

## **A methodological approach to assess beach-dune system susceptibility to erosion. Cases studies from Valdelagrana spit (Spain) and Campomarino beach (Italy).**

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Dunes provide many important services to coastal areas, such as coastal erosion mitigation, coastal flooding protection and biological diversity. Their dynamic equilibrium and geomorphological evolution are the result of the interaction between marine and aeolian processes. Moreover, coastal dunes are characterized by a high ecological value, being a narrow strip between marine and terrestrial ecosystems and are habitats considered of community interest by the Habitats Directive 92/43/EEC.

In the meantime, the significant increase of human pressure on coastal environments during the last decades has caused a strong alteration and an increase of the fragility and fragmentation of these habitats.

This paper presents a methodological approach for the assessment of the beach-dune system susceptibility to erosion. The aim is to identify, at the local scale, the degree of susceptibility of coastal stretches in order to evaluate the degree of exposure of human settlements and natural environments located behind the dune system and to support actions to appropriately improve dune management and conservation.

A coastal susceptibility matrix and a corresponding Coastal Susceptibility Index (CSI) are proposed. Following the assumption that a good index should be based on a minimum amount of essential information (Cooper and McLaughlin, 1998), possibly already available or easy to be obtained (Villa and McLeod, 2002), the proposed index consisted into eight variables concerning existing beach and dune conditions, covering geomorphological, physical and anthropogenic aspects. Each variable was inserted into a GIS system and overlapped with the others through a logical overlay operation. The resulting layer was reclassified according to the formula proposed by Rangel and Anfuso (2015) allowing to calculate the CSI, which ranged from 1 (null/very low susceptibility) to 5 (very high susceptibility). In a further step, the predominant processes occurred in the last decades were considered by taking into account the medium term evolution (approx. 30 years) of the dune toe and dune vegetation cover.

The proposed methodology was tested for two coastal sectors with different physiographic and marine conditions and different land use characteristics: the Valdelagrana beach and the Campomarino beach that are respectively located in the eastern part of the Gulf of Cadiz (Spain) and in the southern part of the Molise coastal stretch (Italy). Preliminary results show that the methodology allows identifying within the studied coastal sectors coast stretches with different degree of susceptibility. It is furthermore very advantageous as it requires parameters mostly already available through photo-interpretation, therefore it is easy to apply without requiring field surveys as do many other index-based methods.