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# Sea-level rise and land subsidence of low-lying coasts: the study case of Tavoliere delle Puglie (Southern Italy)

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The ongoing climate changes are determining an increase of sea-level rise with potential effects on the low-lying coasts. Future projections show the sea-level rise scenarios with an increase of about 1 m than present sea level at 2100. These scenarios are of great interest considering that low-lying coastal areas could be fully submerged with annexed damages at the socio-economic activities. This applies for the low-lying coasts particularly affected by subsidence processes, which could be attributed to the anthropogenic impact, in particular those areas influenced by well exploitations, infrastructure and resort buildings, dams and long-coast interventions. In this work, the coastal plain of Tavoliere delle Puglie (Apulia, Southern Italy) was surveyed to assess the impact of sea-level rise at 2100. The main factors considered for the assessment of sea-level rise impact are the following: future sea-level projections, high-resolution topographic data, vertical land movements (VLMs), and erosion rates. The sea-level projections were assessed through the recent climate models of Intergovernmental Panel of Climate Change 2021 for the Gulf of Manfredonia. Topographic data were obtained through Terrestrial Laser Scanner (TLS) surveys for the coastal zone of the Tavoliere delle Puglie and Light Detection and Ranging (LiDAR) for the landward areas. The VLMs were obtained through an integrated analysis between Global Navigation Satellite System (GNSS) stations and Interferometric Synthetic-Aperture Radar (InSAR) data. Erosion rates were assessed analysing the historical maps and aerial photographs and integrating them with TLS and LiDAR data. The topography at 2100 was reconstructed considering the VLM and erosion rate values in order to assess the coastal surface prone to submersion. The submersion surfaces were assessed through a mathematical model that considers the sea-level projections, erosion rates and VLM existing in specific areas. The results highlighted significant submersion in the coastal areas characterized by high land subsidence and erosion rates, with surface loss extending over 1 km landward. In this work, the modelled impact of sea-level rise highlighted the high vulnerability of touristic resorts and socio-economic activities along the coastal plain of Tavoliere delle Puglie.