



Research Brief for Resource Managers

Release:

January 2018

Contact:

Miranda H. Mockrin
Stacey S. Frederick

Phone:

443-543-5389
510-642-4934

Email:

mhmockrin@fs.fed.us
ssfederick@berkeley.edu

California Fire Science Consortium Statewide Coordinator | 130 Mulford Hall MC #3114, Berkeley, CA 94720

Wildfire recovery: a ‘hot moment’ for adaptation?

Mockrin, Miranda H., Susan I. Stewart, Volker C. Radeloff and Roger B. Hammer. 2016. Recovery and adaptation after wildfire on the Colorado Front Range (2010-2012). *International Journal of Wildland Fire*. 25: 1144-1155. DOI: 10.1071/WF16020

<https://www.fs.usda.gov/treearch/pubs/52897>

Despite record expenditures on wildfire management and suppression, wildfire damages and losses are growing, including the loss of homes and infrastructure. The natural hazards and policy literatures suggest destructive wildfire events may serve as a motivation for communities to pursue adaptation. However, in comparison to other natural hazards, wildfire recovery has not been well-studied. The authors conducted a research program with two goals: 1. Document rebuilding and new development after wildfire, nationally and 2. Examine the policy choices and adaptation measures local governments and communities pursued after fire, through case studies.

Rebuilding and development after wildfire

Using aerial imagery, Alexandre et al (2015) documented buildings present before and after wildfires, for all fires that occurred in the coterminous U.S., from 2000-2013 (n=3,087). Of these fires, 466 lost at least one building (17,079 buildings total). Many of these losses occurred in California (10,177 buildings in 86 fires). After



Figure 1. Example of a building rebuilt after a fire in 2003 in Colorado. From left to right: 2000, 2003, 2005.

Management Implications

- Rebuilding is not quickly or readily accomplished after most wildfires
- However, rebuilding and new construction can, in some cases, lead to increased development after wildfire events
- Local communities typically invest in enhanced suppression, emergency response, and education after wildfire.
- Encouraging the use of fire-adapted principles during rebuilding and new development can reduce future fire risk
- Changes to land use planning and regulations rarely occur after destructive wildfire.

wildfires, a total of 23% of the buildings lost nationally were rebuilt in up to 5 years (on average 2.25 years). Rates were highly variable between fires, however: Only 120 of the 466 fires had any rebuilding, ranging from less than 1% to 100% of buildings lost to wildfire rebuilt. Many of the buildings that were rebuilt were in California (3,556 rebuilt in CA, 507 elsewhere in the U.S.).

Construction of new buildings within perimeters after wildfire events also continued. Many of these new buildings were constructed in CA (2,155 in CA vs. 4,399 elsewhere in the US). For a total of 71 of 466 fires nationally where buildings were lost, the combination of new construction and rebuilding resulted in more buildings than before the fire. While rebuilding is therefore not quickly or readily accomplished after most wildfires, a combination of rebuilding and new construction

can, in some cases, lead to an *increased* development after wildfire events.

Case study research in Colorado further revealed that rebuilding after wildfire is often slow and challenging, as homeowners grapple with emotional and financial losses, displacement, insurance claim processes, and the logistical and financial challenges of rebuilding. Local government guidance and assistance may be required for years. In Colorado, rebuilding coordinators and information centers were used for one to two years after wildfire events (fires on Front Range from 2010-2012) (Mockrin et al., 2015, 2016).

In Colorado, rebuilding was faster in denser, suburban settings where homes were primary residences and homeowners were well-insured. Rebuilding was slower in more remote settings—in some cases these were secondary homes, rebuilding was more logistically challenging, and people were under/uninsured. The different logistical challenges and speed of rebuilding in different settings have implications for the timing and need for assistance.

Community-level change after fire

Local government and community actions also play an important role promoting adaptation after wildfire. Case study research from across the U.S. (n=8) revealed that communities typically do pursue changes to reduce the future likelihood of destructive wildfire (Mockrin et al in review). However, these changes focused on improving suppression and emergency response and expanding voluntary efforts to mitigate homes (building materials and vegetation management around homes, through programs like Firewise). Regulations and land use planning specific to wildfire hazards were rare before fires, and were not readily implemented or revised after destructive wildfire. However, unless homeowners are required to rebuild with fire-resistant materials or create defensible space it may be challenging for them to do so voluntarily (they may lack financial resources or the ability to investigate standards).

We did see examples where wildfire recovery and changes in land use and planning were both

accommodated (Mockrin et al 2016). For example, after the Waldo Canyon Fire in 2012, Colorado Springs government coordinated a study of wildfire damages, designed code improvements, and worked with the building community and residents to ease concerns about the costs and difficulties of rebuilding with fire-resistant materials and expanding defensible space. Although rebuilding was rapid here (75% in two years), local government was able to work quickly to ensure that all homes were rebuilt to better withstand future wildfires. However, many homes were rebuilt larger, and in closer proximity to each other, which may heighten future risk.

In contrast, after the Fourmile Canyon Fire in 2010, Boulder County officials fast-tracked building permit approvals for those rebuilding homes of similar sizes only. Nearly all people rebuilding took advantage of the expedited process, so that the size and extent of development in fire-prone and environmentally sensitive mountain environment was constrained.

Conclusion

Although rebuilding rates may be variable across fire incidents, for residents and the broader community rebuilding after wildfire is broadly described as challenging. Communities do pursue policy changes after fire, but often focus on enhancing suppression and education. Considered changes in land use and planning can also contribute to adaptation alongside rebuilding.

Further Reading

Mockrin, Miranda H., Susan I. Stewart, Patricia Alexandre, Volker C. Radeloff, and Roger B. Hammer. 2015. *Adapting after wildfire: recovery from home loss. Society and Natural Resources* 28: 839-856. <https://www.fs.usda.gov/treearch/pubs/49020>

Alexandre, P. M., M. H. Mockrin, S. I. Stewart, R. B. Hammer, and V. C. Radeloff. 2015. Rebuilding and new housing development after wildfire. *International Journal of Wildland Fire* 24: 138-149 <https://www.fs.usda.gov/treearch/pubs/47735>

Mockrin, M. H., H. K. Fishler, and S. I. Stewart. In review. *Does wildfire open a policy window? Local government and community adaptation after fire. Environmental Management.*