EGU21-4929, updated on 18 Jan 2022
https://doi.org/10.5194/egusphere-egu21-4929
EGU General Assembly 2021

Post-fire mobilization of metals in a recently burnt area in North-Central Portugal: a contamination risk for waterbodies?

Dalila Serpa[1], Ana Machado[1], Martha Santos[1], Isabel Campos[1], Fátima Jesus[1], Bruna Oliveira[1], Behrouz Gholamahmadi[1], Martinho Martins[1], Oscar González-Pelayo[1], Jan Jacob Keizer[1], Nelson Abrantes[1], and Life-Reforest Consortium[2]

[1]Centre for Environmental and Marine Studies, Department of Environment and Planning, University of Aveiro, Aveiro, Portugal (dalila.serpa@ua.pt)

[2]CETIM Technological Centre, A Coruña, Spain (jfierro@cetim.es)

Wildfires constitute a diffuse source of contamination to aquatic ecosystems. In burnt hillslopes, ash and sediments transported by overland flow are a source of potentially hazardous substances, like metals, posing a risk for downstream water bodies. In the present study, post-fire metal mobilization by overland flow was evaluated in 16 m^2 bounded plots at a eucalypt stand in Albergaria-a-Velha (Aveiro district, North-Central Portugal) that burnt with moderate severity in September 2019. Overland flow samples were collected on a weekly to bi-weekly basis, depending on the occurrence of rain, during the first 6 months after fire. Aside from overland flow samples collected at slope scale, water and sediment samples were also collected in a fire-affected stream within the Albergaria burned catchment, to assess the contamination risk posed by the fire. Samples were collected at three sites along the stream: one upstream, one within and another downstream from the burnt area, after major rainfall events. The metals analysed in this study included, vanadium (V), chromium (Cr), manganese (Mn), iron (Fe), cobalt (Co), nickel (Ni), copper (Cu), zinc (Zn), arsenic (As), cadmium (Cd) and lead (Pb). Results showed that most metals exhibited a peak in exports immediately after the first significant post-fire rainfall event likely due to the wash-off of the ash layer and high sediment losses, but for some elements like Zn and Cu, exports were more or less constant over time. The fire seems to have had a low impact on the water quality of the affected stream, since metal concentrations were similar between the three study sites. The quality of stream sediments, on the other hand, was clearly affected by the fire, especially after the rainy season. As fire severity and frequency is forecasted to increase in the near future due to climate changes, the results of this work reinforce the importance of water managers to define adaptative strategies to effectively protect freshwater bodies.