Ecophysiological responses of coastal forests to groundwater changes: comparing functional groups and climatic regions.

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Groundwater alterations, particularly lowering, will affect ecosystems sensitive to water limitation as coastal dune forests. This can produce dramatic changes in plant communities, on physiological performance or survival of plant species. The additional impact of drought due to climatic change on groundwater-dependent ecosystems has become of increasing concern since it aggravates groundwater reduction impacts with consequent uncertainties about how vegetation will respond over the short and long term. Sand dune plant communities encompass a diverse number of species that differ widely in root depth, tolerance to drought and capacity to shift between seasonal varying water sources. Plant functional groups may be affected by water distribution and availability differently. We aim to evaluate in different climatic regions (Tropical, Meso-mediterranean and Mediterranean) the responses of different coastal plant functional groups to changing groundwater availability. The present isotopic approach (leaf $\delta^{13}C$, xylem+water sources $\delta^{18}O$, leaf $\delta^{15}N$) was used as a tool to assess physiological performance and water strategies integrated in spatio-temporal water dynamics. Groundwater modeling was developed to assess the availability of groundwater in our study areas. Furthermore, this isotopic spatial approach provided the possibility to find general patterns of responses and predict effects of water availability changes.