

Institut Cartogràfic i Geològic de Catalunya (ICGC)

Decision support systems (DSS) for coastal vulnerability assessments

The ICGC does not currently use decision support systems (DSSs) for coastal vulnerability assessments. The ICGC focuses on producing geographic and geothematic outputs, which are made available to policymakers and spatial planners, and also engages in collaborative initiatives.

The ICGC provides a wide range of geographic information in various formats and through web viewers, including topographic maps, digital elevation models (DEMs), bathymetric data, orthophotos (updated periodically and after storms), and geological-geomorphological maps (ICGC, 2025a; ICGC, 2025b; ICGC, 2025c). It also prepares rapid response reports on storm damage and geomorphological maps related to storm surge flooding.

The Digital Shoreline Analysis System (DSAS) is used to calculate shoreline change rates (SCE, NSM, EPR, LRR) based on shoreline data since 1956. The ICGC produces hazard maps in shapefile format for phenomena such as rockfalls and landslides along the entire Catalan coast. These maps serve as tools for technical staff and spatial planners, providing specific recommendations regarding land suitability for construction or infrastructure development.

To analyse flooding and erosion, the ICGC applies the XBeach model and uses a permanent flooding viewer based on bathtub modelling to assess sea level rise impacts under a Climate Change scenario. Another notable product is the subsidence viewer for coastal areas, which relies on data from Sentinel satellites.

Input parameters mentioned in the figure may comprise multiple sub-parameters. For more information on the input parameters see Larsen et al. (2025; Table 1, p 17). For further information on the different approaches see ICGC (2012), Oller et al. (2013), Sanchez et al. (2021), Sánchez-Artús et al. (2023) and Catalan News (2024).

Further reading

Catalan News, 2024. Two-thirds of Catalonia's beaches show long-term regression trends.
<https://www.catalannews.com/society-science/item/two-thirds-of-catalonias-beaches-show-long-term-regression-trends>

ICGC, 2012. What is the Map for the prevention of geological hazards?
<https://www.icgc.cat/en/Mapes-i-geoinformacio/Dades-i-productes/Geoinformacio-geologica/Geological-risks-cartography/GT-VI-Map-prevention-geological-hazards-125000/What-Map-prevention-geological-hazards>

ICGC, 2025a. Subsidence of the coastal area viewer:
<https://www.icgc.cat/en/Thematic-areas/Coastal-area/Applications-and-viewers/Subsidence-coastal-area-viewer>

ICGC, 2025b. PIMA project: Information on coastal flooding and impacts on socio-economic and natural elements:
<https://visors.icgc.cat/PIMA-AdaptaCostas/>

ICGC, 2025c. Permanent flooding viewer due to sea level rise:
<https://www.icgc.cat/en/Thematic-areas/Coastal-area/Applications-and-viewers/Permanent-flooding-viewer-due-rising-sea-levels>

Larsen, I. R., Ernsten, V. B., Maspataud, A., Dakin, N., van Heteren, S., Koutroulli, A., Poyiadji, E. & the GSEU T5.4 Consortium (2025). EGDI multifunctional 2D/3D decision-support module v1. GSEU Report on Deliverable 5.7, 165 pp.

Oller, P., González, M., Pinyol, J., Barberà, M., Martínez, P. (2013). The Geological Hazard Map of Catalonia 1:25,000. A Tool for Geohazards Mitigation. In: Margottini, C., Canuti, P., Sassa, K. (eds) Landslide Science and Practice. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-31325-7_61

Sánchez-Artús, X., Gracia, V., Sierra, J.P., Pinyol, J., Sánchez-Arcilla, A. (2021). PIMA Adapta Costas, a characterisation of flooding and erosion under different climate change scenarios along the Catalan coast. A: International Electronic Conference on Water Sciences. "6th International Electronic Conference on Water Sciences: sessions". DOI 10.3390/ECWS-6-11624

Sánchez-Artús, X., Gracia, V., Espino, M., Sierra, J.P., Pinyol, J. and Sánchez-Arcilla, A. (2023). Present and future flooding and erosion along the NW Spanish Mediterranean Coast. Front. Mar. Sci. 10:1125138. doi: 10.3389/fmars.2023.1125138

