

Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA)

Decision support systems (DSS) for coastal vulnerability assesments

ISPRA does not employ DSSs for coastal vulnerability assessments. However, the DSS Drivers-Pressures-State change-Impact-Response (DPSIR) framework has been used in some Italian studies (Patricio et al., 2016; Bruno et al., 2020).

GIS is the most applied tool. Some studies apply Multi-Criteria Decision Analysis (MCDA) methods which incorporate the Analytical Hierarchical Process (AHP) for weighting of parameters (De Serio et al., 2018; Pagano et al., 2023). Outputs most commonly consist of vulnerability maps.

In many Italian studies, indices like the Coastal Vulnerability Index (CVI) are derived (Aucelli et al., 2018; De Serio et al., 2018; Pantusa et al., 2022; Di Luccio et al., 2023). Further, a Multi-Dimensional Coastal Vulnerability Index was proposed by Furlan et al. (2021).

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).

Further reading

Aucelli, P. P. C., Di Paola, G., Rizzo, A., & Roskopf, C. M. (2018). Present day and future scenarios of coastal erosion and flooding processes along the Italian Adriatic coast: The case of Molise region. *Environmental Earth Sciences*, 77(10), 1–19. <https://doi.org/10.1007/s12665-018-7535-y>

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Di Luccio, D., Aucelli, P. P. C., Di Paola, G., Pennetta, M., Berti, M., Budillon, G., Florio, A., & Benassai, G. (2023). An integrated approach for coastal cliff susceptibility: The case study of Procida Island (southern Italy). *The Science of the Total Environment*, 855, 158759. <https://doi.org/10.1016/j.scitotenv.2022.158759>

De Serio, F., Armenio, E., Mossa, M., & Petrillo, A. F. (2018). How to define priorities in coastal vulnerability assessment. *Geosciences (Basel)*, 8(11), 415. <https://doi.org/10.3390/geosciences8110415>

Furlan, E., Pozza, P. D., Michetti, M., Torresan, S., Critto, A., & Marcomini, A. (2021). Development of a multi-dimensional coastal vulnerability index: Assessing vulnerability to inundation scenarios in the Italian coast. *The Science of the Total Environment*, 772, 144650. <https://doi.org/10.1016/j.scitotenv.2020.144650>

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

Pagano, M., Ferneti, M., Busetti, M., Ghribi, M., & Camerlenghi, A. (2023). Multicriteria GIS-based analysis for the evaluation of the vulnerability of the marine environment in the Gulf of Trieste (north-eastern Adriatic Sea) for sustainable blue economy and maritime spatial planning. *People and Nature (Hoboken, N.J.)*, 5(6), 2006–2025. <https://doi.org/10.1002/pan3.10537>

Pantusa, D., D'Alessandro, F., Frega, F., Francone, A., & Tomasicchio, G. R. (2022). Improvement of a coastal vulnerability index and its application along the Calabria coastline, Italy. *Scientific Reports*, 12(1), 21959. <https://doi.org/10.1038/s41598-022-26374-w>

Patricio, J., Elliott, M., Mazik, K., Papadopoulou, K. N., & Smith, C. J. (2016). DPSIR—Two decades of trying to develop a unifying framework for marine environmental management? *Frontiers in Marine Science*, 3, 177.

