



Structural overshoot and post-drought recovery depend on site and species-specific characteristics in Mediterranean mixed forests

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Increasing drought severity can affect the healthy status of forests and determine changes in structural and ecophysiological responses to such extreme climate events. Reduced canopy cover, productivity and tree growth and recent dieback phenomena are widespread responses to drought. However, favourable climatic conditions can improve the post-drought recovery capacity of forests, but also make them vulnerable to drought damage through structural overshoot by altering the root to shoot ratio due to wet conditions. Due to the lack of integrated and retrospective field data, the patterns and responses of forests to wet-dry climate variability are still poorly understood. In this work we used remote sensing data (NDVI) to characterise the canopy conditions and combined them with field and tree-ring width data to assess the effects of the summer 2017 drought on Mediterranean tree species in southern Italy (*Fraxinus ornus*, *Quercus pubescens*, *Acer monspessulanum*, *Pinus pinaster*). By comparing radial growth and resilience indices we found that growth responses to drought depended not only on tree species but also on site conditions. Overall, the growth decline due to drought was followed by a rapid recovery, while negative legacies to drought were found at lower quality sites, which corresponded to sites with the lowest NDVI values. Indeed, trees at these sites showed high growth rates before drought, in response to wet winter-spring conditions, and then suffered more from drought stress. Our results demonstrated how structural overshoots predisposes to drought damage and induced negative legacies. Specific knowledge on the effects of drought overshoot over time is important for analysing and understanding current forest responses and dynamics.