

Science for Environment Policy

Fire patterns in Spain under a changing climate

A recent study has found that fire regimes have changed in Spain over the past 42 years. The pattern of changes has affected the number of fires and burned area, reflecting a changing climate and environmental conditions, such as land use changes caused by a population shift from rural to urban areas, and modern fire suppression activities.

Understanding the fire regime, which is defined by multiple factors including the timing, frequency and extent of [wildfires](#) over time, is vital to help manage fires under a [changing climate](#). Several factors must be taken into account when predicting fire behaviour, including the weather, fuel sources and topography.

For this study, the researchers used forest fire records covering the period 1968 to 2010 to investigate changes in the frequency of fires and area burned in the northwest, interior and Mediterranean regions of Spain, which each have separate fire regimes. The study included all fires greater than one hectare that occurred between May and November (the 'vegetative' or growing season) and between December and April (the dormant season).

The researchers identified distinct changes to trends in the number of fires and area burned. These 'change points', which are clearly defined upward or downward changes, indicate that the fire regime has changed in all three regions. For example, an 'upward change point' occurred in the 1970s with increases in the number of fires and the area burned in all regions and during both seasons. In the Mediterranean region, downward changes in the fire frequency were detected during both seasons from the 1990s and also in the northwest and interior regions during the growing season.

The researchers linked the different patterns of upward and downward changes to both climate and environmental changes, as well as fire management changes, although the impact of these changes varied between the regions and seasons. Climate variability, which has contributed to an increase in the frequency of droughts and warmer temperatures, was identified as a driver of upward changes in the number of fires and area burned in all regions during the growing season.

Fire management was identified as a possible driver of downward changes in the number of fires and area burned in all regions during the growing season. In the dormant season, changes in population density and livestock grazing probably better explain the changing pattern of fire regimes.

Environmental changes are also strongly affected by human activities and the study found that population shifts were associated with changes in fire regime, confirming that in Spain human activities are a major risk for fires. For example, a downward change point in the Mediterranean during the dormant season was most likely caused by a decrease in traditional livestock grazing, because in the past farmers have used fire to clear or regenerate pasture. At the same time, an exodus from rural areas resulting in abandoned agricultural land, smaller numbers of livestock and less wood gathering, as well as reforestation, have increased the forest area and the number of fires and burned area.

Improved fire management in forests in recent years has resulted in better fire prevention, which has reduced the number of fires. Greater fire suppression has reduced the burned area in all three regions during the vegetative season. However, the researchers warn that such management techniques are less effective when dealing with the extensive fires which can occur during extreme weather conditions. Overall, this study has highlighted the importance of landscape and fuel availability in managing fire regimes in the context of global environment change.

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