

EGU22-4224

<https://doi.org/10.5194/egusphere-egu22-4224>

EGU General Assembly 2022

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Evaluating and Interpreting Post-fire Water Quality Changes in Portuguese Reservoirs

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Wildfires can have adverse impacts on adjacent aquatic ecosystems, the hydrological cycle and ultimately water management. Recent global events have cemented the need to study these impacts in fire-prone Regions. Surface waters experience contamination by ash loads and fire-induced erosion, where contaminants, both organic and inorganic are introduced into surface water bodies after precipitation events. These contaminants can be detected directly or indirectly through monitoring basic water quality parameters as proxies.

This study is exploring the impacts of wildfires on the water quality of Portuguese water reservoirs, by analyzing and interpreting changes in water quality that occurred over the past 30 years (1990-2020). Yearly burned areas were calculated for the watersheds of selected reservoirs to identify major fire events. Time series of water quality parameters (BOD, COD, DO, NO₃, TP, Conductivity, TSS and pH) from around 75 different reservoirs in Portugal were then explored via changepoint analysis to detect post-fire responses in each watershed. Further, possible causes or drivers for water quality impacts, such as the burned area, land-use, aridity, watershed size to reservoir volume ratio and fire severity will be explored and weighed through logistic regression techniques.

The burned area of the examined watersheds ranged from <1% per year to around 85% per year. Preliminary results suggest high thresholds in fire size to detect clear impacts in the measured parameters. With fire season becoming more extreme in Mediterranean regions, larger impacts on reservoirs can be expected in the future.

Acknowledgement: This work was produced in the framework of project FRISCO - managing Fire-induced RISks of water quality Contamination (PCIF/MPG/0044/2018), and funding attributed to the CE3C research center (UIDB/00329/2020).

