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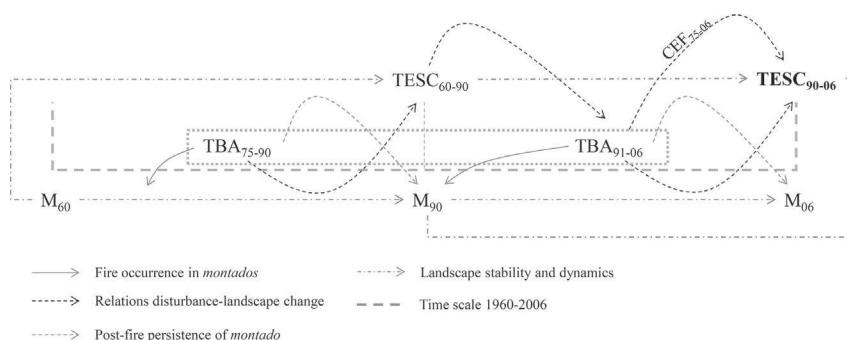
Wildfire patterns and landscape changes in Mediterranean oak woodlands

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HIGHLIGHTS

- Transitions in Mediterranean oak woodlands (*montados*) were assessed;
- Low spatial connectedness in *montado* landscape increases its vulnerability;
- Changes were mostly explained by fire characteristics and spatial factors;
- Large fires have a major role in transitions from *montado* to pioneer communities.

GRAPHICAL ABSTRACT



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ABSTRACT

Fire is infrequent in the oak woodlands of southern Portugal (*montado*) but large and severe fires affected these agro-forestry systems in 2003–2005. We hypothesised transition from forest to shrubland as a fire-driven process and investigated the links between fire incidence and *montado* change to other land cover types, particularly those related with the presence of pioneer communities (generically designed in this context as “transitions to early-successional communities”). We present a landscape-scale framework for assessing the probability of transition from *montado* to pioneer communities, considering three sets of explanatory variables: *montado* patterns in 1990 and prior changes from *montado* to early-successional communities (occurred between 1960 and 1990), fire patterns, and spatial factors. These three sets of factors captured 78.2% of the observed variability in the transitions from *montado* to pioneer vegetation. The contributions of fire patterns and spatial factors were high, respectively 60.6% and 43.4%, the influence of *montado* patterns and former changes in *montado* being lower (34.4%). The highest amount of explained variation in the occurrence of transitions from *montado* to early-successional communities was related to the pure effect of fire patterns (19.9%). Low spatial connectedness in *montado* landscape can increase vulnerability to changes, namely to pioneer vegetation, but the observed changes were mostly explained by fire characteristics and spatial factors. Among all metrics used to characterize fire patterns and extent, effective mesh size provided the best modelling results. Transitions from *montado* to pioneer communities are more likely in the presence of high values of the effective mesh size of total burned area. This

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