



A sustainable alternative for coastal dune restoration by sand-trapping fences and algae wrack: AlgoBox[®]

Mouncef Sedrati

University South Brittany, LGO UMR CNRS 6538, Vannes, France (mouncef.sedrati@univ-ubs.fr)

Shorelines are the locus of significant and diverse economic activity as well as ecosystem services and conservation interest. At a time of global climate change and sea level rise, the type of management being implemented has direct influence on the future of the shoreline and its resources. Several approaches can be taken, but in practical terms, the overwhelming response has been, and continues to be, to armour or nourish the shoreline and prevent it moving. This removes the shoreline's natural resilience, damages the coastal ecosystem and the resources it provides, and has a direct economic cost (in design, construction and maintenance) and indirect costs (through its impact on recreation, scenic quality, tourism potential and several other economic activities).

The coast of south Brittany in France is subject to severe erosion. This coast is characterized mainly by seacliffs and headland embayed and pocket beaches with a "low-tide-terrace" active morphology. Wrack deposits (macroalgae: mainly *Soleiria Chordalis*) also form significant seasonal accumulations on the beaches, thus impacting their morphology and ecosystem. Because of the absence of sediment stocks that could be used for beach nourishment, shoreline management has had recourse, thus far, to "hard" engineering techniques to hold the coastline. The use of "soft" engineering techniques to protect dunes and beaches in south Brittany has been limited to the implementation of sand fences on the dunes to limit human access to these fragile systems. The aeolian sediment transport potential, with a relative abundance of onshore winds on this coast, has unfortunately been under-exploited.

In order to gain maximum profit from the aeolian transport potential and from the nutrient release generated by wrack decomposition (which may facilitate plant growth and sediment fixing), we proposed an experimental tool, the "AlgoBox", which consists in sand-trapping fence cases filled by wrack after partial aeolian sand deposition. The fixing of sand in the "AlgoBox" by vegetation colonization is facilitated by the nutrients released by wrack decomposition during spring and summer seasons (Sedrati and Cochet, 2015).

This paper presents the design and evaluation of the "AlgoBox" system which has now been successfully experimented at two sites in South Brittany coast (Penvins beach since July 2014 and Kerjouano beach since June 2016) including the regular topographic dune-beach profile surveys, algae wrack decomposition and nutrient generation, vegetation colonization processes and future considerations for the optimal design and improvement of the system as a new tool for ecological engineering of beach-dune systems.