

Effects of abiotic variables in determining the differences in vegetation between artificial and natural salt marshes in the Venice Lagoon

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Monitoring the outcomes of ecological restoration and understanding the factors affecting its effectiveness is fundamental to improve future interventions. Over the past few decades, the Venice Lagoon underwent large-scale saltmarsh restoration, yet few published studies examine restoration outcomes in a critical manner. Here, natural and artificial saltmarshes often present widely different plant communities and the ‘naturalization’ process of artificial saltmarshes can be slow or incomplete. Four pairs composed of a natural and a neighboring artificial saltmarsh were monitored to explore the relationship between vegetation and abiotic variables such as soil elevation, redox potential, granulometry, bulk density and organic matter content. Vegetation was explored through visual identification in 10 quadrats per marsh, measuring the abiotic factors in each quadrat. Multivariate statistics was applied to explore the differences between natural and artificial saltmarshes, while Generalized Linear Mixed Models (GLMM) allowed to understand which abiotic variables were shaping species distribution. Artificial marshes displayed higher elevations and lower organic matter content, and the vegetal communities in natural and artificial saltmarshes were significantly different, including a higher percentage of bare soil in artificial marshes. GLMMs allowed us to explore how halophytic species distribute along gradients in abiotic variables and showed that various factors contribute significantly to the difference between communities: elevation, organic material content and granulometry all strongly shape saltmarsh vegetation. These results give important insights on the relationships between vegetation and abiotic variables that can be translated in practical indications for the construction of better artificial saltmarshes in the future.