Projet cofinancé par le Fonds Européen de Développement Régional (FEDER)
Project cofinanced by the European Regional Development Fund (ERDF)

MED MARITIME INTEGRATED PROJECTS
Med-IAMER

Adriatic Ionian ecoregion (AIE)

Climate Change on Coastal Zones

Definition

Climate change refers to a system's exposure to climate variations altering land and sea temperatures and precipitation quantity and patterns, resulting in the increase of global average sea level, risks of coastal erosion and an expected increase in the severity of weather-related natural disasters (ESPON Climate, 2011; CEC, 2009).

Regional context – *How will climate variability & change affect coastal areas?*

According to recent studies including the reports of the Intergovernmental Panel on Climate Change (IPCC), climate variability and change would have adverse impacts in the Mediterranean region. Phenomena such as sea level rise, recurrent and persistent droughts, overall decrease in precipitation, salt water intrusion, salinisation of groundwater, more intense rainfall over fewer days causing floods and soil erosion, serious long-term decrease of soil moisture and productivity accelerating desertification, are expected to intensify significantly in this region with time.

Such phenomena are expected to impact the natural environment and biodiversity in the region threatening important wetlands and habitats that safeguard the overall ecological balance, and consequently the provision of ecosystem services and goods on which people's livelihoods depend. These impacts will be intensively felt particularly in the Mediterranean coastal zones.

Related Pressures

- Intense rainfall (extreme events)
- Sea level rise
- Coastal erosion
- Changes in thermal and salinity regime
- Introduction of non-indigenous species and translocations

For the eastern Adriatic coast, Human Development Report (UNDP) analyzed through modelling the area and type of land that would be covered by sea due to climate change phenomena. The

study was developed according to two scenarios: 50 and 88 cm sea level rise. Preliminary results show that, for the first scenario, more than 100 km^2 of the mainland would be flooded while an additional 12 Km^2 would be lost according to the second scenario (SHAPE, 2013a). Furthermore, several areas were identified potentially vulnerable to sea level rise at the Croatian coast, namely cities (i.e. Nin, Zadar, area of Sibenik), rivers (i.e. Rasa, Cetina, Krka), lakes (i.e. Vransko – Cres island), western Istria coast as well as the island of Krapajn (SHAPE, 2013a).

Though the results of the two models differ considerably in terms of the degree of sea level rise, the models agree that coastal regions will be affected.

One of the most recent climate change models is represented by CIRCE (2011), applied on the Mediterranean to forecast the whole climate evolution in the region during this century. According to CIRCE projections in the period 2021-2050, climate change might induce a mean strict sea level rise ranging between +7 and +12 cm in the Adriatic sea, with respect to the period of reference (1961-1990) (Gualdi et al, 2013).

Data/Indicator used

Two sub-indicators are developed to assess the impacts of climate change on the Adriatic Ionian ecoregion:

- the sub-indicator on climate change pressure on the Sea,
- the sub-indicator of climate pressure on coastal areas (land).

The sub-indicator assessing the pressure on Marine environment due to climate change is determined by a composite indicator calculated based on two single variables of effects in the seas:

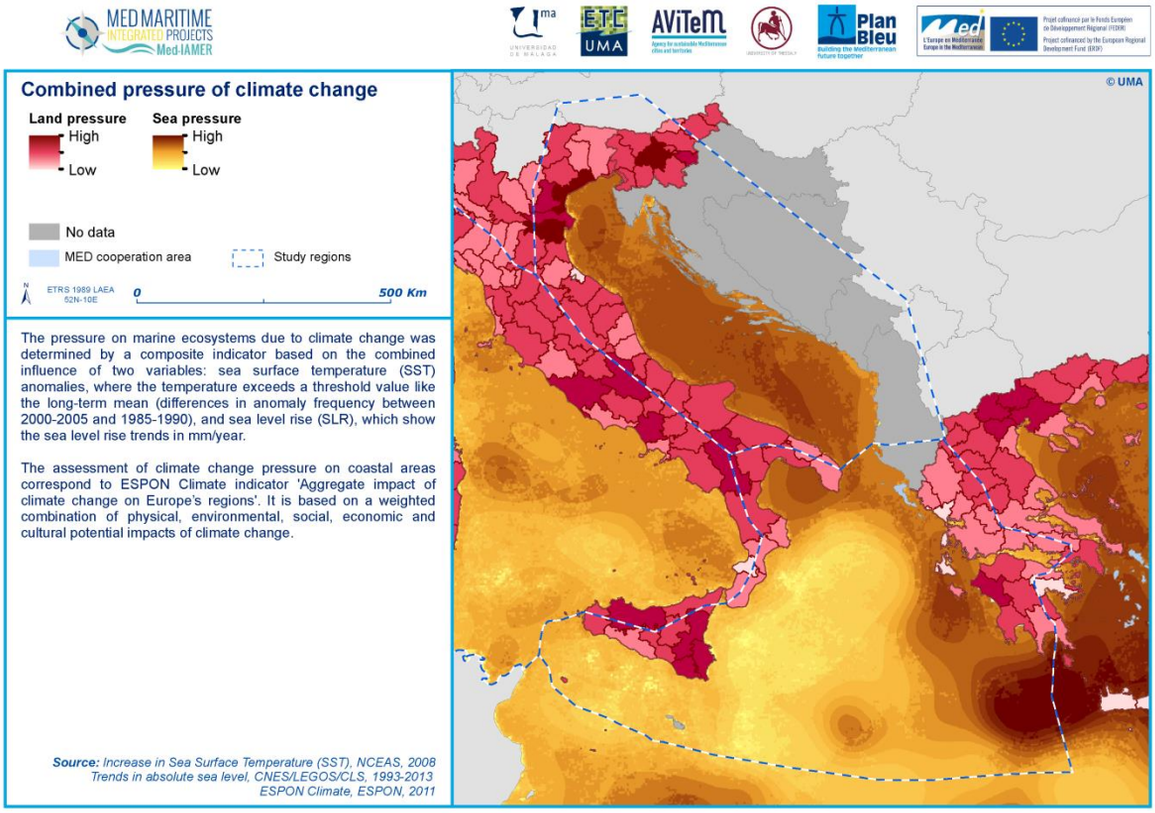
- Variable 1: Change in sea surface temperature (SST) from NCEAS measure as the frequency of temperature anomalies, where temperature exceeds a threshold value like the long-term mean (differences in anomaly frequency between 2000-2005 and 1985-1990). The relevance of this variable lies in the SST influence in the marine ecological processes at different latitudes.
- Variable 2: sea level rise (SLR) along the European Coast. This variable is land-based and created using data of CLS/Cnes/Legos. It shows the impact of sea level rise trends observed by satellite altimetry.

The subindicator of climate change pressures on coastal areas is taken from the ESPON Climate indicator “Aggregate impact of climate change on Europe’s regions” (ESPON 2011).

Gaps

The indicator on climate change effects on marine environment (SST) in the Adriatic Ionian ecoregion does not present spatial gaps. Nevertheless, its spatial resolution is coarse as it is based on global datasets. Whenever available, regional datasets are recommended.

The indicator assessing the impact of climate change on coastal is limited to the European Mediterranean countries presenting spatial gaps in the Adriatic Ionian ecoregion. The indicator is not available for the Western Balkan Countries, the Middle East and North Africa. Despite the quality of the ESPON Climate analysis, it is important to mention the limitation of the scale of



study to NUTS3 level. It is recommended to develop an indicator of these characteristics with a higher spatial resolution.

Limits of methodology

The climate change pressure on marine environment is calculated based on the combination of variables [SST] and [SLR]. The values of each variable are normalized and summed using an equal weight, as the decision of applying a specific weight would need to be set based on expert agreement process. The resulting assessment ranges between 1 and 10, being 10 the highest pressure value.

For coastal areas, the ESPON Climate indicator "Aggregate impact of climate change on Europe's regions" was used (ESPON 2011) without modification. In addition, the classification and categories assigned are kept the same as set by ESPON as they proved to be relevant for their application within Med-IAMER.

List of proposed indicators

The following table lists the indicators developed and mapped within Med-IAMER on the impacts of climate change on coastal (land) and marine environments. **The maps, identified by the indicator ID, can be found at the project's web page:** http://www.medmaritimeprojects.eu/section/med-iamer-redirect/outputs

ID	Indicator description
CC01	Combined pressure of climate change (Sea level rise + Sea surface temperature anomalies)
CC02	Pressure in coastal regions due to climate change (exposure to coastal storm surge events and coastal erosion trends)

CC03	Pressure of river flooding on population due to climate change
CC04	Pressure of summer heat on population due to climate change

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