

## Hellenic Survey of Geology & Mineral Exploration (HSGME)

### Decision support systems (DSS) for coastal vulnerability assessments

HSGME is not currently applying DSS to assess coastal vulnerability. However, this approach is adopted by partner research institutes in Greece. Specifically, the National and Kapodistrian University of Athens (NKUA), has developed a DSS for coastal vulnerability assessments, with a focus on addressing hazards like coastal erosion, inundation, and sea-level rise. The system, which is primarily based on GIS software, combined preferably with field measurements and observations, analyses spatial data to evaluate current conditions, identify risk factors, and propose mitigation strategies. The relevant parameters are weighted. As the DSS is developed for a regional domain, the weighting of the individual parameters may change from area to area, depending on local factors such as geology, coastal morphology and how they interrelate), as well as the availability of data and time for processing. To assess coastal vulnerability, the system produces a Coastal Vulnerability Index (CVI) as well as coastal erosion maps, providing valuable insights into risk levels and necessary protective measures.

All these data and insights are necessary for integrated coastal zone management, including application of mitigation strategies and protection measures. When unavailable and missing, these data should be collected or generated (e.g. using GIS), because they all affect the coastal zone evolution and the efficiency of any applied measure. Skipping or simply estimating any of those data is highly avoided, and accurate measurements are to be done to acquire them.

Upon comparison of the results with field observations, historic trend of shoreline evolution, as well as reports of past inundation or erosion events and phases, the DSS is used to both evaluate the current and future situation of the coastal zone. It is used to identify both natural and human-induced factors that affect the shoreline and may provoke or hinder coastal hazards, as well as their interactions. The final assessment of the DSS, combined with spatial (GIS) analysis and field observations, is used to identify measures and mitigation strategies that can potentially be applied to ensure coastal protection and sustainability, as well as evaluate their efficiency in connection to the implementation cost (before and after implementation).

Artificial Neural Networks have so far been used in runoff erosion hazard assessments, but the plan is to apply them in coastal vulnerability assessments as well.

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 readings:

Larsen, I. R., Ernstsén, 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.

