

Complex interactions between people and natural disturbance: Lessons learned and questions raised from a case study of beetle outbreak, wildfire, and property values in south-central Alaska.

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People in the western United States increasingly live in the wildland-urban interface (WUI), or semi-rural areas where homes are interspersed in natural vegetation. Development often occurs in forests where natural disturbances, such as bark beetle outbreak and wildfire, are important ecosystem processes that shape the forest. At the intersection of society and ecosystems, the WUI can be a site of conflict between the needs of people and ecosystems. For example, residential expansion, in parallel with climate-driven increases in fire frequency and severity, has led to rapidly expanding wildfire suppression and protection costs. Federal expenditures average more than three billion dollars per year. Society needs to develop innovative and flexible strategies to ensure human wellbeing while preserving the ecologically critical role of disturbance. Fostering flexibility will likely require designing strategies based on an improved understanding of how people perceive and respond to disturbance.

In the 1990s, a bark beetle outbreak (*Dendroctonus rufipennis*) affected over one million ha of forest in south-central Alaska and the Kenai Peninsula. Subsequently, residential expansion has occurred in many post-outbreak stands. Residents are rightly concerned with post-outbreak fire risk; studies on the Kenai Peninsula show that the beetle outbreak has been associated with increased wildfire probability. To provide insights into how people respond to disturbances, we asked *how does the occurrence of bark beetle outbreak and wildfire influence people living in the WUI of the Kenai Peninsula?* Applying a hedonic model that uses property values as a metric of human response, we related changes in assessed WUI property values with the occurrence of and time since natural disturbance. We hypothesized that disturbances occurring within one km would be associated with decreased property values and the negative effect would diminish with time since disturbance. We found the opposite. Wildfires and BB outbreaks were associated with increased property values and effects magnified with time. We speculate that emerging views of Cook Inlet, resulting from disturbance, outweigh the costs. The post-outbreak residential expansion is also consistent with these speculations. These results highlight important conceptual questions: What components of natural disturbances benefit or harm people? How do tradeoffs between costs and benefits shape human response? How does human response feedback and interact with other drivers to shape ecosystem processes?