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GOVERNANCE PRINCIPLES: Towards an International Framework

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WILDFIRE RISK ANALYSIS IN PORTUGUESE COMMUNITY FORESTS AND THE SEARCH FOR EFFECTIVE SOLUTIONS FOR ITS REDUCTION

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INTRODUCTION

Investigations of factors influencing wildfire risks in Mediterranean forest areas have rarely considered the possible influence of the ownership type and management modalities in forest areas owned and/or managed by rural communities, referred to as **Baldios*** in Portugal.

This study aimed to analyse the relationship between forest ownership types and the management modalities of community forests in the distribution of wildfires in *Pinus pinaster* areas of Portugal over the past 40 years (1975–2017).

***Baldios -** Portuguese's forest areas owned and managed by rural communities. Most of the baldios are managed in collaboration with the State Forest Services.

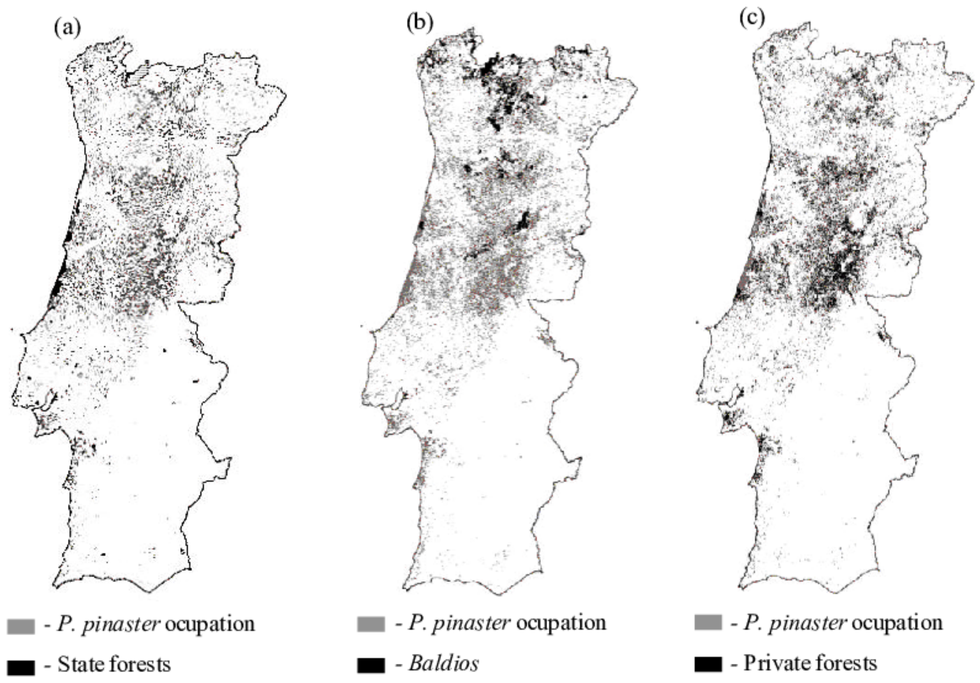
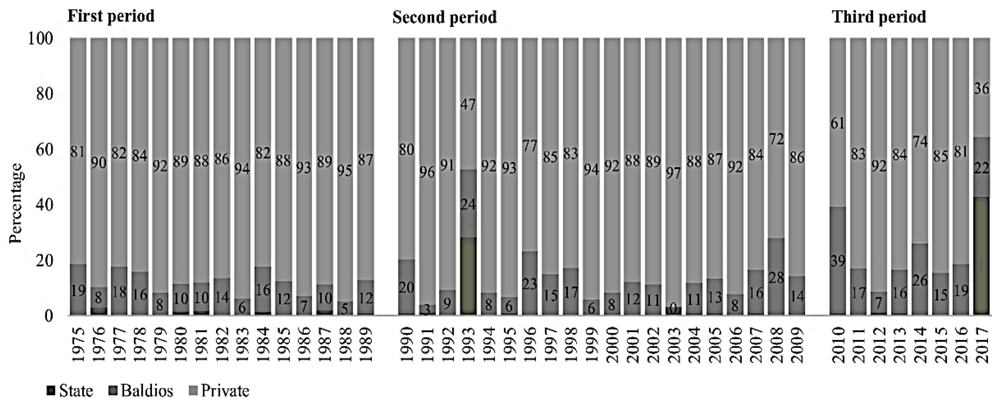


Figure 1. *P. pinaster* forests in State forests (a), baldios (b), and private (c) areas.



.Figure 2. Percentage of total burned area of *P. pinaster* by ownership type. Source: data from Forest Services ICNF, accessed in 2020.

DATA AND METHODS

Study areas:

Pure stands of *Pinus pinaster* in three main types of Portuguese forest ownership:

- State;
- Private;
- Communities.

Periods:

1st: 1975–1989;
2nd:1990–2009;
3rd: 2010–2017.

Materials:

- IFN70, COS1990 and COS2010 LULC maps (source: DTM, ESRI-PT);
- Forest Regime perimeters (source: ICNF);
- Baldios perimeters (source: 664 baldios' management plans - PUBs);
- Burned areas. Period between 1975 -2017 (source: ICNF).

Software:

- ArcGIS®10.6; R-4.2.3; Sigma Plot

Table 1. Main baldios´ management modalities, based on the type of managers and the type of management. Source: ICNF 2015.

BALDIOS´ MANAGEMENT MODALITIES		Type of management	
		Co-management with the Forest Services	Autonomous
Type of managers	Communities	Modality 1	Modality 2
	Local authorities	Modality 3	Modality 4

RESULTS

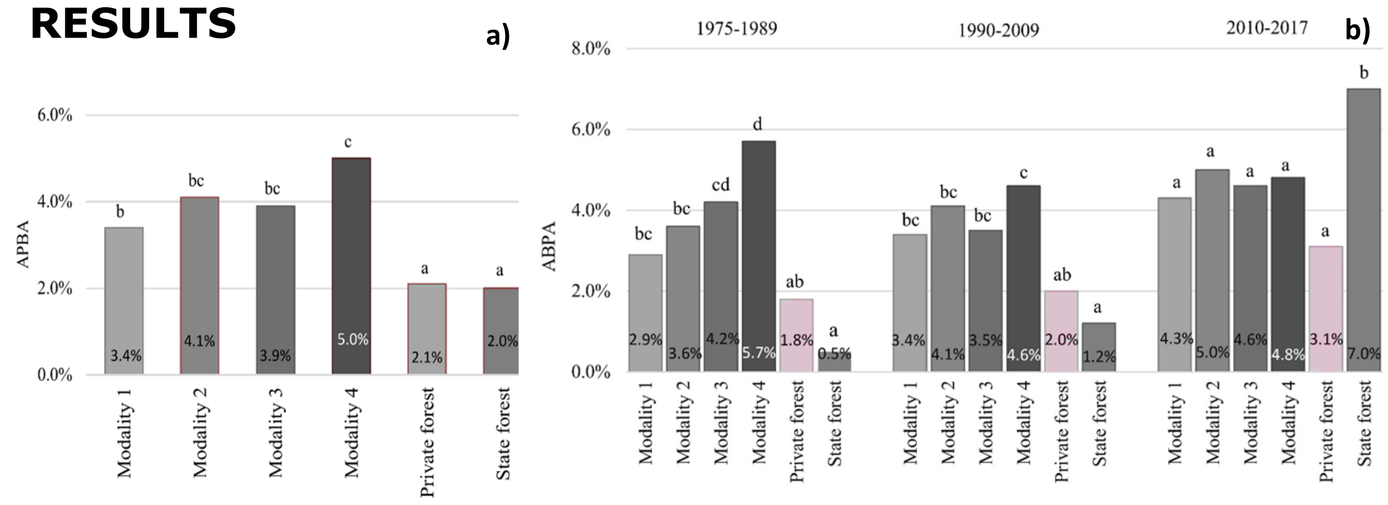


Figure 3. Average annual percentage burned area (APBA) of P. pinaster forests from 1975 to 2017 (a) and in three periods (b) in different management modalities of baldios and of private and State Portuguese forests. Values of APBA with the same letter above the bar are not significantly different ($p > 0.05$) according to Duncan's post hoc tests.

- Between 1975 and 2017 the highest percentage of pine forests burned (APBA) was observed in the various management modalities of baldios (3.4% to 5.0%), while the State and private forest areas showed significantly lower values (2.0% and 2.1%, respectively) (Figure 3a).

- During the 2nd of 3rd analyzed periods (Figure 3b), the APBA of baldios was always higher than in other types of property, except in the 3rd . The 2017 wildfires in Mata Nacional de Leiria increased the state APBA compared to other property types.

CONCLUSIONS

- Since the 1970s, amongst other factors, ownership and management type, have been influencing the spatial and temporal distribution of burned areas in *P. pinaster* Portuguese forests.

- In community property, the largest APBA was identified in autonomously managed baldios, while in state forests the APBA has increased in recent years.

- It is important to find a way to increase the participation of both Forest Services and local communities in the management of their forest areas.

- Attention and efforts are recommended in preventing the wildfire risk, as well as in the sustainable management of existing fuels in baldios and state forest areas.