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On the use of climate indicators for strategic planning of natural solutions in French vineyards, the case of St Emilion

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Climate change is one of the major environmental and socio-economic challenges facing sustainable wine production. Saint Emilion, a world-renowned wine growing region is witnessing first-hand a series of weather events related to frost waves, hailstorms, rising temperature and shift in rainfall patterns. Accordingly, through the European Commission funded AgriDataValue project, the implementation of natural solutions, based on fine scale modeling of climatic variables is being sought. Saint Emilion has been chosen as the study area given the presence of existing on-field solutions adopted by winegrowers and supported by the Saint-Emilion wine council to mitigate climate change effect such as improving soil health and fertility using grass strips and enhancing landscape feature and hedges planting. A salt dispersing balloons system was also adopted to fight against hailstorms. In addition, Saint-Emilion has a large network of weather stations and data that are key for understanding better climatic events and for modelling the efficiency of active and passive solutions. However, given the costly nature of the latter, strategic risk-based planning is needed. For this purpose, the MeteoFrance DRIAS and outputs of the CMIP6 model are used. Data is obtained in NetCDF format, then rasterized for subsequent downscaling. By transposing NetCDFs to raster and then points, the gridded rasters become a virtual weather station network, and hence can be considered as a mesh of ?spatial weather stations?. Through specific Bayesian kriging techniques using semi-variograms, the initial 100 km grid is downscaled to 1 km. Following the establishment of the climate indicators, exposure is determined. This framework embodies the first elements of the IPCC risk analysis framework (IPCC, 2014; 2020). As the studied climatic risks will show different spatial-temporal gradients, different grape types and plantations will be affected at different degrees, hence the GIS-based exposure analysis based on their setting with respect to the risk at different horizons. At this resolution, the evolution of the studied risks can be tracked at a fine scale and at different time horizons and climatic scenarios, namely SSP2-4.5 and SSP5-8.5. Accordingly, with this long-term planning aspect and its climate-informed nature, a strategic planning of solutions in areas of different risk levels can be made following a prioritized approach, thus ensuring both short-term and long-term efficiency.

Keywords: AgriDataValue, climate change, active and passive solutions, vineyards

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