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The use of mine spoils in the quarries restoration in Mediterranean environments: problems for revegetation

Montse Jorba¹, Lorena Diez²

¹University of Barcelona, BARCELONA, Spain

In quarry restoration, the spoil materials are commonly used as substrate for restoration of the affected areas. These substrates have a high stoniness that determines their hydric functioning and amount of water reserve. However, revegetation actions often promote seeding with commercial herbaceous of fast growth and high water requirements. The combination of stony substrates and dense herbaceous cover can limit the efficiency of woody plantations. This project aims to establish treatments to reconcile stony substrate water limitations with woody plantations. The mastic (*Pistacia lentiscus*) has been used as reference woody species, that has been planted in containers of 25 L with stony substrates where different treatments have been tested. A treatment series is intended to determine the effectiveness of the application of different types of mulch in reducing herbaceous development and water conservation in the system. Another series of study concentrates on establishing whether seedling with a commercial herbaceous species (*Festuca arundinacea*) or with native species (*Brachypodium phoenicoides*) can determine differences on system evapotranspiration.

The results show that during a period of drought, soil water loss is much faster and higher when there is herbaceous cover, although there are no differences between herbaceous species tested. Mulch materials, gravels in single or double dose, or pine bark, determine a lower water loss compared to controls without mulch. However, bark is more effective than gravel though economically more expensive. The obtained information can improve the revegetation process of stony substrates, which are usual in quarry restoration. The extractive sector would be the main beneficiary of the results.

O-15.4

Ecosystem restoration by temporary facilitation of coastal vegetation and shellfish reefs using biodegradable habitat structures

Wouter Lengkeek¹, Karin Didderen², Ralph Temmink², Greg Fivash³, Malenthe Teunis¹, Christine Angelini⁴, Tjeerd Bouma³, Tjisse Van der Heide³

¹Bureau Waardenburg / Radboud University, CULEMBORG, Netherlands

³NIOZ, YERSEKE, Netherlands

⁴University of Florida, GAINESVILLE, USA

Worldwide, coastal zones are increasingly at risk from flood disasters due to climate-induced sea-level rise and increased storm intensity. Growing recognition of the importance of nature-based flood defense for coastal protection has created a need to restore degraded coastal wetlands in flood-prone areas. Establishment of the foundational species that engineer these systems is however hampered by physical and biological thresholds. Restoration of these habitats is very challenging, because self-sustaining feedbacks generated by habitat-structuring organisms, only work beyond a certain minimum patch size and density.

To overcome this threshold, we developed innovative multi purpose ecosystem restoration elements (BESE-elements). One essential feature of these multi purpose elements is their biodegradability. They are designed to temporarily provide essential habitat characteristics for new settlement of foundational species. After successful recruitment and growth, the adults will provide these habitat characteristics and there is no more need for artificial structures, hence the elements can degrade.

We tested restoration of several foundational organisms by using BESE-elements in multi-year field experiments. Quantitative experiments where performed with intertidal blue mussel beds (*Mytilus edulis*), salt march vegetation dominated by *Spartina anglica* and beds of the Eastern oyster (*Crassostrea virginica*). Furthermore, proof of principle trials where performed with mangrove species and aquatic vegetation species (both submerged and emergent).

Our experimental results show that the BESE-elements can facilitate recruitment and multi year survival of several foundational organisms, among which are blue mussel beds, salt march vegetation and Easter oyster beds. This was always tested against controls without artificial structure that yielded no recruitment or much poorer survival. It also became apparent, however, that for each species specific deployment techniques of the artificial structures are essential for restoration success.

We conclude that the use of temporary establishment structures is a promising approach for the recovery of vital coastal ecosystems and their services.

Posters

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The effects of seismic lines on soil properties and permafrost in peatlands of NW Alberta

Anna Dabros¹, Anna Pinzon², David Langor²

¹Natural Resources Canada, OTTAWA, Canada