

G-06-2024			
Project	Beneficiary	Activity	Duration
EnhanceForMed	Hellenic Agricultural Organization - DIMITRA Greece University of Patras, Greece	Mediterranean regions face persistent droughts and heatwaves, impacting the environment, society, and economy. Greece, a climate change hotspot, is especially vulnerable, with rising temperatures, reduced precipitation, and more frequent droughts affecting its forests. Assessing climate change's impact on trees and forests is key to understanding ecosystem resilience and help decision-makers to implement sustainable ecosystem management and nature-based climate mitigation. This research aims to nowcast the health and resilience of key Mediterranean forests in Greece and establish mechanistic links between ground based-measurements and remote-sensing evidence collected with aerial (UAV) and satellite techniques. Objectives include (O1) establishing systematic ecohydrological observations at sites within larger monitoring networks (ICP Forests, LTER), including tree-level monitoring and ecosystem-level field surveys (UAVs), (O2) providing real-time data on key ecohydrological processes, and (O3) nowcast ecosystem resilience to environmental stressors. To achieve these goals, four strategic monitoring sites have been selected: a fir-dominated mountainous forest in Evrytania, a Mediterranean sclerophyllous forest dominated by Quercus ilex in Varetada (Amfilochia), a mesophytic deciduous forest dominated by Quercus frainetto in Ossa (Thessaly) (all three part of ICP Forests Level II network), and a coastal Aleppo pine forest at the Sani Environmental Observatory in Chalkidiki (part of eLTER). The proposed research will enhance infrastructure at these sites, establishing a standardized ecohydrological monitoring framework for nowcasting Mediterranean ecosystem pulses and assessing their health and	Start: 5/ 2025 18 Months

		resilience to global change and will link ground-based observations with ecosystem-level surveys and remote sensing products.	
MONIMATSCH	Eurac Research, Italy	European mountain forests provide essential ecosystem services but face significant challenges due to climate change, such as elevated temperatures, more extreme weather events and more frequent disturbances. To assess the impact of changing climate conditions on tree growth and water use we established an elevation transect of forest research sites including four different conifer species (<i>Larix decidua</i>, <i>Pinus nigra</i>, <i>Picea abies</i>, <i>Pinus cembra</i>) within the LTSER platform Matsch Mazia in an inner-alpine dry valley in the Northern Italian Alps. These sites are equipped with automatic dendrometers, sap flow sensors, and microclimate stations Through this project we aim to integrate our sites into the European ForestWard Observatory for stress nowcasting. To this end we will update our dendrometers and integrate our remotely accessible soil moisture and microclimate sensors into the project data base. Additionally, we will combine classical forest mensuration according to the Italian National Forest Inventory, with hemispherical canopy photography, UAV-based and airborne LiDAR to analyze forest structure and carbon stock in detail at plot-, stand- and regional scale. Finally, we will set up litter traps and measure soil physical properties and nutrient availability to get information on carbon and nutrient cycling. Overall, this project will provide nowcasting stress data and enhance the understanding of its causes and consequences for some of the most abundant and important conifer species in the Alps from a transect reaching from water-limited conditions at the valley floor to a temperature-limited ones at the forest line.	Start: 4/ 2025 18 Months

NoBoCo	University of Helsinki, Finland	This project aims to set a network of pilot plots to nowcast the dynamic responses of Scots pine and Norway spruce, the two main conifer species in the European boreal region, to environmental stressors, with a focus on potential drought, heat and frost damage. Furthermore, it seeks to enhance the understanding of how individual tree responses contribute to broader forest structure and biomass in the boreal conifer forest. The research will utilize N12-T-WP point dendrometers equipped with the DecentLab LoRaWan system for real-time measurements, following the Swiss TreeNet design. Trees will be selected from three supersites and four supporting sites in two biogeographic regions: the Finnish Southern Boreal and Northern Boreal Forest regions, ensuring representation of both species in mixed and monospecific plots. Environmental data, including soil water potential, water content, soil and air temperature, and humidity, will be continuously measured and integrated into the TreeNet data servers. Data processing follows the workflow of the Swiss TreeNet to derive dendrometer data derivatives such as growth and tree water deficit. Further manual assessment and cleaning will be conducted to assess potential frost damage. Tree biomass of the studied plot will be assessed allometrically and using terrestrial laser scanning. Hyperspectral imaging from unmanned aerial vehicles will facilitate scaling from Tree to ecosystems. The study also integrates eddy-covariance systems to quantify the impact of tree response to stress to gas exchange between forest plots and the atmosphere. This network of sites will thus contribute to nowcast boreal forest response to the environmental stressors.	Start: 4/ 2025 18 Months
ROAKS	Institutul Național de	The ROAKS project aims to enhance the understanding of climate change impacts on Central Eastern European oak forests. By integrating advanced	Start: 4/ 2025

	Cercetare-Dezvoltare în Silvicultură "Marin Drăcea", Romania	monitoring techniques, the project will assess oak tree responses to stressors such as drought, pests or insect disturbances. The research will be conducted in two key ICP Forests oak plots and four supporting sites, providing insights into forest resilience and contributing to the ForestWard Observatory initiative. The objectives include enhancing the ROAKS network, applying the Air-Water-Soil-Tree (AWST) Nexus through field measurements and remote sensing, and ensuring long-term monitoring data in near real-time. By involving fieldwork in diverse climate conditions, ROAKS will enhance our understanding of climate impacts on forests. The integration of the AWST Nexus into the existing ICP Forests system will create new research opportunities for European forest monitoring, supporting adaptive management strategies and contributing to the long-term conservation of European forests. By using remote sensing technologies and standardized methodologies, ROAKS will provide temporally dense information on soil moisture, tree ecophysiological responses, and carbon storage. The project will also facilitate collaboration and knowledge exchange within international networks, enhancing the scalability and representativeness of the findings.	18 Months
WestWard	Technical University of Munich, Germany Greifswald University, Germany	The extraordinary dry periods between 2018 and 2022 highlight that European forests face increasingly dry and warm conditions, affecting their growth and vitality. Combining near real-time ecophysiological ground truth with satellite-borne remote sensing allows for identifying early-warning indicators of tree stress to support informed forest management. WestWARD aims to establish a unique pilot network of whole-forest stand monitoring sites across Central-West Europe to assess the impact of climate and climate extremes using a tree-centered approach with state-of-the-art dendrometers. We focus on measures of tree water storage and growth to assess climate impacts on phenology, drought stress, and intra-annual biomass production.	Start: 4/ 2025 18 Months

	Bayerische Landesanstalt für Wald und Forstwirtschaft, Germany Landesforst Mecklenburg-Vorpommern, Germany	WestWARD's objectives are to i) upgrade existing monitoring networks with fixed-plot designs, ii) translate dendrometer signals recorded at the stand level to remote sensing signals, and iii) quantify climatic impacts on tree phenology, drought stress, and productivity across a maritime-continental climatic gradient spanning four long-term monitoring plots. WestWARD will deploy novel methods and software including AI and a large swath of dendrometers which allows for sub-hourly stand-level monitoring of ecophysiological important parameters with 80+ dendrometers per site. Four super-sites will be installed across a continentality and moisture gradient in Germany, from Sub-alpine to Continental climates, in addition to benchmarking activities at TreeNet (Switzerland) and WALD-Puls (Germany) sites, thereby providing the critical missing link between tree and stand-level monitoring. WestWARD will be a decisive step towards our ambitions to monitor European forest status in near-real time and pave the way for generating public awareness and supporting management and conservation actions.	
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