

## Best Poster Presentation at Environ 2023 Winner: Silvia Cascone, University of Galway

### Coastal Dune Vulnerability Assessment as a Proxy for Nature-based Solution in Ireland

Coastal dunes are recognised as one of the most threatened ecosystems, at both global and European level. They are dynamic habitats that act as a natural buffer against storm surge, waves and erosion and they host highly specialized flora that has the unique capacity to shape the dune system. There is a growing realisation that long-term solutions to climate change impacts in coastal ecosystems will be primarily Nature-based Solutions (NbS). However, the potential of coastal dunes to act as a NbS strictly depend on the 'state' of the system. There are currently several approaches to evaluate the state or quality of beach-dune system: habitat-based assessments and vulnerability type assessments. Finding a rapid and repeatable methodology to assess the vulnerability of these ecosystems is now a priority in conservation strategies to support management decisions and maintain coastal dune resilience.



Figure 1. Coastal Dunes at Dooney, Co Donegal

The coast of Ireland is highly heterogeneous and is strongly influenced by physical, biotic and human pressures. A better understanding of these complex processes is necessary to evaluate the vulnerability of coastal habitats and to sustainably manage the existing dunes.

For the work presented at Environ 2023, we selected eight sites in the NW of Ireland and used 273 random vegetation plots (Fig2) and ordination analysis to quantify vegetation dynamics, and to identify the main habitats of conservation interest. The Dune Vulnerability Index (DVI) was utilised to determine the level of vulnerability of each site and the strongest drivers involved. We also used the classification obtained to observe additional differences in species and landscape metrics.



*Figure 2. Example of random vegetation plots.*

Preliminary results recognised three main habitats: fixed dunes, foredunes and embryo dunes, together with transitional and more disturbed groups. The sites were characterised by different levels of vulnerability, with the geomorphological, vegetation and human indicators being the most relevant drivers. Differences were also found in species and habitat fragmentation between sites. Therefore, to evaluate the vulnerability and the conservation status of coastal dunes, it is important to implement a more flexible methodology capable of prioritising the dynamic nature of these ecosystems and the complex network of disturbances. Working and understanding natural processes is an essential step to improve conservation actions and Nature-based Solution strategies able to preserve and restore coastal dune habitats in Ireland.

Future developments of the project include: exploring the functional strategies adopted by coastal plants to improve resilience, identify natural and anthropogenic drivers of plant diversity, testing different methodologies to implement Nature-based Solution techniques.

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