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## Coastal wetlands and seagrass dynamics with environmental change

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Hard engineering solutions are becoming economically unviable due to the high costs of construction, maintenance and adaptation to changes in sea level and storms. 'Engineering with Nature' (including the creation of salt marshes, seagrass beds) offers a more economically viable alternative for coastal protection.

However, despite the growing recognition of the necessity to move towards this greener alternative for coastal protection, there are still large uncertainties about factors determining the resilience of these systems to environmental change. As a consequence of sea-level rise, and of the increased occurrence of extreme weather conditions, coastal habitats are at risk of degradation and possible recession. Human interactions add a layer of complexity to natural processes. Among the others, the sediment delivery to coastal areas has significantly changed over the years, for instance due to changes in catchment management, with consequences for the resilience of coastal systems.

This work uses numerical models to investigate the morphological and hydrodynamic features of coastal systems with environmental change. These numerical tools consist of hydrodynamic models coupled with morphological and sediment transport modules. Results investigate feedbacks between the shape of existing shorelines, wetlands resilience and external forcing such as tidal currents and wind waves. Results provide information useful for the study and management of 'Engineering with Nature' interventions and highlights the importance of a whole-system approach for the correct management of coastal areas.