Assessing Fire Risk from Land Abandonment in Evora, Portugal

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OVERVIEW

Portugal: highest incidence of fire ignitions in Europe

Potential catalyst for more effective fire management plans

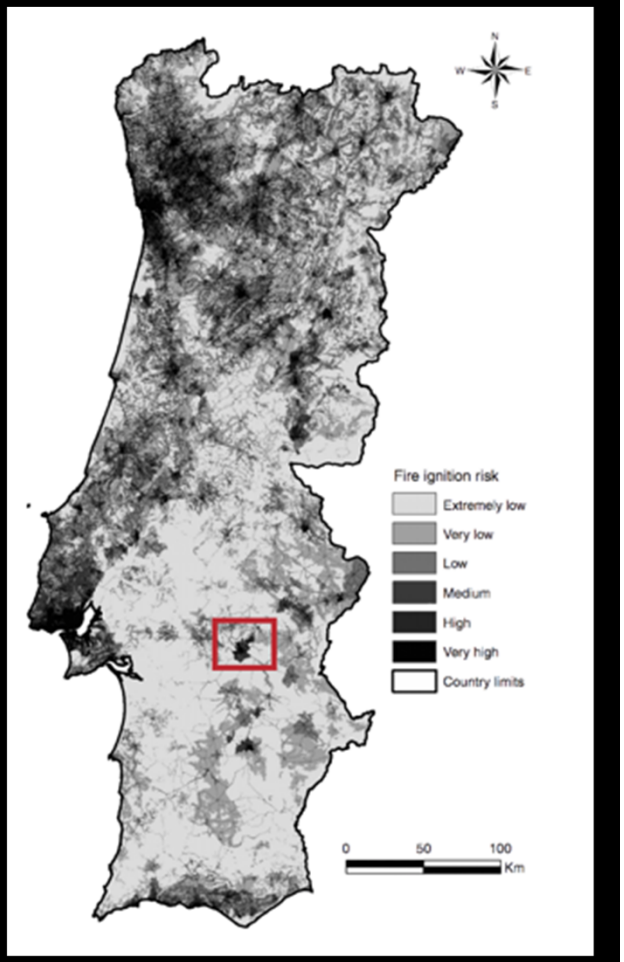
Social desertification → decrease in farmers, increase in unmanaged land

Abandoned areas experiencing shift from grassland to shrubland

AIM: ASSESS FIRE RISK OF DIFFERENT TWO LAND COVER TYPE SCENARIOS, SHRUBLAND VS. GRASSLAND

STUDY SITE

Evora has been identified by previous fire risk maps as a very high fire ignition risk zone



Source: *(Catry and Rego 2009)*

STUDY SITE

- 1.5 square mile study area
- Wildland Urban Interface:
  - high density housing
  - open grasslands
  - orchards & farmland

METHODS

Collected 90 GPS ground control points

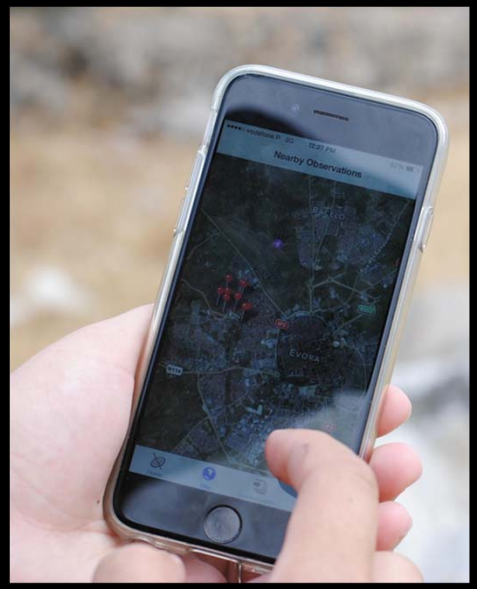
Collected additional ground points, georeferenced photos and fuel details with FireSphere mobile application

FlamMap used to analyze fire behavior between two scenarios:

(1) existing conditions (shrubland encroachment)

(2) maintained grassland

METHODS



DATA COLLECTION

Figure 7. A grove of managed cork trees sits on private property behind a wall.

Figure 8. A managed olive orchard is situated on the site's northern boundary.

Figure 9. Four foot mounds with small to medium rocks shapes a nearby field.

Figure 10. A vacant lot with four foot tall grass cover is situated between two houses.

Figure 11. Some grasses were recently cut.

Figure 12. Many homes had clay tile roofs.

Figure 13. Most grasses were between 1-4 feet tall.

Figure 14. Many streets were lined with trees.

Figure 15. Animals graze this small orchard nestled inbetween a housing complex.

Figure 16. A grassy field was found in between swaths of urban housing.

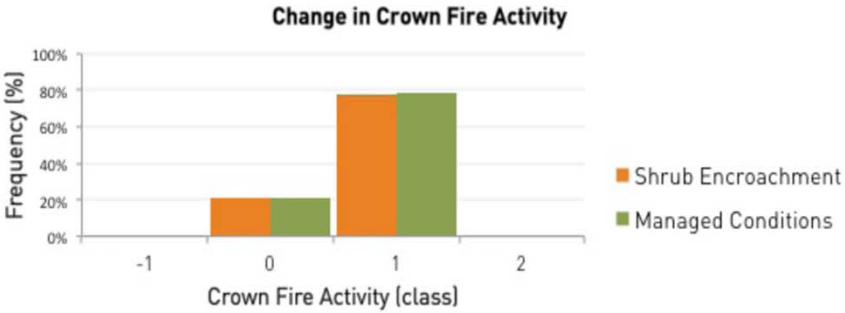
Figure 17. An irrigated field sits adjacent to an urban garden.

Figure 18. Most street trees grew into one another, creating a continuous path if fire were to occur.

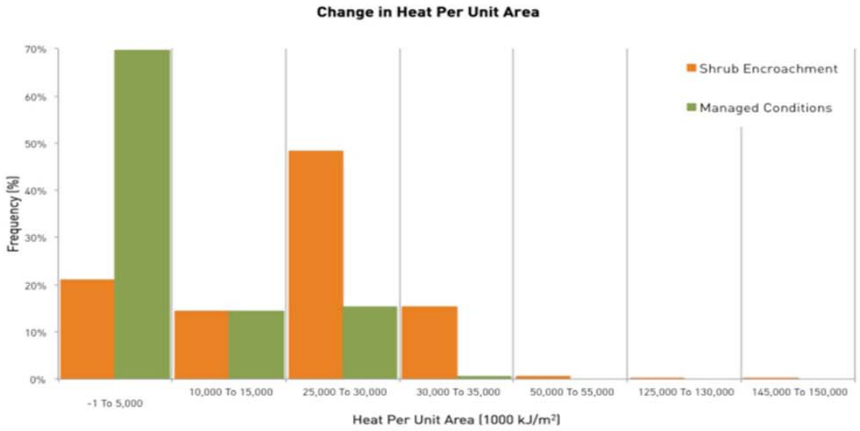
FUEL MODEL

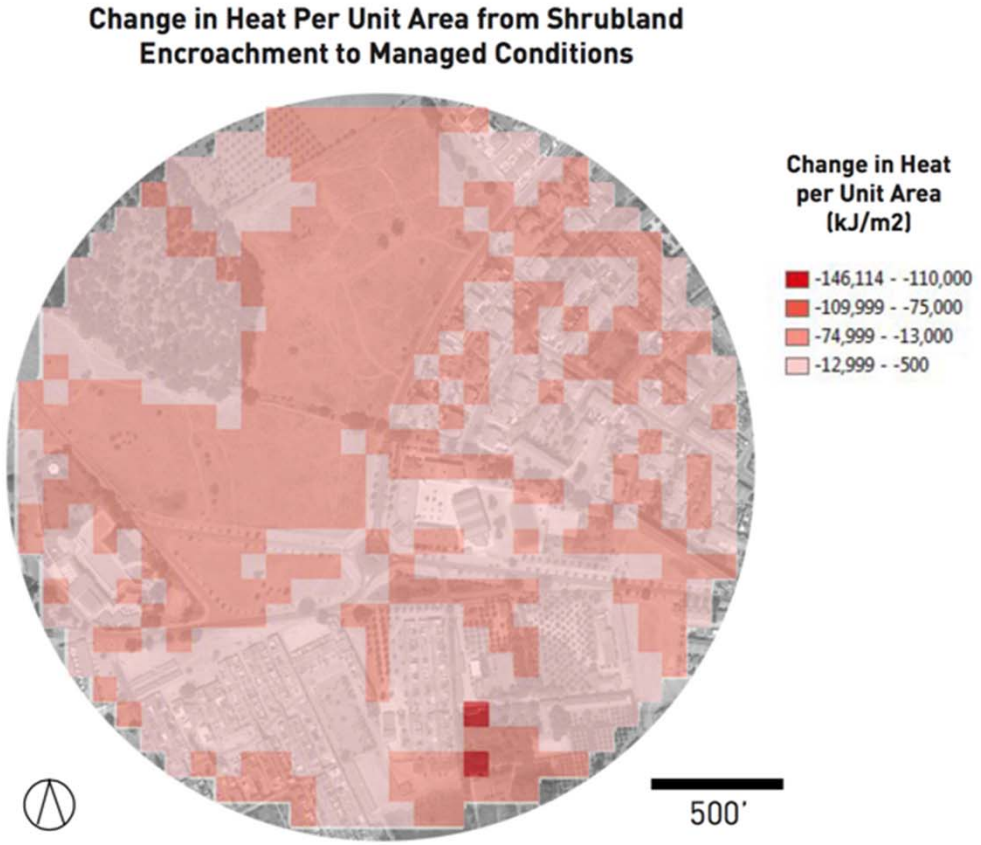
Scenario 1: Shrub Encroachment
Scenario 2: Managed Conditions
Fuel Model Inputs
grasses
shrubs
trees
houses
pools
pavement
1/4 mile

CROWN FIRE ACTIVITY

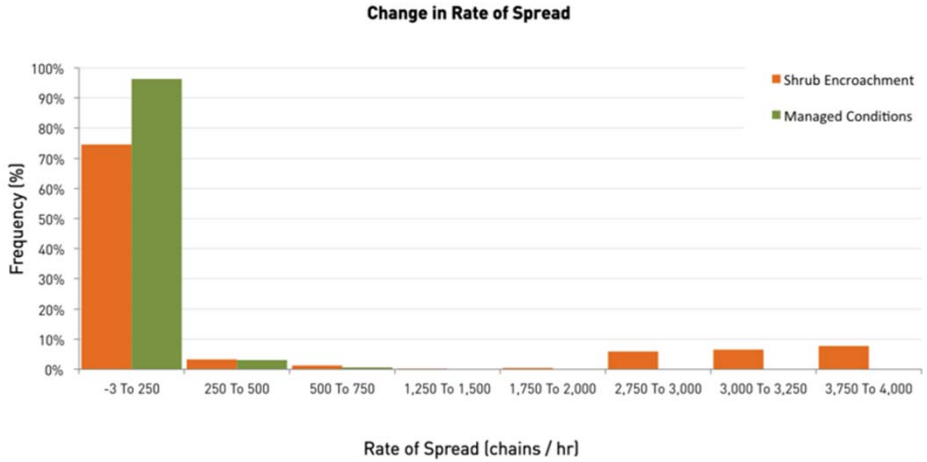


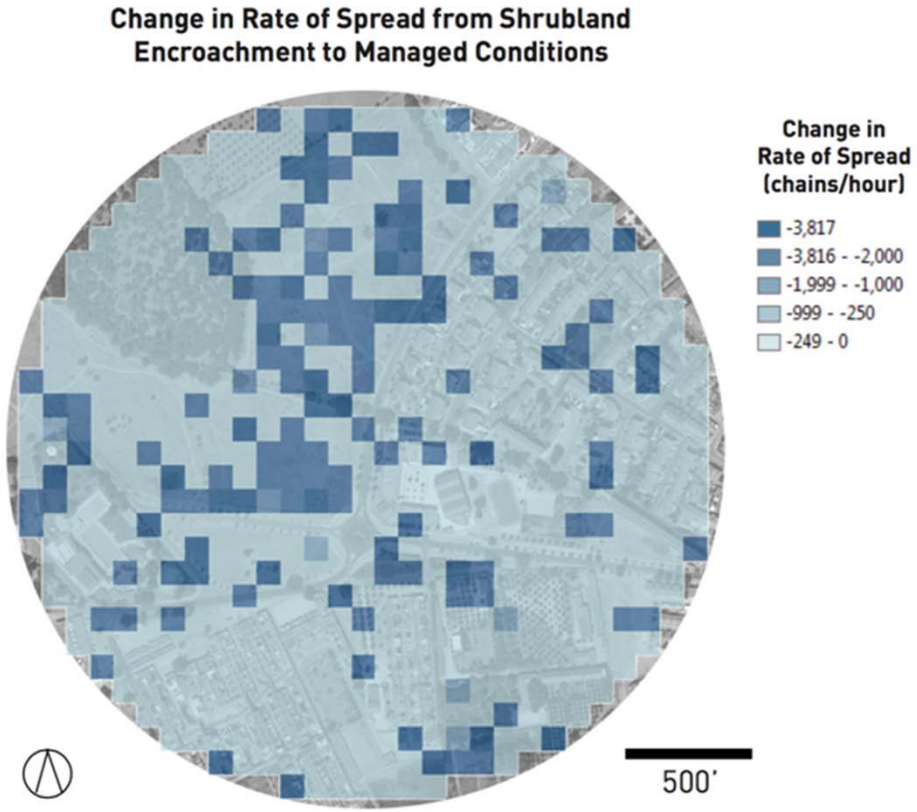
HEAT PER UNIT AREA



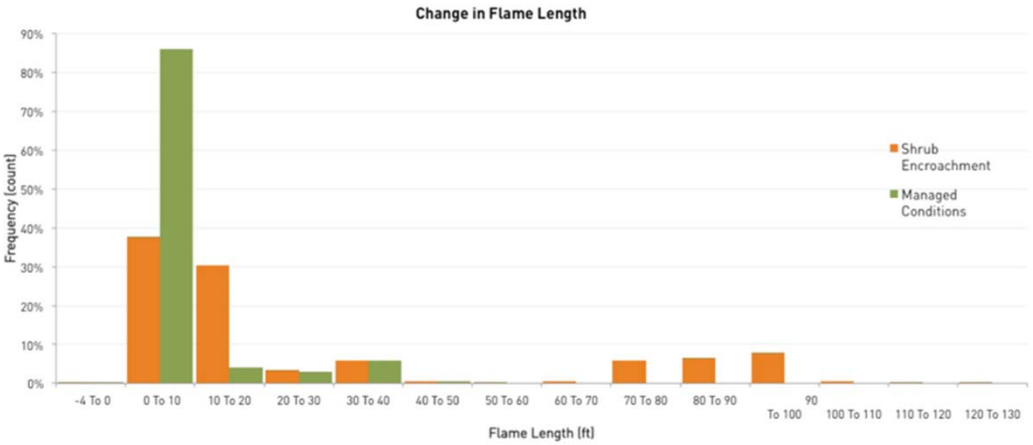


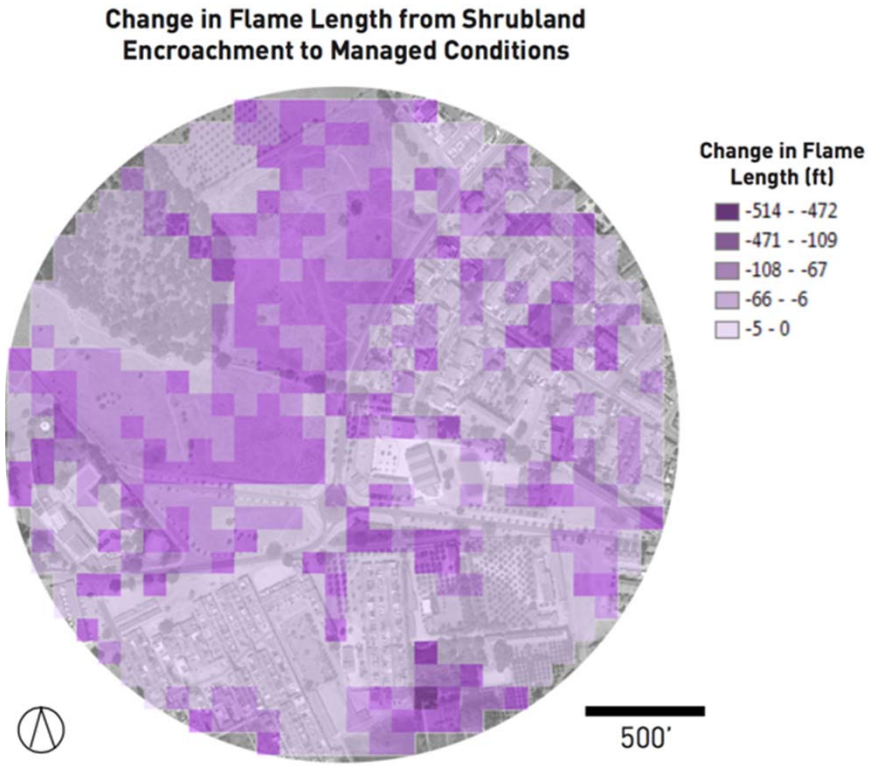
RATE OF SPREAD





FLAME LENGTH





CONCLUSIONS

- Minimizing shrub encroachment can greatly reduce flame length, rate of spread, heat per burned area, and crown fire activity
- A summary of total effects of shrub removal include
  - minimal to no effect on crown fire activity
  - significant decreases in heat per unit area from extreme rates (between 50,000 to 150,000 kJ/m2) to more manageable levels (0 - 5,000 kJ/m2)
  - overall decrease in high rates of spread at dangerous intervals (1,250 to 2,000 chains per hour) to more manageable intervals (0 to 250 chains per hour)
  - reduction from very large flame length (between 60 – 130 feet) to moderate lengths (0 to 10 feet).

FUTURE RESEARCH

- Explore ways to integrate crowdsourced fire risk assessments, modeling and participatory management to reduce overall fire hazards.
- Determine community outreach measures to educate homeowners and local residents on fire risk indicators and mitigation measures to increase awareness of potential vulnerabilities.
- Integrate local-scale methods such as goat grazing or manual management to curb potential fire risks as climate change continues to influence unprecedented and unpredictable climatic conditions in central Portugal.

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