

EGU25-20461, updated on 26 Dec 2025

<https://doi.org/10.5194/egusphere-egu25-20461>

EGU General Assembly 2025

© Author(s) 2025. This work is distributed under the Creative Commons Attribution 4.0 License.



Enhancing Wildfire Resilience: A Comprehensive Approach for the Wildland-Urban Interface and Infrastructure

Stavros Sakellariou^{1,2}, Stergios Mitoulis^{2,3}, Mike Flannigan⁴, Simon Taylor⁵, Stergios Tampekis⁶, and Sotirios Argyroudis^{1,2}

¹Department of Civil and Environmental Engineering, Brunel University of London, College of Engineering, Design and Physical Sciences, London, United Kingdom

²<https://metainfrastructure.org/>

³Department of Civil Engineering, School of Engineering, University of Birmingham, Birmingham, United Kingdom

⁴Natural Resource Science, Thompson Rivers University, Kamloops, BC, Canada

⁵Department of Computer Science, Brunel University London, London, United Kingdom

⁶Department of Forestry and Natural Environment Management, Agricultural University of Athens, Karpenisi, Greece

As wildfires increase both in frequency and intensity due to climate change, there is a pressing need to address the complex interactions between urban expansion and natural ecosystems. The paper explores the development of a novel framework aimed at enhancing resilience against wildfires, particularly focusing on the Wildland-Urban Interface (WUI) and associated infrastructures. The approach proposes an integration of forest, spatial, and physical resilience strategies, leveraging advanced simulation modeling and real-time data to optimize wildfire preparedness and response. While traditional wildfire management has often treated these elements in isolation, the proposed framework emphasizes a holistic strategy that encompasses not just the immediate but also the extended socio-ecological impacts of wildfires. By utilizing cutting-edge technologies including geospatial analysis and artificial intelligence, the framework aims to enhance predictive capabilities and streamline evacuation processes, thus safeguarding both human and environmental health. The implementation of this integrated system is designed to support the infrastructure's inherent resilience features, promoting sustainable urban planning and development. This contribution to wildfire resilience research underscores the critical need for comprehensive planning and collaborative efforts across disciplines, aiming to create a robust buffer against the evolving threat of wildfires in susceptible regions.