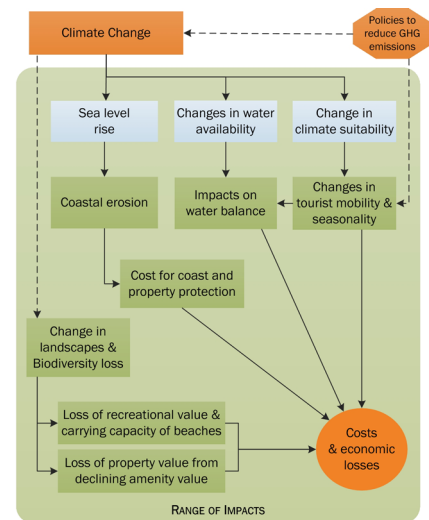


How can climate change impact on tourism?

Climate change is anticipated to have an impact on the tourism industry, as weather conditions influence the choice of destinations and the demand for different activities. Different studies indicate that regional and seasonal shifts in tourism flows should be expected, resulting to an alternative distribution of tourism-generated income.

Tourism in the Mediterranean is likely to be impacted. Direct impacts relate to the suitability of locations for tourism-related activities; they can be linked to changes in the perceived sense of comfort of tourists, due to the alteration of temperature and weather conditions. Indirect impacts concern wider environmental changes that can affect the attractiveness of a tourist destination. They include additional water availability constraints, biodiversity loss, reduced landscape aesthetic, and coastal erosion. Climate change mitigation policies can further affect tourist

mobility, e.g., through increased travel costs related to policies incentivising the reduction of greenhouse gas (GHG) emissions.



A conceptual framework for analysing the impacts of climate change on the tourism sector

In brief:

- Tourism is a sensitive sector of the Mediterranean economies, likely to be impacted by climate change
- WASSERMed focused on the analysis of the direct impacts of climate change at two spatial scales: the entire Mediterranean Basin and the local level up to 2065 for the A1B scenario
- Results indicate that climate change can foster a prolongation of the tourism season towards spring and autumn
- Mediterranean-wide analyses indicate that negative impacts will mainly concern summer tourism in the southern Mediterranean countries. The northern part of the basin will benefit from improved conditions throughout the year

The WASSERMed approach: Methods and tools

From the range of impacts and drivers, research in WASSERMed addressed the interrelation between climate and suitability of destinations for summer tourism (direct impacts for the Mediterranean basin). The analysis of the interrelations between climate and tourism fluxes was performed using the *Tourism Climate Index - TCI* as the indicator of climate suitability for outdoor activities.

Through a dynamic, GIS-based tool and platform (see Factsheet No 5), WASSERMed assessed climate change impacts at two spatial scales. At the **local level**, a

detailed impact assessment was carried out for the tourism industry of two islands, Syros (Greece), and Sardinia (Italy). For the **Mediterranean region**, projections of TCI values were used to indicate potential changes in preferences for summer tourism.

The assessment was based on historical (1961–2010) and future (2011–2065) climate datasets for the A1B SRES (see Factsheet No 1), considering both mean model ensembles and ensemble top and bottom values.

A short note on the Tourism Climate Index (TCI)

The Tourism Climate Index—TCI, which has been used in tourism-related assessments in WASSERMed, is an indicator used for describing the comfort sensation of tourists for outdoor activities. It has been widely used for assessing the attractiveness of a destination, and through its correlation to tourism-related data, such as arrivals and overnight stays, it can also be used to estimate the direct impact of long-term climatic changes on tourist preferences.

The TCI combines seven climatic parameters (monthly mean values for maximum daily temperature, mean daily temperature, minimum daily relative humidity, mean daily relative humidity, total precipitation, total hours of sunshine and average wind speed) in five sub-indices, the Daytime Comfort Index, the Daily Comfort Index, Precipitation, Sunshine, and Wind Speed. The maximum value is 100, with values over 80 depicting very favourable to excellent conditions for summer tourism.

Further Information

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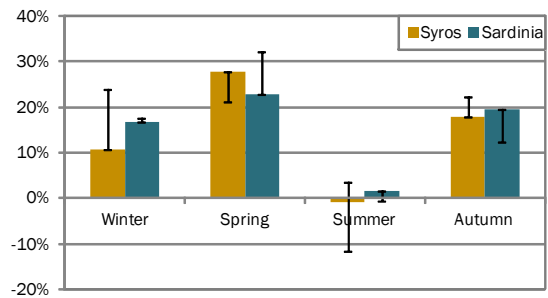
Climate Change Impacts on Tourism in the Mediterranean Region

Main results

Local level analyses

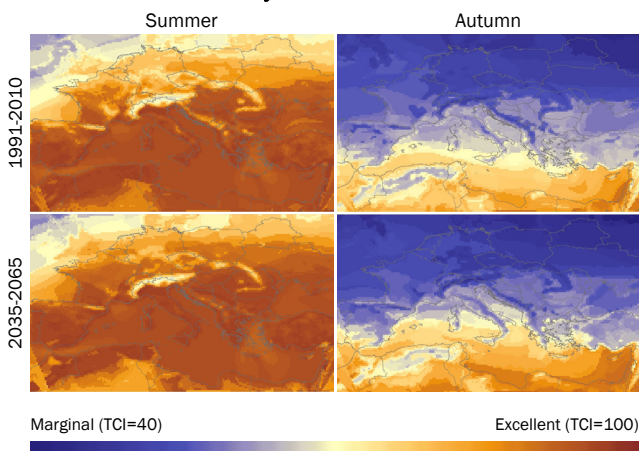
Results indicate that climate change can enhance the potential for tourism development, as the weather conditions will remain favourable in both Syros and Sardinia. Overall, the estimated positive trend becomes significant from 2030 onwards. A 10% increase in arrivals and overnight stays is estimated for 2051-2060 vs. the 1981-2010 period.

A prolongation of the tourist season towards spring and autumn can be expected. This will affect the seasonal variation of income generated by tourism and water demand. Furthermore, the increase of TCI values for winter can provide the potential required for enhancing/investing in other outdoor activities (e.g. agro-tourism, trekking).



Estimated percentage change of seasonal tourist arrivals in Syros and Sardinia in 2051-2060 vs. 1980-2010

Mediterranean-level analysis



Summer and autumn Tourism Climate Index values for the A1B SRES [RACMO2 model, driven by the ECHAM5 GCM]

Results indicate that conditions will remain favourable for summer tourism in the Mediterranean basin. However, a change in seasonality is probable, as there is an improvement in TCI values in spring and autumn and a slight deterioration in the summer.

In more detail:

- In winter, there is a notable increase in TCI values in the southern Mediterranean basin.
- In spring, the dominant trend is an improvement of TCI values.
- In the summer, the future trend is an improvement of conditions in northern Mediterranean and a slight deterioration in the southern part.
- In autumn, an increase in TCI values is noticed, except for some parts in Spain, Italy, Greece and Turkey, where a slight decrease of TCI values is calculated.

Key findings and considerations

- An alternative distribution of Mediterranean tourism can be anticipated, particularly during summer. This would not necessarily impact negatively on the sector, but this information should be disseminated to authorities, tourism businesses and tourism service providers.
- The detailed assessment for two tourist destinations, Syros and Sardinia, portrays minor impacts on summer tourism and opportunities for a prolongation of the tourist season. Such opportunities would require investment in available infrastructure and services for the support of additional activities.
- The effect of other climate change impacts (e.g. sea level rise, change in the frequency of extreme events) should be considered in tourism development plans, particularly regarding the settling of tourism businesses and costs for the protection and restoration of coastal areas.
- Assessments based on climate comfort indices can adequately represent changes in seasonality and attractiveness of a region for outdoor activities. However, such indices alone cannot be used for estimating future tourism patterns. Tourist destination choices are not solely based on climate conditions, and other factors can have more significant influence (e.g. marketing of tourist destinations, improvement of access and tourism facilities).

Further reading

- Arampatzis G., Panagiotakis A., Kampragkou E., Manoli E., and Assimacopoulos D. (2011), A GIS-Based tool for assessing Climate Change impacts on tourism, Proceedings of the 12th International Conference on Environmental Science and Technology, Rhodes, Greece, 8-10 September 2011.
- Kampragou E., Lekkas D., Mereu S., and Assimacopoulos D. (2012), Analysis of climate change impacts on tourism at the Case Study level and relevant water demand projections, WASSERMed Deliverable 4.3.2.
- Kampragou E., Manoli E., and Assimacopoulos D. (2012), Direct and indirect climate change impacts in the Mediterranean Basin, WASSERMed Deliverable 4.3.3.