



Adaptive Management for  
**Forested Lanscapes**  
in Transformation

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Adaptive Management for **Forested Landscapes** in Transformation

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conditions created conditions for widespread wildfires. Considering the increasing frequency of extreme El Niño events due to climate change, results of this research should be considered in future risk maps and in restoration strategies of tropical dry forests.

**Keywords:** *Climate anomalies, El Niño southern oscillation, fire occurrence, MODIS, multitemporal analysis.*

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## EXPLORING THE CONCEPT OF FIRE PROTECTION ECOSYSTEM SERVICE IN CHANGING FORESTED LANDSCAPES

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Landscapes and ecosystems play an important role in fire regulation and in the mitigation of potential negative effects of extreme fire events. Fire protection regulated by ecosystems and landscapes can thus be considered as an ecosystem service with significant benefits for humans' safety, health and economy. Although fire is an important ecological process in most of the planet, fire regulating and protection by ecosystems and landscapes from an ecosystem service conceptual framework perspective have been insufficiently addressed in the literature. In this research we explore the concept of Fire Protection Ecosystem Service (FPES) based on the Fire Regulation Capacity (FRC) and their application in the assessment of socioecological effects of landscape change in mountains landscapes facing rural abandonment. We analyzed responses of FRC and FPES to changes in the landscape structure based on modeling using BFOLDS-FRM for years 1990 and 2006, and three landscape scenarios for 2020 under extreme fire weather conditions. FPES supply and economic value were assessed based on proxies of FRC (burned area and fire intensity) and economic damage caused by fire. Fire events over 100 ha increased in the area since 1990, indicating a reduction in the capacity of the landscape to regulate large and extreme fires, which may decline further in future landscape scenarios. The supply in the FPES is expected to decrease in the area, particularly when fuel builds up and becomes spatially connected in the landscape. The economic value of the FPES is also expected to decrease over time, despite the differences observed among scenarios. Planning and management of mountains regions experiencing change through abandonment (aggravated by future climatic conditions) must take into account trends and patterns in fire regulation and protection to sustain and enhance the provision of ecosystem services in general and promote sustainability in Mediterranean mountain areas.

**Keywords:** *Portugal, fire behavior modeling, ecosystem services assessment, mountain landscape change.*

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