Assessing fire risk of wildland-urban communities across multiple scales

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To effectively reduce fire hazards, homeowners, planners, and fire fighters must conduct risk assessments across multiple scales ranging from a single residential lot to an entire landscape. At the residential lot level, extensive work has been done, and homeowners have a variety of tools to assess risk. Nevertheless, additional plant flammability analyses are needed to improve selection of ornamental plants according to fire risk. Although aerial photography provides a homeowner with the physical and structural context of his/her home with respect to its surroundings, models similar to EcoSmart, a web-based model, which helps Pacific Southwest homeowners evaluate how firewise their current and future landscape designs are, still need to be developed for other regions. At the community level, homeowners, planners and firefighters can view homes in terms of the spatial context of the community. Spatial analyses at the community level provide detailed information on spatial patterns of fire breaks, treated and untreated areas, structural density, proximity of wildland fuel types and loads, and accessibility for fire fighting equipment. Although aerial photography provides sufficient information to meet these informational needs, we currently do not have models that project how a fire spreads through a wildland-urban interface community. The Fire Dynamics Simulator, a 3D structural fire model, provides a foundation to examine structural fires, but is only just beginning to include vegetation and topography attributes. Alternately, BehavePlus and other 2D “operational” fire models do not account for structural density in predicting fire spread and behavior. At the landscape level, both aerial photography and satellite images provide planners and firefighters with spatial information on the juxtaposition of communities, fuel types and loads, fire fighting capacity, cross-jurisdictional units, pest outbreaks, drought conditions, and how rapidly the landscape is developing. Although landscape fire models exist, e.g., FLAMMAP, they generally do not account for urban development. Nevertheless, existing GIS software does provide the capabilities to map conditions. By integrating across multiple scales, homeowners, planners and firefighters can reduce fire risk; however, appropriate tools across all scales still need to be developed to improve planning.