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Analysis of Influencing Factors to Enhance Resilience of Urban Social-Ecological Systems in Urban Wildfire Response

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The risk of wildfires is increasing due to rising temperatures and worsening dry conditions resulting from climate change (Westerling et al., 2008; Vilà-Vilardell et al., 2020). Human activities, driven by urbanization and population growth, contribute to the occurrence of wildfires. As wildfires are a consequence of the complex interplay of various factors, an integrated understanding of the social and ecological systems influencing wildfires is crucial for protecting human communities and preserving the natural environment. Particularly, the Wildland-Urban Interface (WUI), an area where urban and natural landscapes and vegetation coexist or are adjacent, represents a space where the interaction between human activities and natural systems is pronounced (Stewart et al., 2007). A specific and clear analysis and management of the WUI's social-ecological system is necessary due to the severe damage caused by urban wildfires.

There is a growing awareness of the necessity to establish effective prevention and management strategies to protect urban systems. However, there is a lack of research on social-ecological systems over time, such as before and after wildfires in the WUI. Therefore, the objective of this study is to conduct a comprehensive analysis of the socio-ecological system of urban WUI areas, with a focus on identifying and evaluating the factors influencing the resilience of these systems. By examining the interactions within the WUI's socio-ecological framework, the research aims to propose strategies for enhancing the capacity of urban areas to adapt to and recover from environmental disturbances, thereby contributing to the development of robust and resilient urban social-ecological systems.

To define and categorize socio-ecological systems, a spatial analysis of wildfire-prone areas was employed and to identify and evaluate the factors affecting the resilience of the system in response to wildfires, system analysis tools and models were utilized.

Building upon this study, future research will employ the Urban Resilience Index classification to derive strategies for each type of green infrastructure planning based on the 4Rs of resilience (robustness, rapidity, redundancy, and resourcefulness) to improve urban socio-ecological resilience for wildfire response in urban Wildland-Urban Interface (WUI). The results can be utilized to develop a green infrastructure planning decision support system.

References

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