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Mapping fractional shrub cover for predicting wildfires and protecting forest

El Khalil Cherif , Ricardo Lucas , TahaAit Tchakoucht, Ivo Gama , Inês Ribeiro , Tiago Domingos and VâniaProença

About Us

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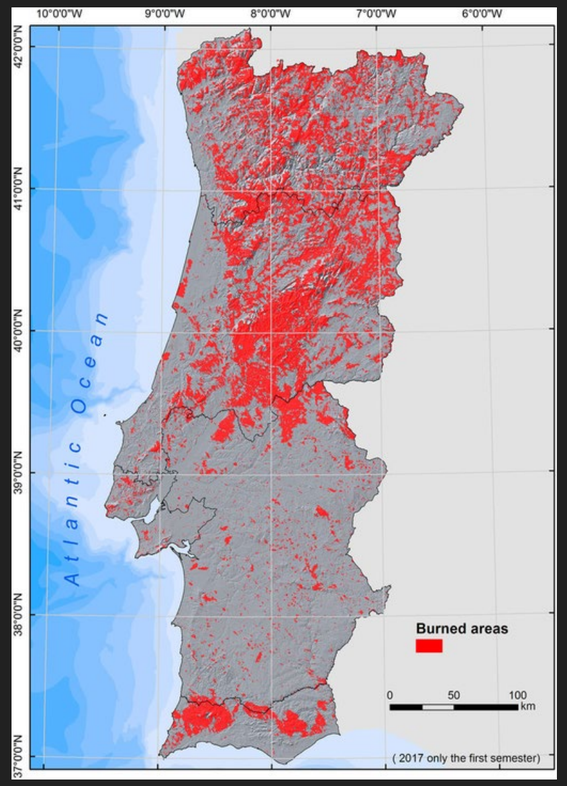
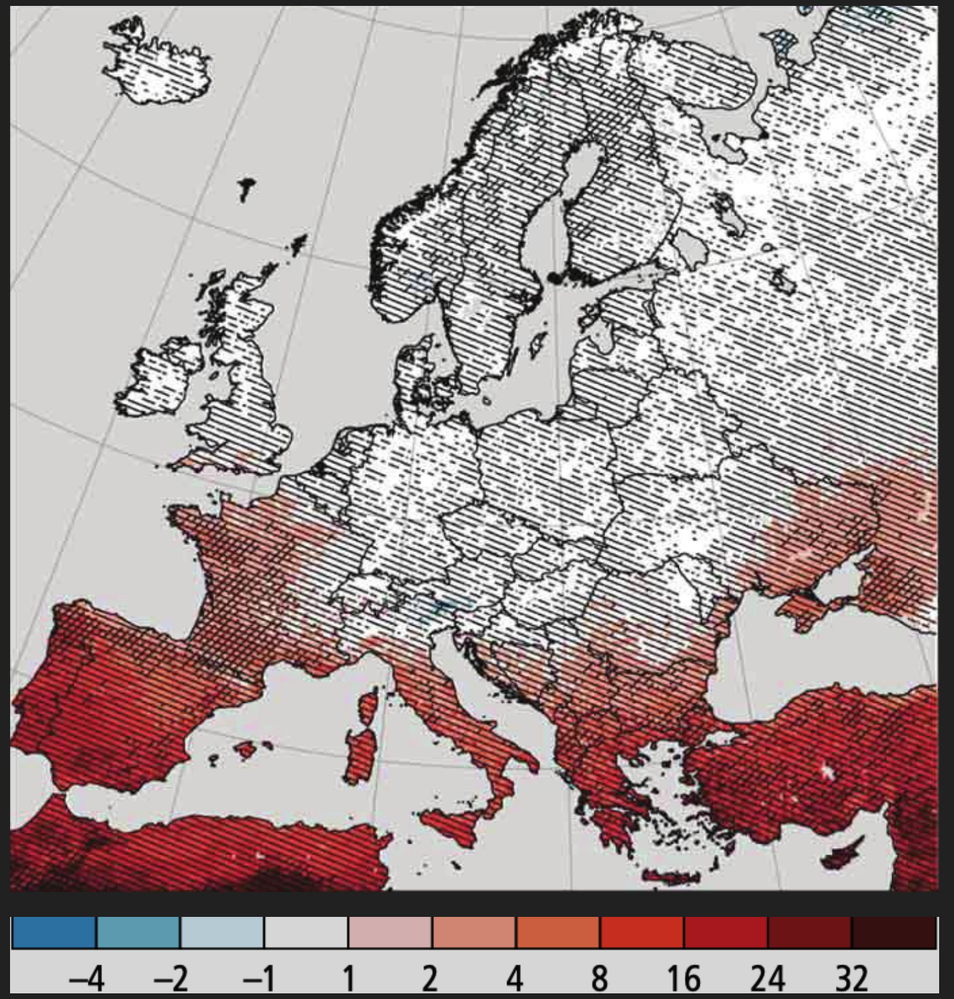
Problem motivation

The **risk of wildfires** is becoming increasingly frequent and severe in Mediterranean landscapes.



Meneses, B. M., Reis, E., & Reis, R. (2018). Assessment of the recurrence interval of wildfires in mainland Portugal and the identification of affected LUC patterns. Journal of Maps, 14(2), 282–292. https://doi.org/10.1080/17445647.2018.1454351



Changes in the 95th percentile of the length of dry spells (days) 2071–2100 compared to 1971–2000, under the RCP8.5 climate scenario

Taken from the Europe chapter of the AR5 WGII

563,532

Hectares burned in Portugal in 2017

+120

Deaths in Portugal in the 2017 wildfires

60 % of all the CO2 emissions

Agriculture, Pastures, Forests and Scrubland absorbed -12% of CO2 emissions


145,763
hectares burned in Portugal in 2024
Seven people have died and 169 have been injured in just three days

Populations at **disproportionately higher risk** of adverse consequences with wildfires and beyond include **disadvantaged** and **vulnerable** populations, particularly in areas such as dryland regions

Photo taken during the 2017 wildfires in Portugal

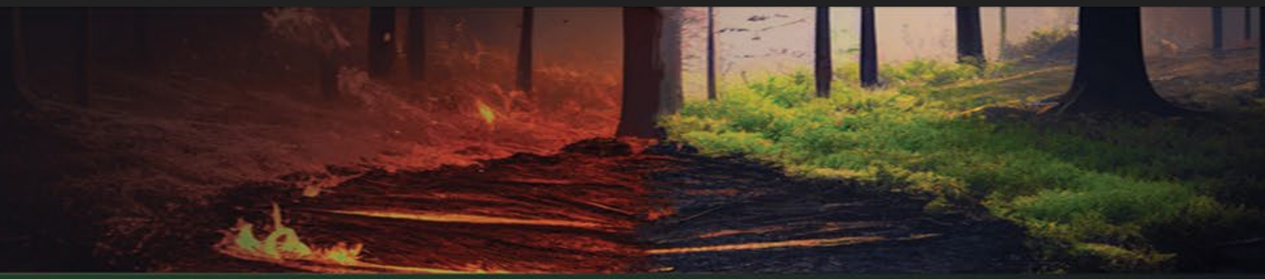
A satellite image from Copernicus Sentinel-3 in Sept, 17, 2024 showed a massive smoke plume from the wildfires, stretching over 100,000 km² across the Atlantic Ocean.

The impact of wilfires on Polution

SILVANUS

European Green Deal Project For Wildfire Management and Climate Change

Modern and Innovative Protector against Extreme Wildfire, For the Benefit of Forests and Humankind



SILVANUS is a Horizon 2020 Green Deal project, whose main objective is to create a climate resilient forest management platform to prevent and combat forest fire in three distinct phases.

IMMERSE YOURSELF IN THE WORLD OF SILVANUS!

Citizen engagement is a vital branch in the development of our platform!

PHASE A

PREVENTION AND PREPAREDNESS

Fire ignition models, Citizen engagement mobile application, Augmented reality training for firefighters

PHASE B

DETECTION AND RESPONSE

Coordination between on-site devices (cameras, sensors), drones and ground robots to detect fire, Deployment of water cannons

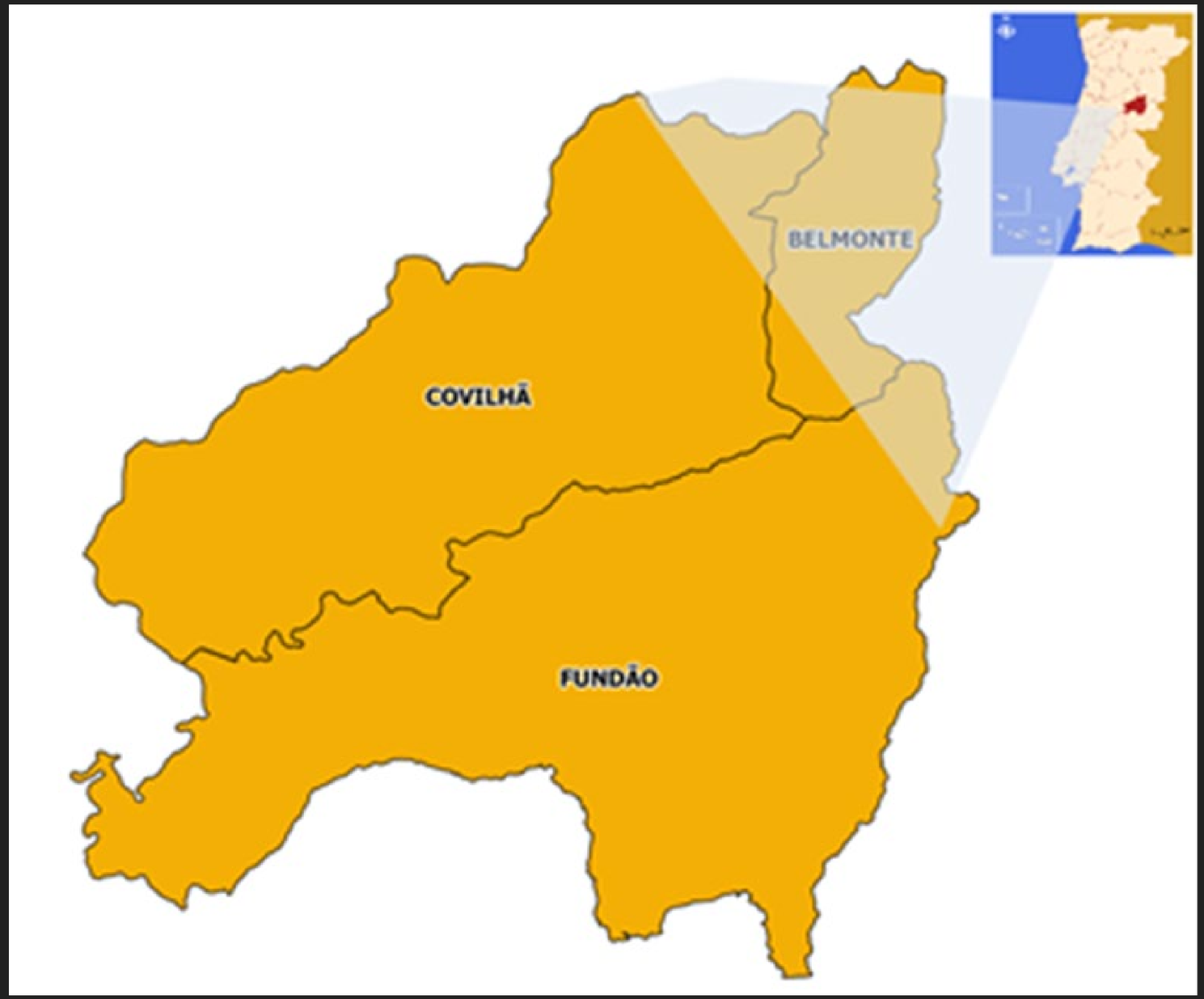
PHASE C

FOREST RESTORATION POLICIES

Forest growth models, Soil rehabilitation strategy, Policy recommendation

The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 101037247

Follow us on:
Silvanus-Project.eu



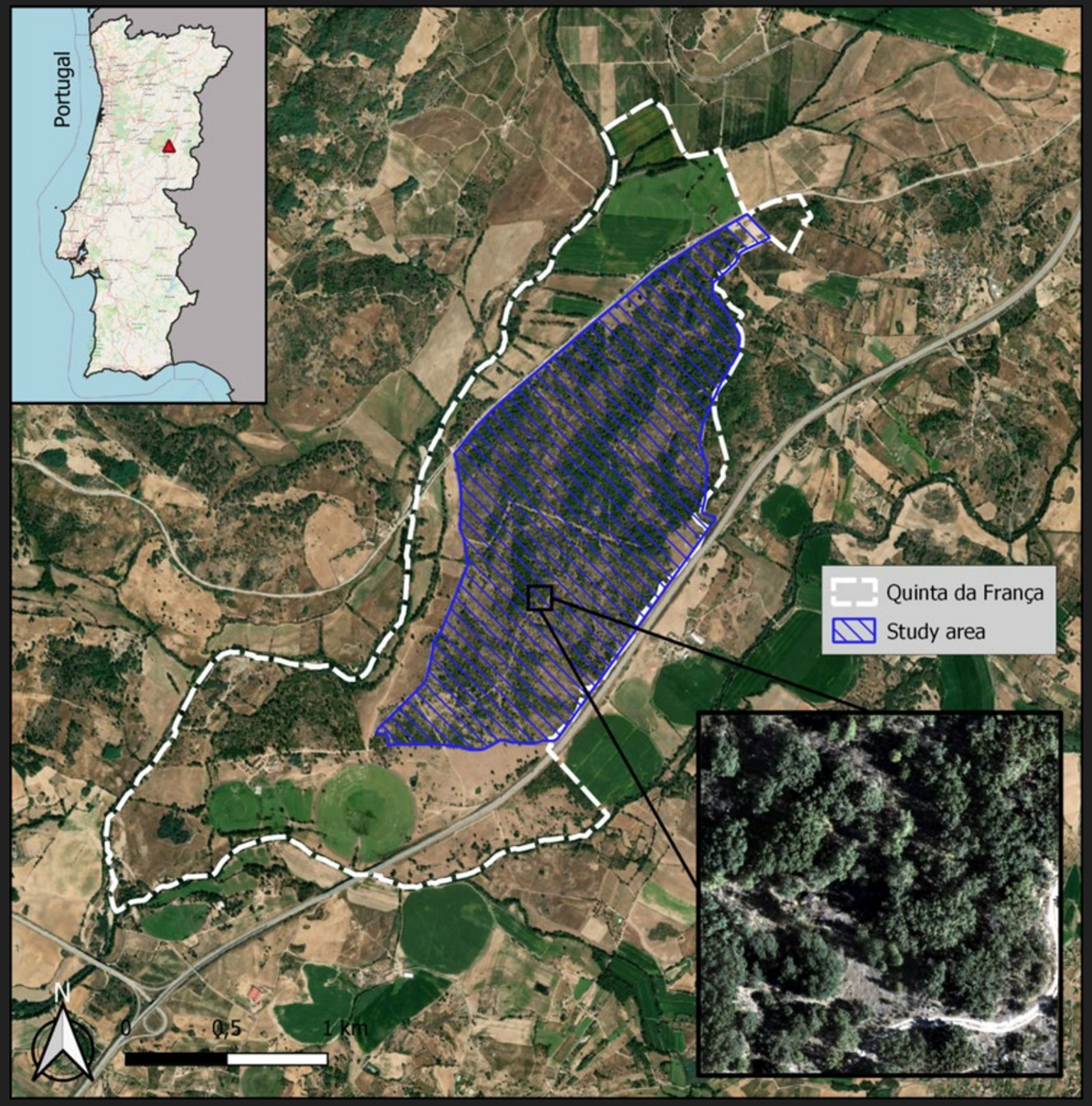
The Silvanus Pilot in Cova da Beira, Portugal

- Location: Interior east part of Portugal, comprising Belmonte, Covilhã, Fundão, and parts of Castelo Branco.

- Characteristics: Agriculture and forestry traditions, warm climate (hot-summer Mediterranean), two altitudinal zones with a flat valley surrounded by mountain ranges.

- Landscape: Mosaic of agricultural land, including pastures, cropland, orchards, and forest patches.

The shrub cover is critical in fire-prone ecosystems, as shrub encroachment contributes significantly to fuel load and influences fire behavior.



The study area within Quinta da França farm (white dashed line), Portugal (top left). The solid blue line outlines the study area in detail. A zoomed-in view in the bottom right corner highlights the land cover within the study area, captured by drone imagery (E.K.Cherif et al., 2024)

Our Study area for Experiments and Investigation

Methodology

Satellite images

Drone images

Shrub cover percentage category per pixel

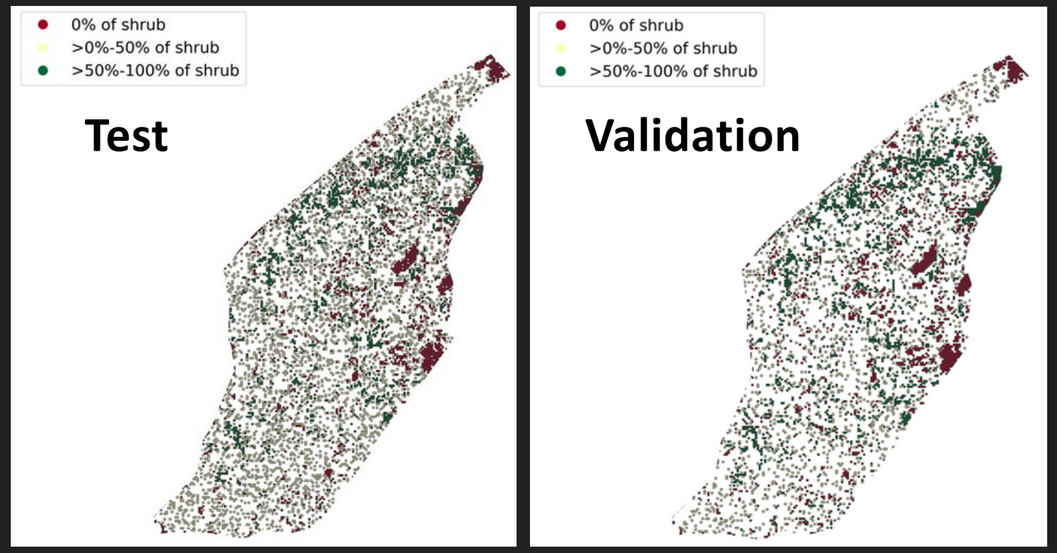
Development of remote smart solution

Validation

Mapping and Predictive Shrub Coverage

(E.K.Cherif et al.,2024)

Results



Shrub Maps

(E.K.Cherif et al.,2024)

Fire Risk
Help decision makers

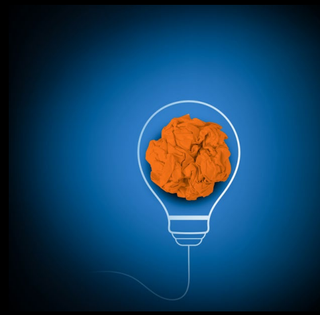
Optimize the socioeconomic costs and time required for management and monitoring

Conclusion and Future

- Our study developed a useful tool for predicting shrub cover, which can aid decision-makers in fire risk management.

- Future research could focus on improving how our models identify shrubs in high-resolution images and explore advanced software for mapping shrub cover.

- We can enhance this study by combining shrub cover mapping with other factors like weather, terrain, and past fires. This will help create better methods for assessing fire risk.



Open Access Article

Predicting Fractional Shrub Cover in Heterogeneous Mediterranean Landscapes Using Machine Learning and Sentinel-2 Imagery

by El Khalil Cherif [1,*], Ricardo Lucas [2], Taha Ait Tchakoucht [3], Ivo Gama [4], Inês Ribeiro [1], Tiago Domingos [1,4] and Vânia Proença [1]

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Forests **2024**, *15*(10), 1739; https://doi.org/10.3390/f15101739 (registering DOI)

Submission received: 24 July 2024 / Revised: 26 September 2024 / Accepted: 27 September 2024 / Published: 1 October 2024

(This article belongs to the Section **Forest Inventory, Modeling and Remote Sensing**)

Communicating to the scientific and public communities

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Thank you for you attention

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