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FRISCO: Assessing and managing post-fire risk of water quality contamination

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Abstract

Fires can change vegetation cover and soil properties, often enhancing surface runoff and sediment transport processes. The ash produced by these fires can also be mobilized and contaminate downstream water bodies with fine sediments, heavy metals, nutrients, and organic carbons. Moreover, mobilized ashes can deposit in streams and reservoir beds and be resuspended for years after the fire, prolonging the disruption of urban supplies in time. Forest and water managers can take some steps to manage these risks, including preventive forest management planning and contingency planning for emergency interventions in the burnt areas themselves and at the treatment plants. However, the variables to quantify these risks are generally poorly quantified in most fire-prone watersheds. Fire regimes might be known, but the relationships between fire characteristics and impacts on water quality are difficult to assess without good datasets, and the costs and benefits of different mitigation approaches are usually not well understood. To further complicate matters, the fire impacts on hydrology and sediment processes tend to vary significantly across climatic regions, making it difficult to transfer knowledge. This presentation will provide an overview of the issues surrounding the assessment of the post-fire risk of water quality contamination. It will also provide an example on how this is being done in Portugal, through project FRISCO: Managing Fire-Induced Risks of Water Quality Contamination (FCT, ref. PCIF/MPG/0044/2018). The project, now in its fourth and final year, has (i) determined the most important fire and post-fire conditions leading to fire-induced water contamination events, through a detailed analysis of a 20-year water quality dataset for over a hundred water supply reservoirs, linked with a concurrent atlas of fire severity; (ii) developed, together with water managers, a risk assessment index that can be used after a fire to inform managers on the need for further action; and (iii) is assessing multiple post-fire intervention options, from the biophysical and socioeconomic perspectives, to help inform managers on which actions they can take to address the issue. This project provides a blueprint for

how these issues might be addressed by water managers in other fire-prone watersheds.

Keywords: water contamination, post-fire risk, sediment connectivity, water management

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