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Recommended Citation

Topics in Middle Eastern and North African Economies, electronic journal, Volume 14, Middle East Economic Association and Loyola University Chicago, September, 2012, <http://www.luc.edu/orgs/meea/>

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The impact of climate change on coastal tourism in MENA countries.

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JEL classification: Q54, Q56, Q59

Introduction:

The marine economy includes the activities related to the sea, such as tourism, seafood, shipbuilding, transportation on sea and river, the extraction of marine materials, power generation, marine works, the submarine cables, the offshore oil, banking, Navy, government intervention and marine research.

Nevertheless, tourism remains the most important economic activity, especially in the MENA region. In fact, tourism is by far the largest sector of the marine and coastal economy while primary activities, agriculture and fisheries, are struggling to maintain themselves.

The importance of increasingly large seaside tourism will play a crucial role in the authorities' awareness of the necessity to implement an active policy to limit 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 it 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 that can deter tourism, including infectious disease, bushfires, insect and water-borne pests and extreme weather events such as tropical cyclones.

Understanding the dynamics of how climate change will affect the global industry is complex. Tourism will continue to grow, but the patterns of travel will change – some destinations will benefit and others will be impacted negatively.

However, tourism is also a significant contributor to climate change through the greenhouse gas emissions produced by transporting and accommodating tourists and the services and products that are 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 the risks will be and why every business must be a part of the solution.

Around the world, businesses and even whole destinations are working hard to reposition themselves as ‘green’ to try to capture a growing share of the market that is seeking travel options that are in harmony with their environment. Growing public awareness about the need to look after our surrounds means sustainable tourism products will soon move from their present niche status into the mainstream. Businesses who fail to respond to this growing demand will not remain competitive.

Beach tourism is strictly linked to climate and meteorological events. This attitude was seen in the past when the authorities acted to limit the risks of pollution and to improve the overall quality of bathing water.

Mediterranean is perceived as an attractive destination. The natural environment is a key element, and part of what differentiates this region from competing destinations.

On a global scale, the Mediterranean countries are considered to be most vulnerable to the adverse impacts of climate change. There are two kinds of impacts: direct and indirect.

The physical impacts of climate change which have 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.
- increasing costs of travel from governments around the world implementing policies to reduce emissions, such as carbon taxes and emissions trading schemes.

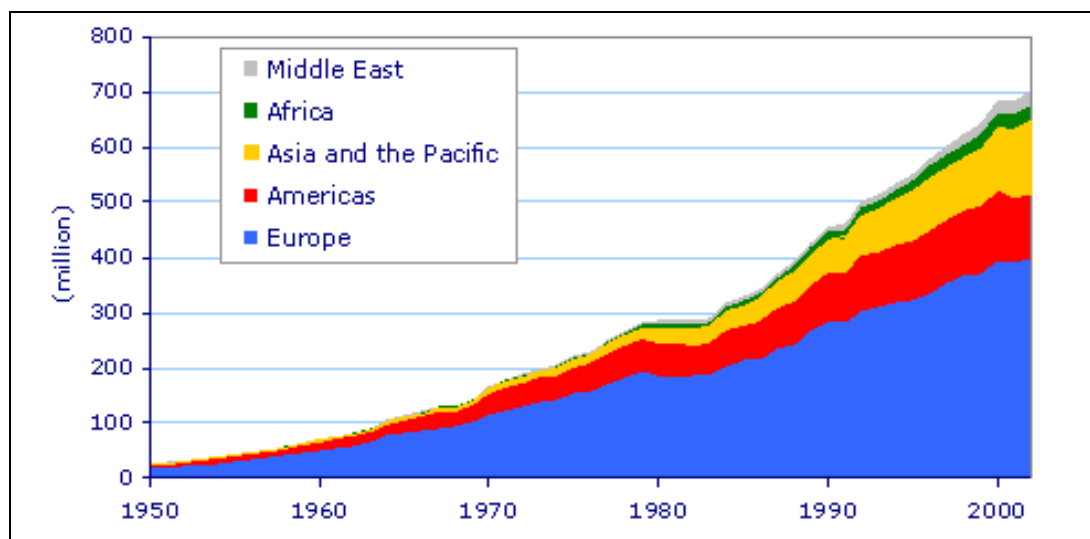
A sustainable development strategy should provide some solutions to enable simultaneous economic development of the area and the preservation of the coastal and marine ecosystems of the Mediterranean Sea.

Therefore, it seems vital to explore this issue on the impact of climate change on coastal tourism MENA. For this, we will explain in a first step the characteristics of tourism in this region to highlight the importance of its coastal part. We analyse in a second step the potential effects of climate change on MENA countries’ tourism based on the latest scientific studies. Then in a third and final step, we will link climate change and coastal tourism in the MENA countries.

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 a 25 million international arrivals in 1950 to an estimated 806 million in 2005, corresponding to an average annual growth rate of 6.5% (**Figure I**)

Figure I : International Tourist arrivals in the world, 1950-2005



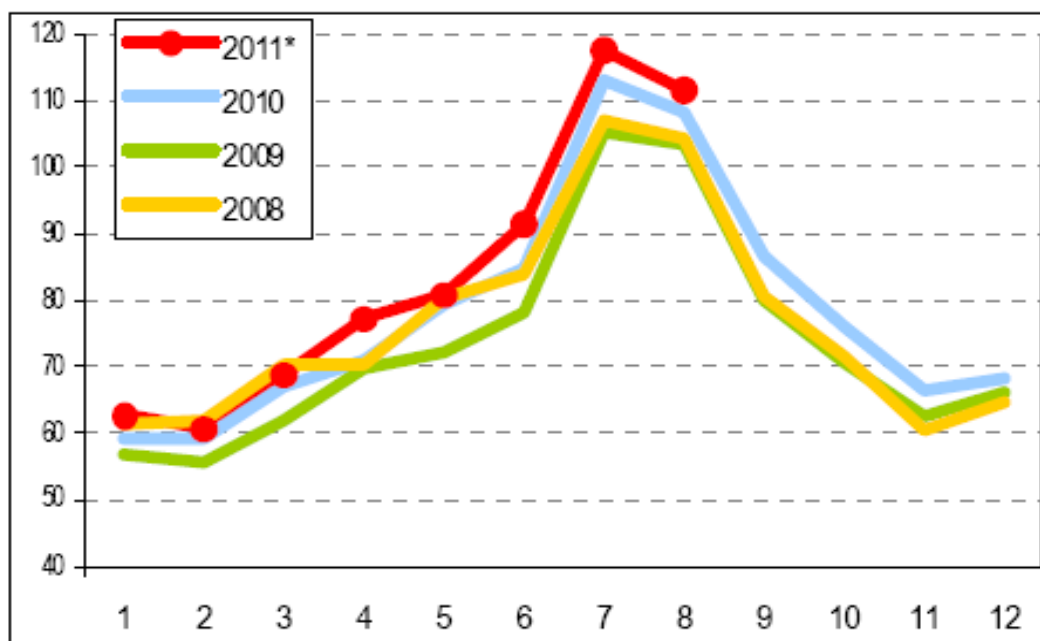
Source : World Tourism Organization

During this period, development of tourism was particularly strong in Asia and the Pacific (13% on average a year) and in the Middle East (10%), but less strong in while the Americas (5%) and Europe (6%). Europe's world share declined by over 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 over 95 per cent in 1950, 82% forty years later and 76% in 2000.

Recently, International tourist arrivals were expected to grow by 4,5% in 2011. They recorded an estimated total of 671 million international tourist arrivals between January and August 2011 (an average of 69% of the yearly total), growing by 29 million more than in the same period of 2010. Europe, showed the strongest growth (+6%) amid continuing economic uncertainty.

So, contrary to the recent years trend, in spite of growth in arrivals during the first eight months of 2011 was higher in advanced economies (+4,8%) than in emerging ones (+4,2%), due to the strong results recorded by Europe which this year benefited from the shift in travels away from Middle East (-9%) and North Africa (-15%) as showed by the **Figure II** below. Contrasting with growing economic uncertainty, European Union destinations brought some relief for those destinations facing major economic challenges, such as Greece (+14%), Ireland (+10%), Portugal (+11%) and Spain (+8%). So, international tourism is an important economic driver, bringing foreign exchange and helping to ease the pressure on the balance of payments.

Figure II : International Tourist arrivals (millions), monthly evolution in the world, 2008-2011.



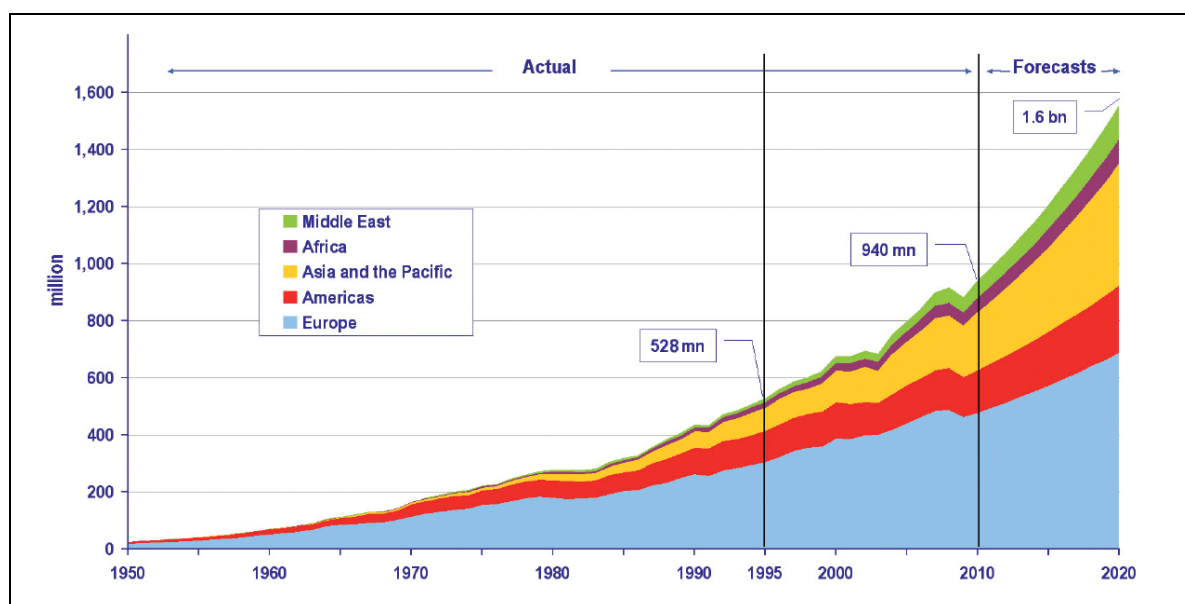
Source : World Tourism Organization

Tourism demand strongly depends on the economic conditions in major generating markets. On one hand, when economies grow, levels of disposable income will usually also rise. A relatively large part of discretionary income will typically be spent on tourism, in particular in the case of emerging economies. On the other hand, a tightening of the economic situation on the other hand, will often result in a decrease or trading down of tourism spending. In general, the growth of international tourism arrivals significantly outpaces the growth of economic output measured by Gross Domestic Product (GDP). As indicated by the UNTWO, tourism grew on average 1.3 times faster than GDP.

In the World Tourism Organization's long-term outlook and assessment of the development of tourism, it is forecasted that international arrivals are expected to reach nearly 1.6 billion in 2020 (See **Figure III**).

Of these worldwide arrivals in 2020, 1.2 billion will be intraregional and 0.4 billion will be long-haul travellers. The Middle East and North Africa are forecasted to grow over 5% per year, compared to the world average of 4.1%. Europe will maintain the highest share of world arrivals, although this share will decline from 60% in 1995 to 46% in 2020. The tourist activities in Europe will positively affect the tourism in Mena countries because of their proximity.

Figure III : International Tourist arrivals by region (million), 1950-2020.



Source : World Tourism Organization

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 impacted not only the directly involved countries, such as Egypt, Tunisia, Syria and Yemen, which have seen arrivals decline. European holidaymakers tended to stay away from the whole region, even Arabs in general have avoided to travel 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.

We consider that 2011 is an exceptional period and it does not give us the real potential of tourism in Mena countries. By consequence, we limit our empirical study to 2010.

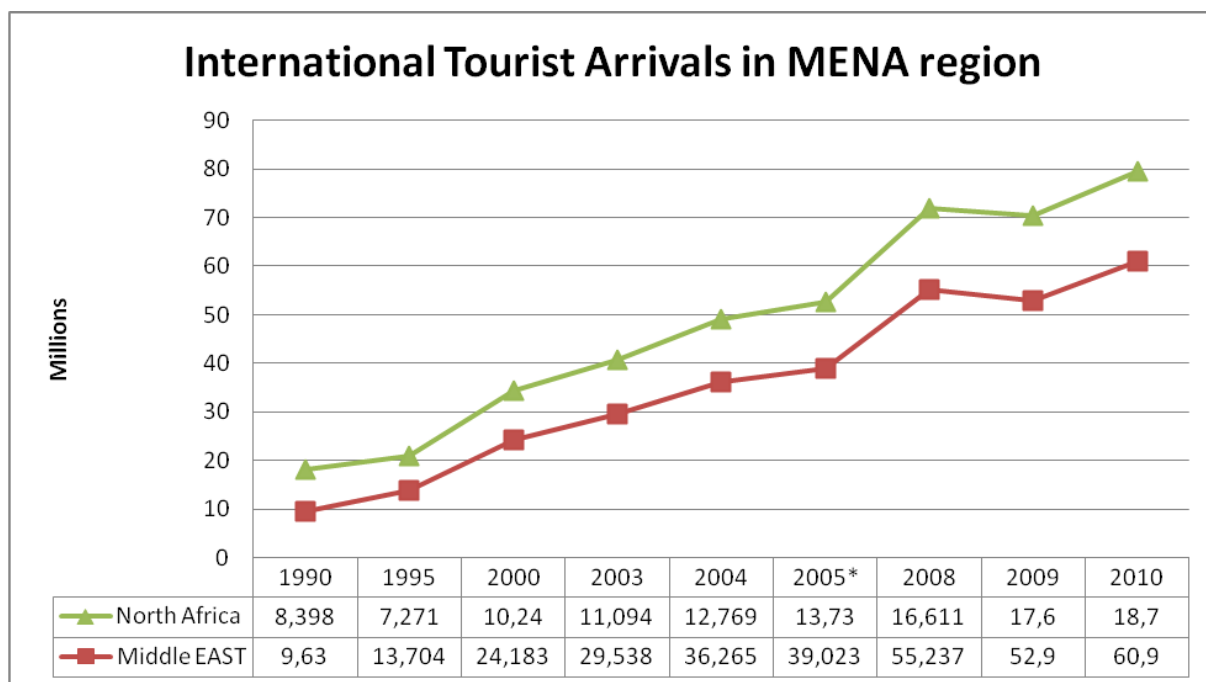
So, the Middle East was the fastest growing region in 2010 (+14%), but this followed a significant drop in 2009 (-4%) due to 2008 financial crisis. Boosted by intraregional travels favoured by high oil prices, the region reached 60 million arrivals in 2010, up to 7.5 million in 2009 and 5 million compared with the peak year of 2008 (See Figure IV). International tourism receipts are estimated to have increased as well, by 14% in real terms to US\$ 50 billion. Almost all destinations recorded double-digit increases in arrivals, such as: Syria (+40%), Jordan (+20%), Egypt (+18%) and Lebanon (+17%).

As we can observe (See Figure IV and Figure V), the trend in recent years in international tourist arrivals was higher in Middle East and North Africa countries. This is essentially due to the fact that in MENA countries there are a growing economic wealth and the development of new tourism infrastructure adapted to growing international demand, especially from Europe, but also intra-regional. So, international Tourism is an important economic driver, bringing foreign exchange and helping to ease the pressure on the balance of payments.

The substantial growth of the tourism activity clearly is evident in the MENA region. The numbers of international arrivals shift from 18 million international arrivals in 1990 to 80 million estimated in 2010. Therefore, we observe the same phenomenon with the rise of international tourist

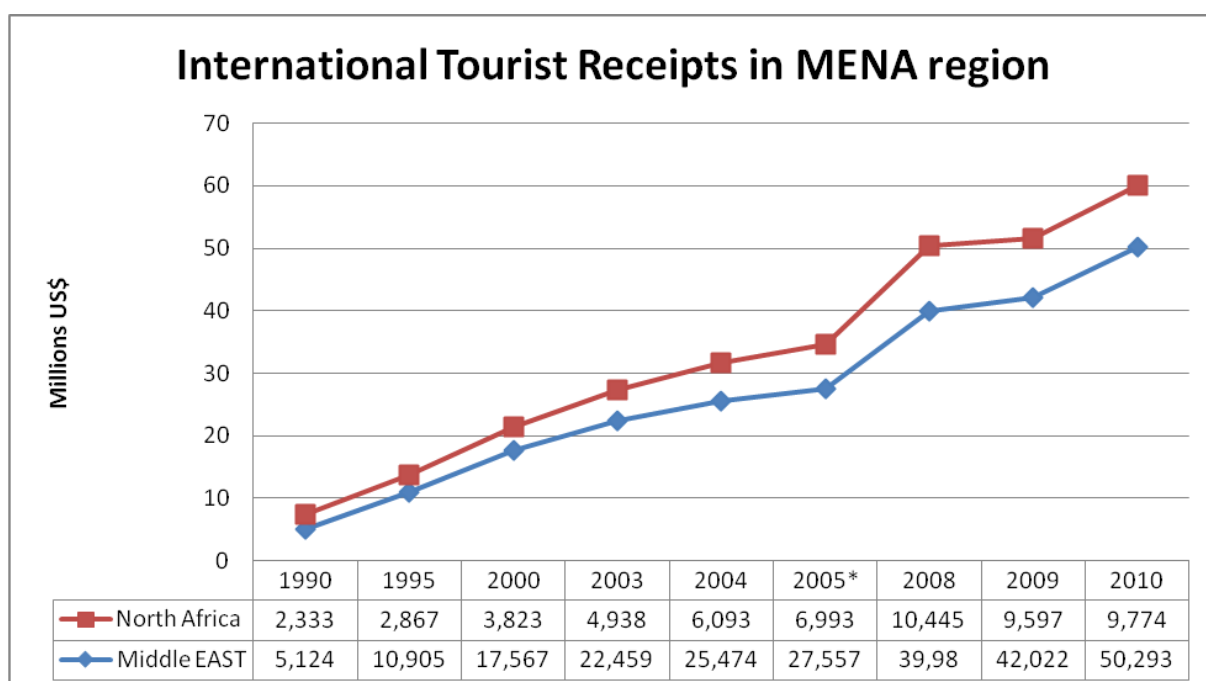
receipts. The Figure V shows an increase from 7 billion US\$ of receipts in 1990 to 60 billion US\$ estimated in 2010.

Figure IV : International Tourist arrivals by region (million), 1990-2010.



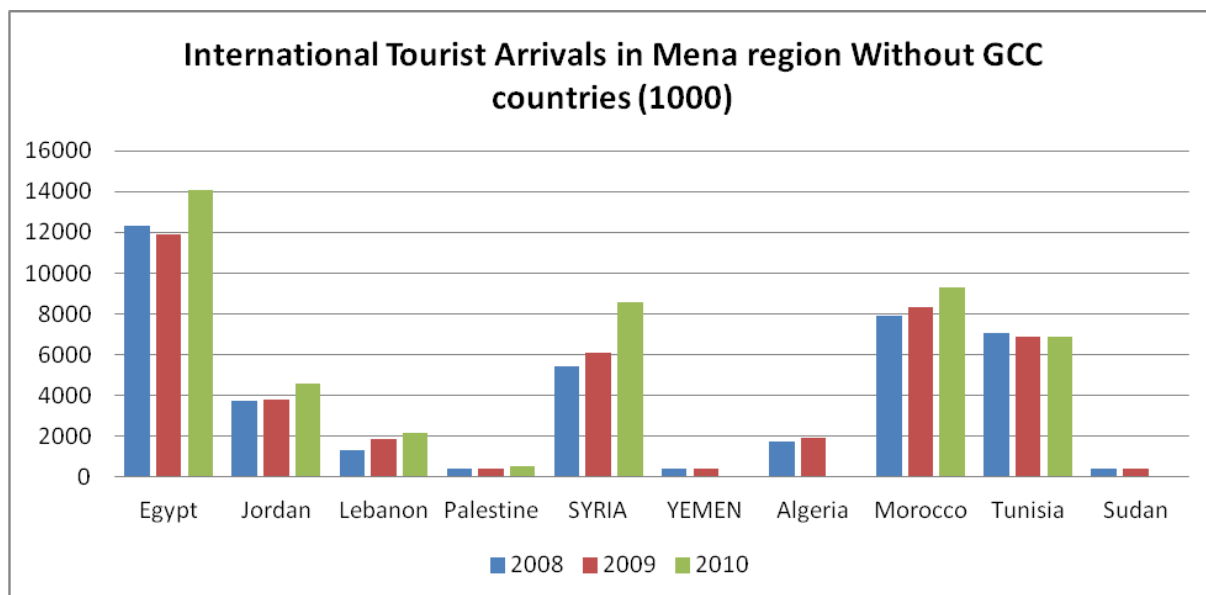
Source : By authors from UNWTO data.

Figure V : International Tourist receipts by region (millions US\$), 1990-2010.



Thus, we can confirm that the MENA countries have most attractive countries by number of International Tourist Arrivals in descending order and without the GCC countries are Egypt, Morocco, Tunisia, Syria, Jordan and Lebanon (**FIGURE VI**).

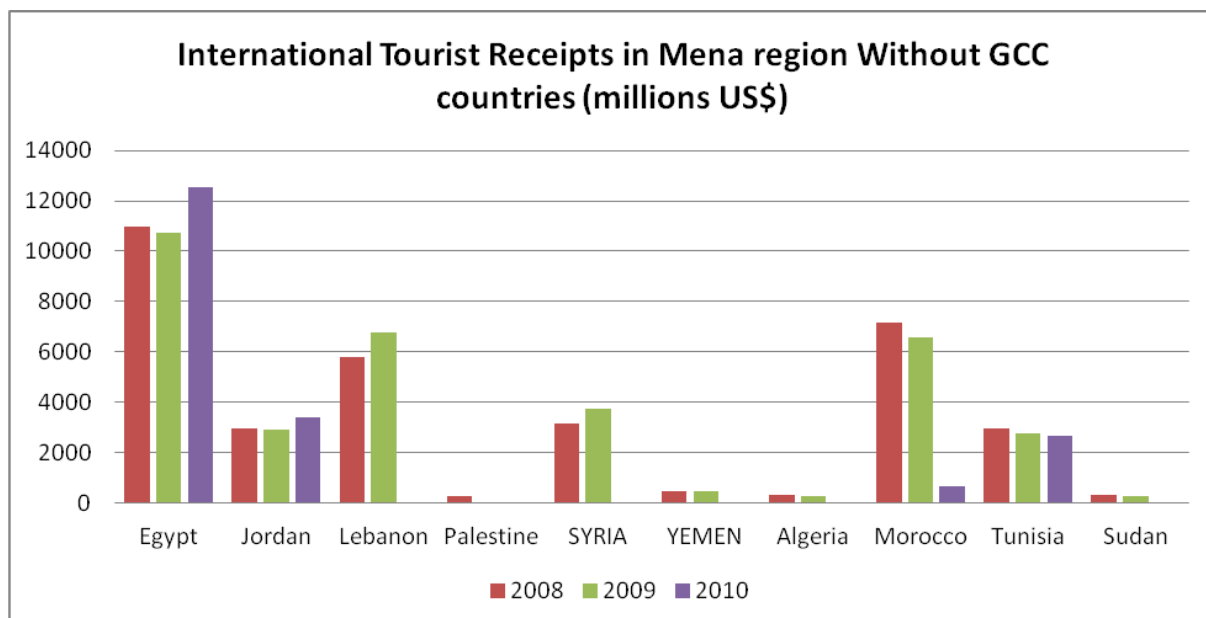
Figure VI : International Tourist arrivals in MENA region by country (million), 2008-2010.



Source : By authors from UNWTO data.

Thus, we observe important international tourist receipts in these countries. The most attractive countries according to the amount of International Tourist receipts in descending order and without the GCC countries are Egypt, Morocco, Lebanon, Jordan, Syria, and Tunisia (FIGURE VII).

Figure VII : International Tourist Receipts in MENA region by country (billion US\$), 2008-2010.



Source : By authors from UNWTO data.

So, the International tourism receipts have a crucial socio-economic impact in these countries. The amount of the receipts designs the kind of tourism and the added value of the international tourist

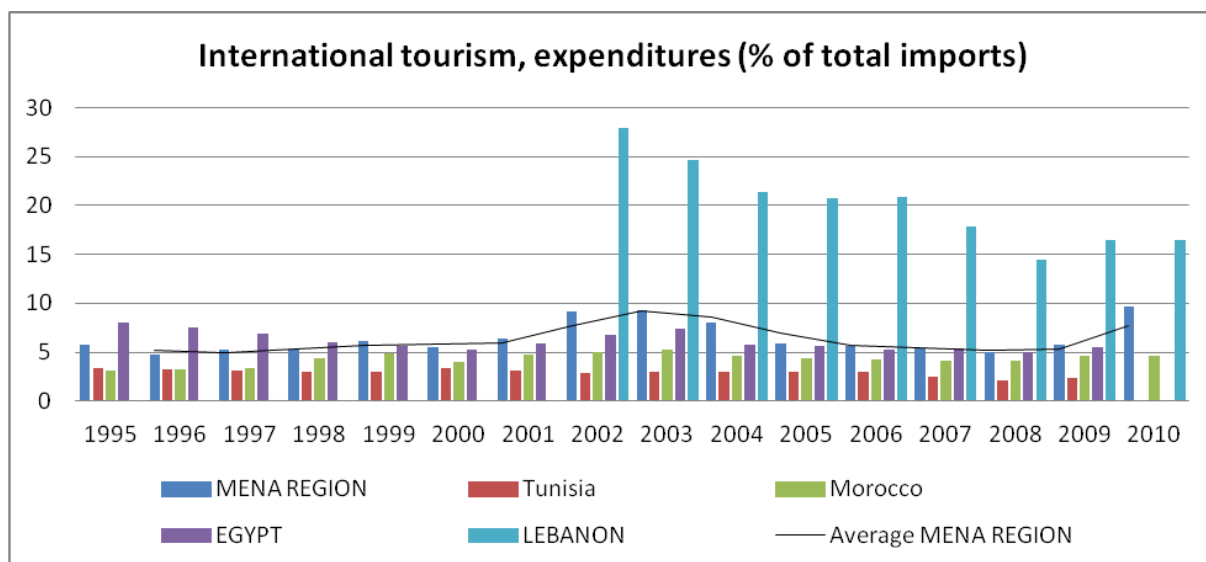
arrivals, especially in Lebanon. The international tourism receipts represent more than 30% of total exports and 15% of total imports. (Figure VIII and Figure IX).

Figure VIII : International Tourist Receipts in MENA countries (% total Exports), 1995-2010.



Source : By authors from UNWTO data.

Figure VIX: International Tourist expenditures in MENA countries (% total Imports), 1995-2010.



Source : By authors from UNWTO data.

As we can see, it's very clear that the tourism play a key role in Mediterranean countries from Mena region, except Syria, newly attractive for cultural and archaeological raisons, and Saudi Arabia for religious raison. So, we can conclude that the most important aspect of tourism is the coastal one as we can observe in all Mediterranean countries, even in MENA region or in southern Europe. Tourism

is not only a complementary source of currency; it became an economic growth model with its financial, economic but also social and cultural impacts.

The Mediterranean is currently the world's most popular and successful tourist destination with 120 million visitors every year in 2005. Its climate is perceived, by many tourists as idyllic, benign and delightful. It has remained seductive to north European visitors since the habit of escaping from the cold and dark of the northern winter became well established by the upper classes last century.

Several countries with Mediterranean shorelines, including Spain and France are now among the most visited countries in the world and in these countries international tourism receipts account for just over 2% of gross domestic product In Greece 10% of total employment is in the tourist industry.

There is large scale capital transfer from the tourist demand areas of North-West Europe to the generally poorer Mediterranean countries. Climate constitutes an important part of the environmental context in which recreation and tourism takes place. Because tourism is a voluntary and discretionary activity, participation will often depend on favourable conditions. Climate and weather are among the most important factors affecting participation in leisure and tourism activities, since for many activities there are critical threshold levels beyond which participation and enjoyment levels fall and safety may be endangered.

The Mediterranean is attractive to tourists because of its good climate. The Mediterranean region can justifiably claim to have been the focus of the modern tourism.

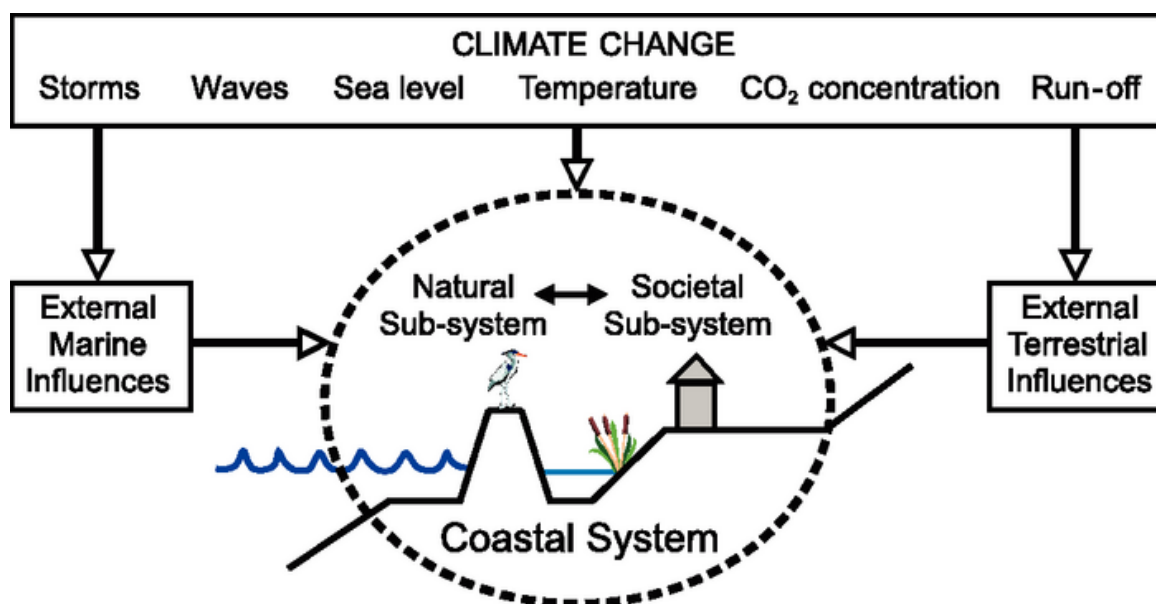
The tourist industry is by nature very fragile and dependant on political, economic and social changes and the probability of climate change adds another element of uncertainty to future developments planning.

Past growth and attractiveness are not necessary a guide to the forecast and the Mediterranean tourist industry cannot assume an untroubled and guaranteed future The primary resources of sun, sea and beaches are likely to be re-evaluated in the light of climate change.

II- The potential effects of climate change on MENA countries

In this section, we present 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 (see **Figure X**).

Figure X : Climate Change and coastal system.



Source : The IPCC report, 2007.

Since the IPCC¹ Third Assessment Report (TAR), our understanding of the implications of climate change for coastal systems and low-lying areas (henceforth referred to as ‘coasts’) has increased substantially and **six** important policy-relevant messages have emerged.

➤ 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 (**UNDP, 2004**). 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).

¹ IPCC Fourth Assessment Report: Climate Change 2007.

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.

- 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 acclimatisation by corals.
- 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.

Table I : Summary of climate-related impacts on socio-economic sectors in coastal zones.

Coastal socio-economic 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 resources	X	X	X	X	-	X	x
Agriculture and forestry	X	X	X	X	-	X	x
Fisheries and aquaculture	X	X	x	-	x	X	X
Health	X	X	X	x	-	X	X
Recreation and tourism	X	X	x	-	X	-	X
Biodiversity	X	X	X	X	X	X	X
Settlements/ infrastructure	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. Utilisation 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 5.2 billion people by the 2080s, depending on assumptions about migration.

➤ 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 (See Table II).

➤ 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.

Table II : 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 (Tol, 2002) (see also Figure 6.11).			
Region	Protection Costs (10⁹ US\$)	Number of People Displaced (10⁶)	
Africa	92	2.74	
OECD Europe	136	0.22	
World	955	8.61	
Construction costs for coastal defence in England and Wales (average total cost in US\$/km) (Evans et al., 2004a)			
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 (Neumann et al., 2000)			
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 (Jenks et al., 2005)			
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 – 300,000
Sea walls and revetments (maintenance costs high – full rebuild every 20 – 40 years)			900,000 – 1.3 million
Direct losses, costs and benefits of adaptation to 65 cm sea-level rise in Pearl Delta, China (Hay and Mimura, 2005)			
Tidal level	Loss (US\$ billion)	Cost (US\$ billion)	Benefit (US\$ billion)
Highest recorded	5.2	0.4	4.8
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. Stabilisation 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 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.

Table III : Indicative estimates of regional exposure as a function of elevation and baseline (1995) 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	10m	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 : Anthoff et al., 2006.

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 Programme (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 affecting 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.

Subsequent workshops supported by the European Science Foundation (ESF) (Milan 2003), the North Atlantic Treaty Organization (NATO) (Warsaw 2003), the European Forum on Integrated Environmental Assessment (EFIEA) (Genoa 2004), and the Experts on Climate Change and Tourism group (eCLAT) (Netherlands 2006, Paris 2007), as well as the Helsingborg Meeting on Sustainable Tourism (Helsingborg 2007; cf. Gössling et al. 2008a) and the Marrakech Task Force on Sustainable Tourism Development further contributed to the development of collaborative research and practical case studies by a 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 (UNWTO-UNEP-WMO 2008), was presented during the Second International Conference on Climate Change and Tourism, which took place in Davos, Switzerland, 1-3 October 2007:

“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

As we developed in the second section, the 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 the result of human activities that are increasing 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.

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 2007b)

Tourism

UNWTO has determined that tourism is a primary source of foreign exchange earnings in 46 out of 50 of the world's Least Developed Countries (LDCs) (UNWTO 2007c, see also UNDP 2005; Hall 2007). Global discussion about Africa and UNWTO's Sustainable Tourism for Eliminating Poverty (ST-EP) initiative re-energised the debate about pro-poor tourism or tourism for poverty alleviation (Hall & Coles).

Climate Change and Tourism

Tourism has the potential to lift people out of poverty through the employment and entrepreneurial opportunities it provides. And the recognition of tourism's role in poverty alleviation has made it a substantial component of the international development and trade agenda (Hall & Coles 2008a, b). The tourism sector also has the potential to make a substantial contribution to the achievement of, the United Nations' Millennium Development Goals. This, however, demands that the sector adapts to climate change, and reduces its contribution to climate change through emissions of greenhouse gasses, and the overall environmental footprint of tourism. Both aspects require substantial changes in the tourism production system.

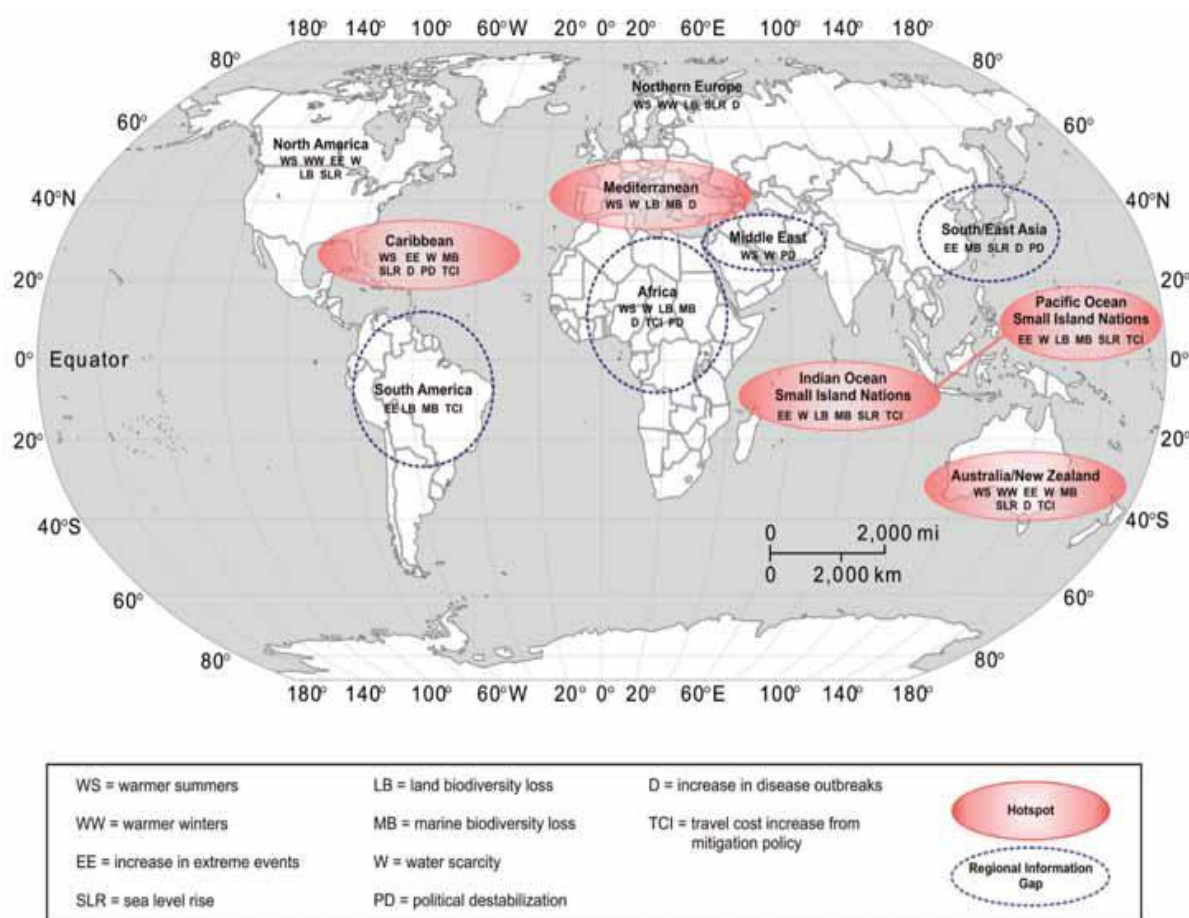
With its close connections to the environment and climate itself, tourism is considered to be a highly climate-sensitive economic sector similar to agriculture, insurance, energy, and transportation. Indeed, climate change is not a remote future event for tourism, as the varied impacts of a changing 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 impacts that will affect tourism destinations, their competitiveness and sustainability (UNWTO-UNEP-WMO 2008).

➤ **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 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. 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 operating 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. Importantly, there remain major regional gaps of how climate change will affect the natural and cultural resources critical for tourism in Africa, the Caribbean, South America, the Middle East and large parts of East Asia (See Figure XI).

Figure XI : Climate Change Vulnerability Hotspots in the Tourism Sector



Source : UNWTO-UNEP-WMO 2008.

➤ **Impacts of mitigation policies on tourist mobility:** National or international mitigation policies – that is policies that seek to reduce GHG emissions – may have an impact on tourist flows (Simpson et al. 2008a). 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.

➤ **Indirect societal change impacts:** Climate change is thought to pose a risk to future economic growth and to the political stability of some nations. 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 (e.g. **Barnett and Adger 2007, Stern 2006, Simpson and Hall 2008**). Many of which are believed to be in developing nations (**Hall et al. 2004**).

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 for emissions from aviation. In 2005, tourism's contribution to global warming was estimated to contribute between 5% and 14% to 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 17% to global tourist emissions.

By 2035, tourism's contribution to climate change may 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.

What about the link between climate change and Tourism in MENA countries and especially in Mediterranean ones?

The Mediterranean has long been familiar to tourists because of its perceived good climate. The Mediterranean 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 adds another element of uncertainty to planning future developments.

Maria Berrittellaa & all (2005) in "A GENERAL EQUILIBRIUM ANALYSIS 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 equilibria, 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 in 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. 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 reducing greenhouse gas emissions and tackling 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 Bleu'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 characterised 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 (Eurobarometre 1995).

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 (Eurobarometre 2002).

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 harbours, 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 have 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 or 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.

Finally, tourism is characterised by a vast number of indirect and induced repercussions that have to be assessed. The dispersion of tourism consumption in the various sectors of the economy has sometimes prevented the measuring of its contribution to many environmental problems such as that to greenhouse effect gases or water consumption

CONCLUSION

Even if there are very many « sustainable » initiatives at all levels of MENA tourism, they have proved to be insufficient faced with 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 organisation 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 mitigate against dependent resource sectors.

Adapting to climate change does not necessary 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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