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## Climatic trends, disturbances and short-term vegetation dynamics in a Mediterranean shrubland

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### Abstract

Fire and erosion are two major disturbances affecting Mediterranean ecosystems. Both of them are closely related to climate. There is evidence of decreasing precipitation in the Mediterranean, particularly during summer. There are also indications of an increased variability in the rainfall distribution. Climatic changes, though show high heterogeneity at a local scale. Based on these observations, we have evaluated the following hypotheses for the Region of Valencia (East Spain). (1) During the past three decades, climatic conditions have become more favourable for wildfires and high erosivity rainfall events. We have used 30-year climate records from 97 meteorological stations to examine this. Results indicate that in general the hypothesis is true, although trends are spatially dependent. (2) The effect of high intensity rain on burned land may substantially affect short-term ecosystem composition and function, and thus successional trajectories. Based on a plot scale study, we have assessed nutrient and vegetation dynamics after burning a pyrophytic community dominated by gorse (*Ulex parviflorus*). Erosion following high intensity rainfall affects physicochemical soil properties. As a consequence, plant cover is reduced and specific composition affected, changing the previous relationship between obligate seeder and resprouter species. © 2001 Elsevier Science B.V. All rights reserved.

**Keywords:** Rainfall; Trends analysis; Fire; Functional groups; Short-term responses; Vegetation dynamics; Seeder and resprouter species

### 1. Introduction

In Mediterranean areas, wildfires constitute one of the most relevant environmental problems (Moreno, 1989; Vallejo, 1997). They are frequently considered a major cause of soil degradation and desertification (Rubio, 1987). Wildfires eliminate plant cover and leave the soil unprotected against the impact of raindrops (Elwell and Stocking, 1976). The Region of Valencia is characterised by low and uneven rainfall

inputs. In fact, the western Mediterranean has the world's highest density of cyclogenesis (Petterssen, 1956), and annual totals are determined by two or three precipitation events (Martín-Vide and Wheeler, 1988; Wheeler, 1991), occurring mainly in autumn (Romero et al., 1998, 1999). Rainfall events higher than 200 mm typically occur in a few hours in zones with a mean rainfall of 350 mm per year (Olcina, 1994; Lana et al., 1995; Millán et al., 1995). In these environmental conditions of strong and frequent periods of drought associated with wildland fires, as well as large floods and serious erosion problems (López-Bermúdez, 1990; Romero et al., 1992; Rubio and SanRoque, 1990; Albadalejo, 1995), water erosion

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