Water Availability and Security in Southern EuRope and the Mediterranean
http://www.wassermed.eu

Factsheet No 5

A GIS-based tool for assessing climate change impacts on tourism

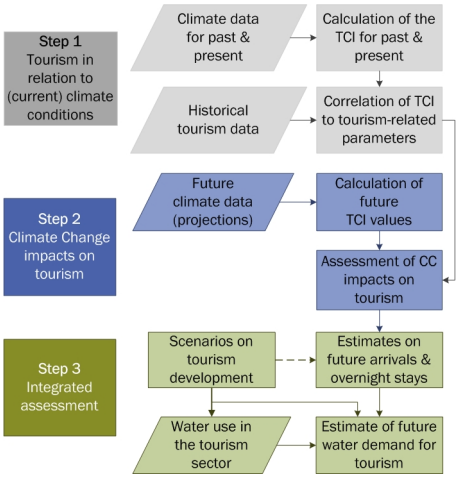
The Tourism-CCIA tool: Methodology and structure

Within WASSERMed, the analysis of climate change impacts on tourism was based on a GIS-based tool, the Climate Change Impact Assessment (CCIA) Tool for Tourism, specifically designed for this purpose. The tool implements a stepwise methodology, based on the Tourism Climate Index (TCI), initially developed by Mieczkowski (1985).

Starting from the analysis and correlation of tourism-related information to current or historic climate conditions, the tool assesses the direct effects of climate change in the sector, as well as potential development opportunities (e.g. shoulder tourism). In a third step, it performs integrated assessments to assess indirect effects on income and water demand (magnitude and seasonality) with the aim to support informed planning for tourism and infrastructure development.

Two levels of analysis can be supported. At the **local level**, the emphasis is on the analysis of observational data and localised projections and impact assessments. At the **regional level**, the analysis is based on gridded datasets, referring to either historical data or future projections from different emission scenarios and climate models.

In the context of WASSERMed, the tool was used for the assessment of climate induced impacts on tourism in Syros, Greece and Sardinia, Italy and at the Mediterranean (see Factsheet No 4).



Methodological framework for the Tourism Climate Change Impact Assessment (CCIA) tool

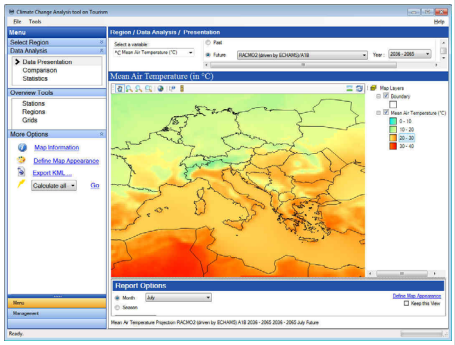
Tool features

As mentioned above, the emphasis of the Tourism-CCIA tool is on the estimation of selected climate change impact-related indicators, the illustration of their temporal and spatial variation, and on the assessment of the significance of their changes for different timeframes and climate projections.

As such, the tool can be used as:

- A well-organized repository for storing and visualizing data related to climate and tourism;
- A platform for presenting future climate projections and formulating user-defined scenarios;
- An analytical framework for assessing climate change impacts on tourism, focusing on trends, seasonality, income and water demand.

A distinctively powerful feature is the ability to accommodate and fully describe different spatial and temporal datasets. In its current version, the platform incorporates climate datasets from a variety of sources (e.g. WorldClim, FutureClim, Rossby Centre , the E-OBS, the Prudence and WASSERMed projects, for different periods and SRES). Time series for meteorological parameters, tourism, agriculture, water availability, etc, can be accommodated, offering the possibility to extend the tool application scope.



The Tourism-CCIA tool interface for the visualization of climate projections for the Mediterranean region

In brief:

- *The Tourism-CCIA tool is a GIS-based software package that can be used for the analysis of direct and indirect effects of climate change on the tourism sector*
- *The methodology implemented by the tool is based on the Tourism Climate Index, which can express the suitability of a location for different light outdoor activities*
- *The software embeds a platform which can be used to store, visualise and compare different data and climate projections, as well as diverse information related to demand, water availability, cropping patterns, etc. at regional level*

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Assessments and application examples

Regional level assessments

Analysis and assessments at the regional level are mainly supported through gridded datasets, where users can visualise historical or projected climate data and estimates for the Tourism Climate Index. Data and results can be displayed for different time-frames and time steps (monthly, seasonal, yearly or longer periods). Furthermore, the platform can estimate the difference between datasets pertaining to different periods (historical or projected values), emission scenarios and RCMs/GCMs, thus helping to identify significant trends and differences between them.

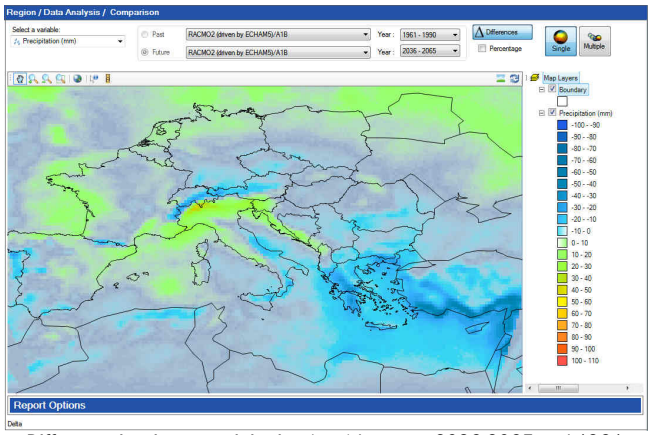
Local level assessments

Similar analyses can be conducted for observational data from individual meteorological stations, complemented with statistical analysis of the entire or a subset of the meteorological time series.

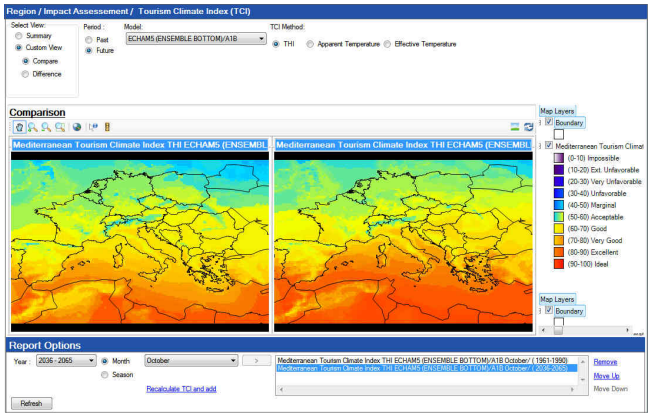
Climate change impact assessments

The assessment of the impacts of climate change on tourism for a specific area or region can be performed based on user-defined scenarios or on projected climate data. Historical data are used to derive correlations between the TCI and tourism-related data; the correlation model is then used to estimate future overnight stays, arrivals, income from tourism-related activities and water demand.

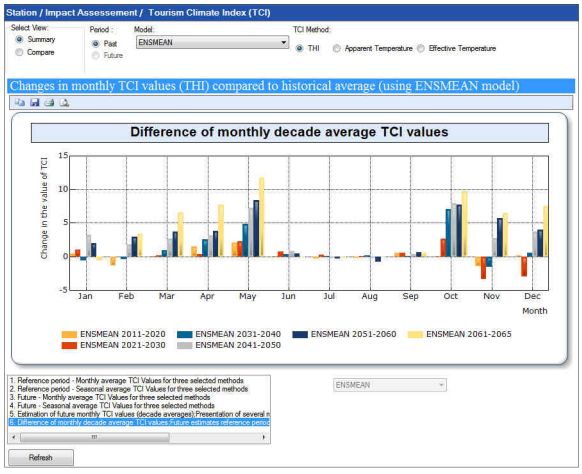
Results can be exported in a variety of formats, fully customizable to accommodate requirements for presentation and further analysis.



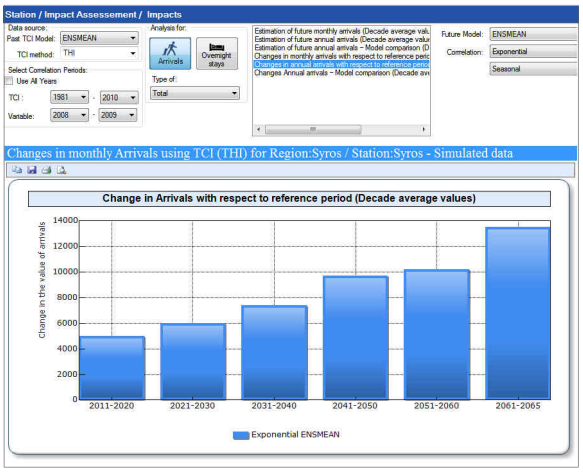
Difference in winter precipitation (mm) between 2036-2065 and 1961-1990 [RACMO2 RCM driven by ECHAM5, A1B SRES]



Comparison of Tourism Climate Index values between 1961-1990 (left) and 2036-2060 (right) [RACMO2 RCM driven by ECHAM5, A1B] SRES]



Estimation of Tourism Climate Index changes in Syros Island, Greece for 2011-2065 at decadal scale



Climate-induced change in tourist arrivals in Syros, Greece, indicating the potential for prolongation of the tourist season

System requirements and further information

System Requirements: The Tourism-CCIA tool is a Windows Application developed with the Visual Basic .NET programming language. The software requirements are: (a) Microsoft® Windows XP Service Pack 2 (32bit or 64bit), Microsoft® Windows Vista (32bit or 64bit) or Microsoft Windows 7 (32bit or 64bit); (b) .NET framework 4.0; (c) Any version of MS Office Access; (d) Microsoft Scientific Dataset (SDS) version 1.2.6754.0.

More information can be found at: http://environ.chemeng.ntua.gr/en/Default.aspx?t=129#1.

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