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The impact of wildfire on water resources in the Serra da Estrela Mountain, Central Portugal

[1]Mansilha, C., [1]Melo, A., [2]Ribeiro, J., [3]Martins, V. and [3]Espinha-Marques, J.

[1]*National Institute of Health Doutor Ricardo Jorge; LAQV/REQUIMTE, University of Porto*
[2]*University of Coimbra, Instituto Dom Luiz, Department of Earth Sciences*
[3]*Department of Geosciences, Environment and Spatial Plannings, Faculty of Sciences, University of Porto; Institute of Earth Sciences, University of Porto*

Abstract

Mountains play an important role as reservoirs of high-quality fresh water, which is fundamental for human communities as well as for ecosystems. Wildfires lead to considerable impacts on water resources, which may cause serious disruptions in the volume and quality of water resources (e.g. Espinha Marques et al., 2021).
Serra da Estrela is the highest mountain range in Mainland Portugal (1993 m a.s.l.) and comprehends two main protected areas: the Serra da Estrela Natural Park (SENP – 888 km2) and the Estrela Geopark (encompassing the SENP area and its surroundings – 2216 km2), whose natural heritage, including its geodiversity and biodiversity, has been for decades studied and valued. In 2022 Portugal was the third most affected European Union country by wildfires and, in August 2022, over 250 km2 of the Serra da Estrela territory were destroyed by a wildfire (San-Miguel-Ayanz et al., 2023) which disturbed a wide variety of mountain habitats.
With the present work, we intend to contribute to the knowledge of the post-fire exports of trace elements and organic compounds into water bodies in Serra da Estrela. The first sampling campaign took place in October 2022, after the fire and before any rain event, and included the selection of four springs (two of them potentially affected by the wildfire), and four superficial water streams (three located in the burned areas and one in an area that was not affected by the wildfire). Sampling campaigns are being performed every two months for one year, with the in situ measurement of pH, electrical conductivity, and temperature. In the field, the water samples were also properly preserved to be analysed in the laboratory: colour, turbidity, total alkalinity, bicarbonates, total organic carbon, total hardness, major inorganic ions, metals and PAH.
The results show differences in the chemical composition of water samples collected in areas affected by the wildfire, when compared to those from non-affected areas.
It is hoped that the research results will contribute to the sustainability of water resources in this mountain region during recovery from a major wildfire, in the context of climate change.

Keywords: mountain area; wildfire; springs; streams; trace elements; PAH

References

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