



Total N exports from once vs. repeatedly burnt Pine plantations

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Post-fire nutrient losses in Mediterranean forested areas have been suggested as a key driver for ecosystem degradation. The role of fire recurrence in soil nutrient depletion, however, has been poorly studied. The EU-funded CASCADE project addresses this research gap in the study case in Portugal, having as overarching aim to assess if repeated wildfires lead to land degradation in Maritime Pine stands through a gradual process or, instead, through tipping-points in plant-water-soil relationships. Following a large wildfire in September 2012 affecting more than 3000 ha in the municipality of Viseu (central Portugal), total N losses are being monitored in three zones: 4x burnt since 1975; 1x burnt since 197, i.e. in 2012); unburnt since 1975. Within each zone, three replicate slopes were selected with similar slope angles and expositions and, at each slope, three pairs of erosion plots of approximately 0.25 m² were installed on the lower, middle and lower slope section. Additionally, a catchment outlet within the 4x burned zones was equipped with a gauging station for automatic recording of water level sensor and turbidity and for collecting stream flow samples using an automatic sampler.

Preliminary results from the first 6 months after the 2012-wildfire suggested that total N losses were, on average, twice as high at the 4x times burned slopes than at the 1x burned slopes. Nonetheless, temporal patterns in average losses during these initial six months were similar for the two zones. By contrast, the results obtained during the subsequent spring and summer seasons suggested that average total N losses from the 1x burned slopes closely approximated those from the 4x burned slopes. At the unburned slopes, total N losses were very small and limited to few rainfall events.

Interestingly, at the catchment outlet the total N values were 66% higher compared to the 4x times burned microplots, highlighting the importance of up-scaling effects in terms of nutrient losses.

Preliminary results on total N losses during the first post-fire year showed that nutrient depletion can be triggered by increasing the fire regime. The up-scaling effect suggested an increase in nutrient exportations from micro-plot to catchment scale. These results are being further investigated to establish the relationships between soil fertility losses and fire recurrence.