على التكيف. ويمكن أن يؤدي تعزيز هذه القدرة إلى الحد من مخاطر الآثار السلبية في المستقبل. وهذا هو السبب في أنه سيكون من المهم جدا تبنى إستراتيجية زيادة القدرة على التكيف في قطاع السياحة. ولمنع تأثير تغير المناخ على السياحة الشاطئية والعكس، ينبغي وجود منظمة مشتركة للسياحة في منطقة الشرق الأوسط وشمال أفريقيا على غرار المنظمات الدولية كي تلبى حاجة الدول السياحية والقطاع الخاص والمنظمات غير الحكومية في إنشاء مشاريع مشتركة للحد من الآثار المناخية المحتملة على المناطق السياحية الشاطئية.

الكلمات الدالة

التأثير المحتمل، تغير المناخ، السياحة الشاطئية، دول الشرق الأوسط وشمال أفريقيا.