



Acronym	TREAD
Full Title	Tracking Resilience and Early Assessment of Disturbances: an automated early-warning system for forest vulnerability using functional traits and thermal remote sensing
Partner(s)	Agencia Estatal Consejo Superior de Investigaciones Científicas, Spain (<i>coordinator</i>) Universidad de Córdoba, Spain CoLAB ForestWISE UTAD, Portugal
Grant Theme	Characterization of European forest disturbances
Start Date	May 2024
Duration	24 months
Description	Forest decline caused by biotic and abiotic disturbances poses a severe risk to ecosystems, with devastating economic and environmental consequences. Early detection of disease symptoms is crucial for managing and mitigating forest die-offs through precision forestry. However, developing early-warning models remains challenging due to limited knowledge of the physiological changes affecting plant traits (PTs) under stress Remote sensing-derived PTs have shown great potential in quantifying vegetation structure and biochemical composition, offering insights into susceptibility to pests and early-stage disease symptoms. However, their specific responses to different stressors remain poorly understood, as do the spatial and temporal transferability of detection models, limiting their effectiveness in predicting forest decline. The TREAD project aims to overcome this limitation by identifying key PTs and establishing reference values for healthy trees in two major European forest formations: conifers (<i>Pinus</i> spp.) and oak species (<i>Quercus</i> spp.). These are sampled along a climatic gradient in Portugal and Spain, in areas affected by water stress and diseases such as <i>Phytophthora</i> root rot and Pine wood nematode. By integrating real-time data acquisition from remote sensing, field measurements, and physical models, the project will establish a quantitative baseline for healthy trees. This will enable precise comparisons with trees at different decline stages, facilitating the early detection of critical forest alterations. Ultimately, TREAD will enhance forest conservation strategies and improve the management of large-scale decline processes.



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