Relationship between seagrass traits and PES strategies with ecosystem functions along environmental gradients

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One of the central tenets of trait ecology is the plant economic spectrum (PES), which describes plant strategies along a continuum from fast resource acquisition to resource conservation. According to the PES, species and populations within species respond to environmental gradients by adopting either acquisitive traits for fast resource acquisition and growth or conservative traits for stress and disturbance resistance. Although the PES approach is widely used in terrestrial systems, its application is just starting in marine ecosystems.

Here we explore if the PES theory also applies to seagrasses, as they are known to align along an axis from fast-growing, low resistance to disturbance to slow-growing, high resistance to disturbance. This study examines how the three seagrass species co-occurring in the Venice Lagoon (Italy), *Cymodocea nodosa*, *Zostera marina*, and *Zostera noltei*, vary in their functional traits and productivity along environmental and urban gradients. Plants were collected in April, June, and August 2024 at six sites across the lagoon in urban and non-urban areas to assess: shoot density and biomass, oxygen production, photosynthetic efficiency, traits related to plant ecological strategies (e.g., specific leaf area and leaf dry matter content), carbon and nitrogen content of leaves and root material, and carbohydrate storage. Additionally, we investigated the epibiotic communities growing on seagrass leaves to understand to what extent seagrass traits drive epiphyte cover. The outcomes will provide insight into how trait variations relate to the temporal stability of key functions such as primary production and on how seagrasses adapt to relevant environmental gradients.