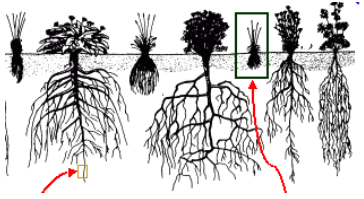
Responses of dune forest ecosystems to changing groundwater availability: from Tropics to Mediterranean – *GWTropiMed Project*

Cristina Antunes [1,3], Mauro Lo Cascio [1], Otília Correia[2,1], Simone Vieira [3], Maria Cruz Barradas [4], Maria Zunzunegui [4], Maria João Pereira[5], Cristina Máguas [2,1]

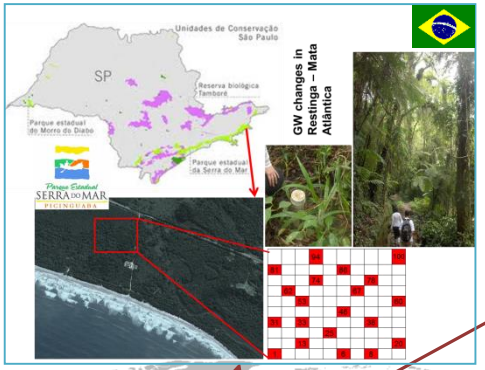
Groundwater (GW) alterations are important to vegetation as can produce dramatic changes in plant communities, on physiological performance or survival of plant species. GW lowering and surface water diversions will affect vulnerable **coastal dune forests**, ecosystems particularly sensitive to **GW limitation** and inevitably affect groundwater-dependent species at ***Tropical***, ***Meso-mediterranean*** and ***Mediterranean*** areas where future climate change is predicted to drastically change water availability.

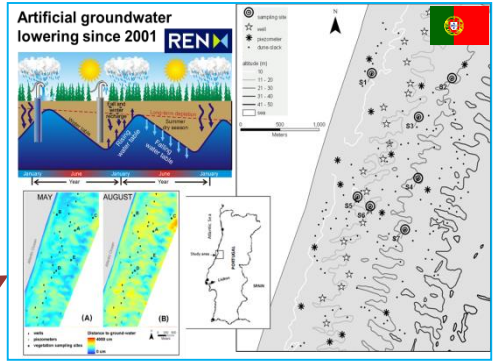
The aim of the study is to evaluate, along a climatic gradient, the capacity of different plant communities to adapt to GW future scenarios and define GW stress indicators

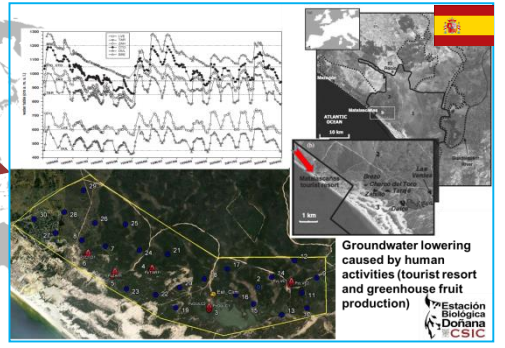


H_1:Physiological responses of plant functional groups changes due to water availability changes

H_2:Short- and long-term ecophysiological GW limitation stress indicators can be integrated in spatio-temporal water dynamics.







Task 1	Task 2	Task 3	Task 4
Installation of experimental plots; Characterize and understand plant functional groups water use in a GW limitation situation in a climatic gradient	Understand ecophysiological responses of functional groups in a GW gradient and define suitable **short-term stress indicators** in GW limitation scenarios, using stable isotopes (leaf ^{13}C and xylem ^{18}O) and photosynthetic indices as the main approach	Estimate important factors that could function as GW **long-term stress tracers** and evaluate long-term stress sensitivity of the functional groups to temporal changes in water availability, through the use of **tree-ring** isotopic signal (^{13}C and ^{18}O) as an archive tool	Develop a model to evaluate community water use and response under future groundwater change scenarios through ecophysiological parameters

This approach will ultimately contribute to trace GW stress in coastal dune forests in an early stage and help to manage vulnerable communities in a global perspective