In this study, the three dimensions of risk (Hazard, Exposure and Vulnerability) are quantified by means of case specific indicators from which sectoral climate risk indexes are calculated and mapped with the following general formula:

$$Risk = f(Hazard, Exposure, Vulnerability)$$

The selection of indicators and indexes has been carried out with the support of local stakeholders. The approach adopted herein derives from the Socio-Economic Regional Risk Assessment (SERRA) method developed by the EU Kulturisk Project (Giupponi et al., 2015).

The formula above has been implemented with a combination of multiplicative and multi-criteria operators adapted to the four sectors assessed, i.e., tourism, winter and sport events, the eyewear industry, and the electricity supply. The general rationale of a multiplicative aggregation lays in the evidence that whenever one of the three dimensions assumes a zero value, i.e. with no hazard, or nothing exposed, or no vulnerability, the risk should necessarily be null, or negligible. Concerning the aggregation with multi-criteria operators, it has been applied for vulnerability, to aggregate multiple dimensions of V, i.e. the various - usually socio-economic - indicators used for its quantification and mapping.

The analysis of multiple risks, multiple receptors and multiple climatic scenarios generates a huge number of possible combinations. We opted here for a statistical approach, aimed at providing both synthesis by means of averaged results and maps of risk, and also extensive documentation of the various sources of uncertainty and their effects on final results. Therefore, the results are presented as sets of maps (and related statistical summaries), focused on highlighting the diversity of situations within the study area, taking also due account of the uncertainty deriving from the different data sources considered, such as the multiplicity of possible future scenarios.

This work enriches the literature on climate proofing and spatial planning, by combining high-resolution Regional Climate Model (RCM) data, customer-tailored on the characteristics of the studied area and on the hazards to be analysed, with a solid analysis of the main economic activities. This integrated approach allows estimating the potential damages associated with risks of different kind and magnitude, offering a concrete application of the adopted methodology and potentially supporting stakeholders and policy makers in future decision and investments.